

A STUDY ON EFFECTIVENESS OF INVENTORY MANAGEMENT SYSTEM AT BIRLA CARBON INDIA PRIVATE LIMITED

Submitted in partial fulfillment of the requirements for the award of Degree in

MASTER OF BUSINESS ADMINISTRATION

by

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SCHOOL OF MANAGEMENT STUDIES

SATHYABAMA

INSTITUTE OF SCIENCE AND Technology

(DEEMED TO BE UNIVERSITY)

Accredited with Grade "A" by NAAC | 12B Status by UGC | Approved by AICTE

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **ANTONY FRAZER I 41410027** who carried out the project entitled "**A STUDY ON EFFECTIVENESS OF INVENTORY MANAGEMENT SYSTEM AT BIRLA CARBON INDIA PRIVATE LIMITED**" under my supervision from January 2023 to March 2023.

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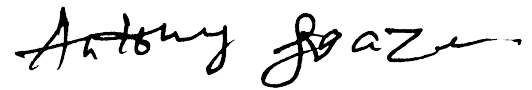
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DECLARATION

I **ANTONY FRAZER (41410027)** hereby declare that the Project Report entitled “**A STUDY ON EFFECTIVENESS OF INVENTORY MANAGEMENT SYSTEM AT BIRLA CARBON INDIA PRIVATE LIMITED**” done by me under the guidance of **DR.YAMUNA** is submitted in partial fulfillment of the requirements for the award of Master of Business Administration degree.

DATE: 05/05/2023

PLACE: Chennai

A handwritten signature in black ink, reading 'Antony Frazer' in a cursive script.

ANTONY FRAZER I

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I ANTONY FRAZER

ABSTRACT

Inventory is one of the resources that are managed by business organizations. Inventory has created a great impact on the profitability of the manufacturing firm which resulted to the deep study of this topic. **Effectiveness of Inventory Management in a manufacturing Company.** Effective Inventory management leads to high success of any company specifically in manufacturing industries is undeniable. The primary purpose of this study was to evaluate the Effectiveness of inventory management practices and the challenges of the Manufacturing Company Birla Carbon India Private Limited. (An Aditya Birla Group). The descriptive research design with challenging approach was adopted. Primary and Secondary data sources used in this study. Primary data collected through open and closed ended questionnaires. A total of 36 questionnaires were prepared on generic and inventory management practices followed by the Company and responses were collected for the study based on the ratings given. The questionnaire was circulated to a total of 29 Employees and 27 have responded for the study. The secondary data was collected from respective department MIS reports, interactions and field observations. The study revealed that Birla Carbon is managing relatively good inventory practices and internal control procedures very effectively and the techniques taken helps in continuous flow of its activities. The trend of classifying the inventory was has yielded good results in reducing its inventory cost and its working capital. The study examined that the optimum level of inventory is effectively balanced and it is evident that the Company has adopted EOQ, ABC, JIT, and inventory turnover ratio. Beside the study the supply chain relationship of Companies was good. The study suggested the scope in further reducing its inventory cost on Non-moving items and obsolete stock. The overall performance of the Organization is satisfactory because of its prominent increase in sales and control over inventory and its cost.

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ABBREVIATIONS

EOQ	Economic order Quantity	IMS	Inventory Management System
ROL	Reorder Level	JIT	Just in Time

CHAPTER I

INTRODUCTION TO THE STUDY

In any business or organization, all functions are interlinked and connected to each other and are often overlapping. Some key aspects like supply chain management, logistics and inventory form the backbone of the business delivery function. Therefore these functions are extremely important to marketing managers as well as finance controllers.

Inventory management is a very important function that determines the health of the supply chain as well as the impacts the financial health of the balance sheet. Every organization constantly strives to maintain optimum inventory to be able to meet its requirements and avoid over or under inventory that can impact the financial figures. Inventory is always dynamic. Inventory management requires constant and careful evaluation of external and internal factors and control through planning and review. Most of the organizations have a separate department or job function called inventory planners who continuously monitor, control and review inventory and interface with production, procurement and finance departments.

Inventory management is primarily about specifying the shape and percentage of stocked goods. It is required at different locations within a facility or within many locations of a supply network to proceed the regular and planned course of production and stock of materials.

The scope of inventory management concerns the fine lines between replenishment lead time, carrying costs of inventory, asset management, inventory forecasting, inventory valuation, inventory visibility, future inventory price forecasting, physical inventory, available physical space for inventory, quality management, replenishment, returns and defective goods and demand forecasting. Balancing these competing requirements leads to optimal inventory levels, which is an on-going process as the business needs shift and react to the wider environment.

The basic goal of inventory management is to maintain optimum level balance within a manufacturing firm because the excess and inadequate inventories are not desirable.

The process of control and management of inventory is very important factor in success or failure of business. Inventories are defined as stocks of raw materials, work in progress, finished goods and supplies held by business organization to facilitate operations in the production. Inventory management includes planning, coordinating and controlling activities related to the flow on inventory.

Effective inventory management is vital part of the manufacturing organization to be more competitive and also it ensures that continuous supply of raw material to facilitate production, maintain sufficient stock of raw material for period of shortage of raw material supply, and price anticipate, maintain sufficient finished goods inventories for sales operation and demand of customers, minimize carrying costs and time and keep optimum inventory level throughout production periods. So effective inventory management is the cause for high success of any company especially in manufacturing industries.

Besides Raw materials and finished goods, organizations also hold inventories of spare parts to service the products. Defective products, defective parts and scrap also form a part of inventory as long as these items are inventoried in the books of the company and have economic value.

1.1 INDUSTRY PROFILE:

CARBON BLACK INDUSTRY

Carbon black is produced from "sour" gas-natural gas that contains more than 1½ grains of hydrogen sulfide or more than two grains of sulfur per hundred standard cubic feet. Although J. K. Wright, a Philadelphia ink maker, discovered the process of manufacturing carbon black in 1864, it was little used until improved technology in the twentieth century reduced the high cost of production. After 1915 carbon black became widely used as a reinforcing agent in the production of automobile tires.

In early 1923 the first Texas plant for manufacturing carbon black by burning residue gas from gasoline plants was constructed in Stephens County. Two other plants were erected in the same county later that year; together the three plants annually produced 2,633,013 pounds of carbon black valued at \$184,306. Carbon black production was limited to Stephens and Eastland counties until March 11, 1926, when the Railroad Commission permitted the Phillips Petroleum Company to build a plant in the Panhandle for the casing head gasoline plants in Carson and Hutchinson counties.

This plant, initially run by the Western Carbon Company, was later owned and operated by the Columbian Carbon firm. By 1926 there were seven carbon black plants in Stephens County and two in Eastland County, as well as the one in Hutchinson County; that year Texas produced 20 percent of the nation's output of carbon black. In 1928 the Cabot Carbon Company established the first of several plants near Pampa, and in 1931 a plant was erected at Big Lake. Such corporations as Coltexo, Texas-Elf Carbon, Peerless Carbon, and United Carbon continued to expand and sometimes established their own company towns in more remote areas to house employees and their families. In 1931 thirty-one plants in Texas produced 210,878,000 pounds of carbon black, or 75 percent of the nation's output.

In 1937 forty Texas plants, thirty-three of them in the Panhandle, produced 82 percent of the nation's carbon black; the Panhandle plants alone yielded 405,247,000 pounds. Plants were also operating in Winkler and Ward counties during the late 1930s and 1940s. By the close of [World War II](#) there were forty-two carbon black plants in the state, including one at Bunavista, west of Borger, built shortly after the Japanese bombing of Pearl Harbor.

Production continued to be concentrated in the Panhandle, although some carbon black plants were built along the Gulf Coast. Major locations included five plants (four furnace-type and one channel-type) at Borger, two furnace-type plants at Big Spring, and two plants (one furnace-type and one channel-type) at Seagraves. Other plants were located at Skelly town, Baytown, and Aransas Pass. Of the two methods of production, channel and furnace, the latter was becoming more popular by the 1960s.

During the 1950s, when eighty-eight billion cubic feet of gas were burned annually to produce carbon black, Texas retained its position as the nation's leading carbon black producer. In 1954 thirty Texas plants with a total daily capacity of three million pounds were located in eighteen counties and produced 65 percent of the nation's total carbon black. Rubber companies absorbed most of the total production; smaller quantities were used as pigments in ink and paint.

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Carbon black is a material produced by the incomplete combustion of heavy petroleum products such as FCC tar, coal tar, ethylene cracking tar, and a small amount from vegetable oil. Carbon black is a form of amorphous carbon that has a high surface-area-to-volume ratio, although its surface-area-to-volume ratio is low compared to that of activated carbon. It is dissimilar to soot in its much higher surface-area-to-volume

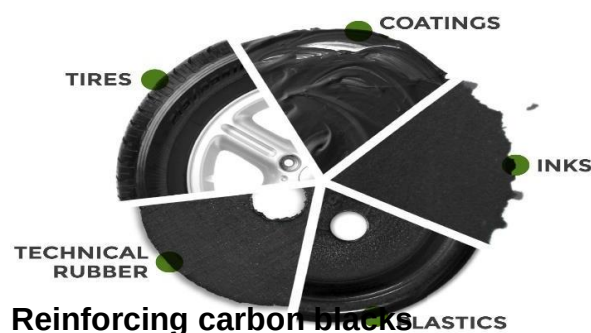
ratio and significantly less (negligible and non-bio available) PAH (polycyclic aromatic hydrocarbon) content. Carbon black is used as a pigment and reinforcement in rubber and plastic products.

Common uses

The most common use [70%] of carbon black is as a pigment and reinforcing phase in automobile tires. Carbon black also helps conduct heat away from the tread and belt area of the tire, reducing thermal damage and increasing tire life. Carbon black particles are also employed in some radar absorbent materials and in photocopier and laser printer toner.

Total production was around 8,100,000 metric tons (8,930,000 short tons) in 2006. About 20% of world production goes into belts, hoses, and other non-tire rubber goods. The balance is mainly used as a pigment in inks, coatings and plastics. For example, it is added to polypropylene because it absorbs ultraviolet radiation, which

otherwise causes the material to degrade.



Reinforcing carbon blacks

The highest volume use of carbon black is as a reinforcing filler in rubber products, especially tires. While a pure gum vulcanizate of styrene-butadiene has a tensile strength of no more than 2.5 MPa, and almost nonexistent abrasion resistance, compounding it with 50% of its weight of carbon black improves its tensile strength and wear resistance in tires to longer life.

1.2 COMPANY PROFILE

Birla Carbon (Aditya Birla Group) Gummidipoondi. Tamil Nādu.
(A leading manufacturing core business and global Carbon Black leader)



Landscapes: 56 Acres. Established year: 1998

Product: Carbon Black, Electricity.

Uses: Fillers for Tyres, Speciality blacks and mechanical rubber goods.

Customers: MRF, Apollo Tyres, J.K.Tyres, Birla Tyres, Goodyear, Bridgestone.

Birla Carbon is one of the largest manufacturers and suppliers of high-quality carbon black additives globally, and a flagship business of the US \$60 billion Aditya Birla Group.

The company's footprint extends 12 countries, with 16 manufacturing facilities and two state-of-the-art technology centers in Marietta (USA) and Taloja (India), providing industry-leading innovation.

Its Sustainable Operational Efficiency (SOE) strategy focuses on employee safety, environmental stewardship, efficient use of carbon black, and a key focus on conducting operations in a socially and ethically responsible manner.

Birla Carbon was awarded the 'platinum' rating by Eco Vadis for sustainable practices in 2022.

In India Birla Carbon has three Manufacturing units with total production capacity of 3.89 Lac Tons per Annum and a Total Turnover of 4100 Crores.

The Unit located at Gummidipoondi have 5 Production lines with capacity 2.25 lakh metric tons per annum.

The Unit located at Renukoot UP, have 2 Production lines with capacity of 0.8 lakh metric tons per annum.

The Unit located at Patalganga Maharashtra, have 2 Production lines with capacity of 0.8 lakh metric tons per annum.

VISION:

Vision is to be "**the most respected, sustainable and dynamic global carbon black business**". We seek to be the most preferred supplier to our customers and gain respect from all other stakeholders, including partners, communities, government, competition and the industry as a whole.

MISSION:

"To Deliver Superior Value to **our customers, shareholders, employees and society at large**".

VALUES:

- 1) Integrity – Honest in every action
- 2) Commitment – Deliver on promise
- 3) Passion – Energized action
- 4) Seam lessness – Boundaries less in letter & spirit
- 5) Speed - One Step ahead always

1.3 PRODUCT PROFILE:

Carbon black is an engineered compound found in countless items used on daily basis. It is essential ingredient in tires and other mechanical rubber goods, improving their strength, durability, and overall performance. It is also used in pigment ink, Paints and Plastics.

Carbon black is manufactured from Carbon Black Feed Stock (CBFS), a refinery product and has a complex process. The oil is pumped into specially designed reactors, where it is heated up to 1800°C. This process cracks CBFS to produce smog with carbon black powder. This smog is counter flow with compressed air so that air gets heated up to 900°C. Then again heat is extracted from smog and transferred to the fuel oil. Then this hot smog is passed to bag filter. Here Carbon Black powder is separated from the smog. This powder is passed through the palletizer to mix with water and molasses; and pallets are formed. These pallets are transferred to rotary drier. Further it is transferred to silo (container for finished product).

In each day of our life, we come in contact with the products whose manufacturing depends on Carbon Black. The automobile tires, inks, plastics, paints and electrical cables and other products obtain improved strength and overall performance with addition of Carbon Black.

Other industries use carbon for its blackness-to put color in plastic casings, car paint and printer toner, and also used in cable insulation and garbage bags. Carbon Black is a capital-intensive high commodity market in India.

PRODUCT APPLICATION:

Birla Carbon is widely used in rubber products, particularly in vehicle tires, and in the plastics and ink industries. In rubber applications, the carbon blacks are classified broadly into hard and soft grades. Birla Carbon Black and HBL grades are used in the ink and the pigmentation industries, the grading indicating efficiency of coverage and jetness to the product.

1.4 Primary Objectives:

- ❖ To Know the fundamentals of Inventory Management System.

Secondary Objectives:

- ❖ To Study and analysis the Effectiveness of Inventory Management System Practices in Birla Carbon.
- ❖ To Understand Tools and Techniques followed to keep Inventory Cost under Control as they contribute to reducing cost of production.
- ❖ To Analyze control measures taken in maintaining Inventory reducing cost.
- ❖ To measure JIT and Customer Satisfaction Level
- ❖ To Provide the detailed information and suggest suitable technique to the company to have improved control over Inventory.

1.5 NEED FOR STUDY

Inventory Management is crucial for a Business Management to achieve both Efficient and Fast operations at affordable cost.

- ❖ This Study will help me as a student to examine the impact of Inventory Management On various aspects followed by the company such as Standard Operating Procedure, Training, Inventory Management Practices, Cost Analysis, Order levels and Cost Reductions.
- ❖ The study is to examine how effectively the Company adopting the factors that influence the inventory stock.
- ❖ To Study the work flows of Supply chain functions.
- ❖ To understand and examine the optimum level in inventory and its current measures.
- ❖ To identify any weaknesses in inventory management and to examine its impact.
- ❖ To provide valuables suggestions to reduce Inventory cost associated with the operations.

1.6 SCOPE & SIGNIFICANCE OF THE STUDY

The scope of an inventory system will review the company's existing processes and to plan for the future inventory levels.

- ❖ The Scope covers valuing the inventory, measuring the changes in order level.
- ❖ Formulation of policies in inventory management on various aspects such as Investment procurement. fixation of minimum and maximum order levels, economic order quantity and the lead time.
- ❖ Facilitates the movement of material and minimizes the storage and handling costs.
- ❖ The scope of study is to provide information on costs involved in straying above and below the optimal range, inventory management make huge differences in the profitability of business.
- ❖ The scope of study is to help the management to identify the current level parameters on controlling the inventory to optimum level.

CHAPTER - II

Review of Literature

2.1 The History on Inventory control

The Implementation of Inventory Management application has become a valuable tool for every organizations looking to more efficiently managing stock. A structured method of inventory for all incoming and outgoing save a significant cost and inventory run-out stocks.

Inventories constitute the most significant part of current assets of large majority companies in India. On an average, 60 percent of current assets in Public Limited Companies in India. It is possible for a Company to reduce its level of inventories to a considerable degree by 10-20 percent, without any adverse effect on production any sales by using inventory planning and techniques. The reduction in “excessive inventories carriers a favorable impact on a Company’s profitability.

Ali et al (2014), the following are types of inventory control system: shipping, purchasing, receiving, warehouse storage, turnover, tracking, and reordering of inputs. Nevertheless, there is no a common ground among managers and scholars to what makes the difference between stock organization and stock control systems, as an effective inventory control system entail inventory management and vice versa to increase supply chain productivity and efficiency so that the correct inventory is available at the right time to satisfy client demands.

Tyagi (2014) purposes and optimization of inventory model where items deteriorate in stock conditions.

Kafyetta (2016), an inventory control system management is an arrangement that systematizes all inventory management activities. These systems are described to integral successfulness of any business organization and are principally used to

proficiently capture stock movements using both hardware and software gears in supply chain.

Marsudi (2018) reviewed on inventory management in manufacturing industry and found that the demand pattern policy help in determining the best approaches and the inventory system such as the Economic ordering quantity, Material requirement planning and Just-in-time has benefitted the industry in planning, delivering process, timely production with linking factors that is environment, technology , systems and procedures.

Madu (2022) has studied on inventory management practices applied by stores officers in public tertiary educational institutions in southeast Nigeria country and found that some practices like barcode inventory management practices were moderately applied, while activity based costing inventory management practices were lowly applied in such institutions and also they do not significantly influenced in some institutions and required proper training for effectively implementing such inventory management practices.

CHAPTER III

RESEARCH METHODOLOGY

3.1 METHODOLOGY:

Research methodology is a way to solve the research problems. It may be understood as a science of studying how research is done scientifically. Thus, it is the various steps that are generally adopted by a researcher in studying his research problem with the logic behind them. It has many dimensions & methods, which constitute a part of the research & widens the scope of the research. This time research methodology is framed for the purpose of A Comparative Study on Spending and Savings among College Students.

3.2 RESEARCH DESIGN:

Descriptive Research Design

Descriptive studies are undertaken in many circumstances. When the researcher is interested in knowing the characteristics of certain groups such as age, sex, educational level, occupation or income, a descriptive study is necessary. Descriptive studies are well-structured. It tends to be signed & its approach cannot be changed every now and then. It is, therefore necessary that the research give sufficient thought to framing research questions and deciding the types of data to be collected of the producers to be used for their purpose.

3.3 Source of Data

Convenience sampling method

A convenience sample is one of the main types of non-probability.

Sampling methods. A convenience sample is made up of people who are easy to reach.

Data collection is the term used to describe a process of preparing and collecting data.

Primary Data:

Primary Data was collected from Questionnaire circulated. Out of 29 employees 19 employees. Responded. Questionnaire were Generic and Inventory Related.

Secondary Data:

Secondary Data Collected from Department MIS Reports, interaction with Department functionaries and field observations.

Prior research studies based on requirement for analyzing the effectiveness of Inventory Control.

3.4 Questionnaire Development**Basic introduction**

In this questionnaire followed basic and simple way. Hence it is easy for respondents to answer questions without delay or confusion. Set of questions prepared in questionnaire constructed on the based questions. In structure of questionnaire used in the project as Generic questions and questions on inventory management practices. The percentage is measured from the responses given.

3.5 Sample Size**Convenience and purposive sampling method:**

Convenience sampling is the most common type of non-probability sampling, which focuses on gaining information from participants the sample which is convenient for the research to access the data, purposive sampling focuses on getting data from participants who are suitable for the underlying nature of study.

Totally 40 questions were prepared and circulated to 29 employees involved in Inventory management systems. Questions were Generic in nature and on effectiveness of Inventory Management practices and control parameters effecting cost reduction.

Out of 29 employees 19 have responded. Thus it can be generalized that the response rate was satisfactory and collected data from employees is not enough for conducting analysis.

3.6 Period of Study:

The period of time taken to conduct the survey and preparation of the research paper is 3 Months.

3.7 Profile Area of the Study

The profile area of study is to analyses Inventory Management practices and control measures in maintaining Inventory cost reduction and increase in profits.

3.8 Hypothesis:

Based on the problems and objectives of this study, the following hypotheses are formulated:

HO: Null hypothesis – The inventories were not managed well with optimum level and this has resulted in no profitability.

HI: Alternative hypothesis – The inventories were well managed with optimum level and this has resulted in profitability .significant differences with reorder level to be reviewed with regular intervals.

HO: Null Hypothesis – Further Efficient inventory Management training and awareness on cost control lacked among staffs.

HI: Alternative Hypothesis – Efficient inventory Management training and awareness on cost control given which kept inventory under control and business strategies.

3.9 Inventory analysis and Classification:

Inventory analysis helps to determine the right amount of stock to keep on hand To fill demand and avoid run- out stocks. Data analysis assisted in categorizing, manipulating, and summarizing data to answer critical questions.

Data interpretation is the process of reviewing data and arriving at relevant conclusions using various analytical methods.

Data analysis and interpretation is that the method of assigning meaning to the data collected and determining the conclusions, significance, and implications of the findings. it's a crucial and exciting step within the process of research. In most of the research studies, analysis follows data collection.

Inventory categorization

Inventory is being classified into different types:

Raw Material Inventory

Finished Goods Inventory

3. Packing Material Inventory

4. General Stores Inventory

a) Critical Inventory b) Non-Critical Inventory c) Insurance Items & d) Minimax Items.

Raw Material Inventory:

Raw materials inventory refers to the materials that are used to create a business's finished goods. A company keeps raw materials in stock so that they can turn them into work-in-process (or WIP) inventory or finished goods inventory.

Finished Goods Inventory:

Finished goods inventory is the total number of manufactured products that are available, in stock, and ready for purchase by vendors, retailers, and consumers.

Critical & insurance Inventory:

Critical and insurance inventory are commonly considered as critical where the stock should not go below safety level. These inventory is very much important for plant. For Example Spare of Equipment's used for plant operations

Insurance Inventory is classified by long lead inventory where the lead time is more. These inventory are regularly monitored once the actual stock goes below safety stock level it is been informed to the concerned department to take necessary actions for reordered: Spares and machine items used for plant operations.

Non Critical Inventory:

These type of inventory is also maintained and ageing of the inventory is monitored and further categorized to ideal inventory and slow moving inventory. The stock level of these inventory is calculated monthly for user comments and further actions.

Mini Max Inventory:

This type of Inventory is classified or determined by the count of usage by multi departments. The criteria for mini max is that particular item comes under minimax is calculated by annual consumption, average consumption, and purchase lead time. The minimum level of the inventory is calculated by average annual consumption and lead time after rounding to nearest integer, the maximum level is determined by that these times of minimum level, and thus this maximum of those line items will be considered and procured three times of the monthly consumption lead time.

PROCEDURES followed for Calculation of MINI MAX INVENTORY items.

IDENTIFICATION:

Take out the details of Annual General Stores /Material consumption

Analyse the data & prepare a list for the items issued more than 12 times in a year.

Make a proposal for renewal auto items and circulate the list Department Specific items list for their feedback

Finalize the list of Auto indent items in consultation with the user.

LEVEL DETERMINATION:

Use below Formula for level determination

Safety (Minimum) Stock level = SD (consumption) x Service Factor x Lead Time Factor

Standard Deviation: Use Excel Function STDEV to calculate standard deviation of consumption data

1) Lead Time: Calculate the lead time as per historical information of material receipts.

Lead Time Factor: Square root (Lead Time)

2) Reorder Stock Level = Safety Stock + Lead Time Demand

Lead Time Demand = Lead Time + Average Demand During the lead time period

3) Maximum Stock Level = Re-order Level + Average Receipt per Lot - Lead Time Demand

Average Receipt per Lot: Calculate the average receipt per lot as per historical purchase of item

Once the Safety Stock, Reorder Level and Maximum Order are Finalized update the same in SAP

REVIEW AND MONITOR:

Review the list every year.

Review the stock levels every week & raise the indents.

ORDER PLACEMENT AND REPLENISHMENT:

Order of procurement to be placed once the material stock reaches to its Re-order level.

SAP will calculate & raise the Purchase Requisition for required quantity automatically.

MULTI DEPARTMENT CONSUMPTION AND NO OF TIMES CONSUMED LIST TO BE

SENT TO USER DEPARTMENT AND CONFIRMATION FROM THEM.

Selection of material for minimax

FORMULAS TO CALCULATE MIN MAX INVENTORY ITEMS

MATERIAL ANNUAL CONSUMPTION/12 = MONTHLY CONSUMPTION

PURCHASE LEAD TIME/2+ AVERAGE MONTHLY CONSUMPTION = MINIMUM LEVEL

MINIMUM LEVEL AFTER ROUNDING OFF TO NEAREST INTEGER * 3 =

MAXIMUM LEVEL

Two ways of inventory management system

There are two main ways adopted by the company to manage inventory:

Periodic Inventory Management System - Periodic inventory is a way of managing stock that relies entirely on stock taking. Businesses with a periodic system count their stock regularly every 3 to 6 month to verify stock accuracy, whether stock levels matches up to sales accuracy.

Perpetual Inventory Management System - Perpetual inventory is a system that involves tracking stock levels as goods are receipted, produced, sold, or returned to

the store. Perpetual inventory management system tends to deliver the most up to date inventory with less dependence on stock for accuracy.

Inventory analysis and interpretation

Inventory Analysis refers to any calculation that helps business better understanding inventory levels and operating efficiency.

It helps to identify trends and acquire the right mix of products based on Customer demand.

Regular inventory analysis keeps Inventory management on track and increases efficiency.

It reduces stockouts which leads to stoppage of production.

Inventory analysis shows lead time to prepare with safety stock or re-order level.

Cash flow increases on Inventory indicators.

Inventory analysis often bring better pricing from suppliers and vendors.

Inventory analysis at regular intervals reduces waste, lost inventory which enables to introduce cost controls

CHAPTER - IV

DATA ANALYSIS AND INTERPRETATION

Data analysis assisted in categorizing, manipulating, and summarizing data to answer critical questions.

Data interpretation is the process of reviewing data and arriving at relevant conclusions using various analytical methods.

Data analysis and interpretation is that the method of assigning meaning to the data collected and determining the conclusions, significance, and implications of the findings. It's a crucial and exciting step within the process of research. In most of the research studies, analysis follows data collection

Sample Test - 1 Primary Data

4.1 Reliability Statistics Summary of respondents:

As presented in below table-1 the questionnaire were distributed to 29 employees of related departments of which 19 employees responded to the questionnaire. The response percentage is Satisfactory. Among the respondents it is evident that training, inventory practices were well understood among employees and adopted good relationship with inventory control.

Table – 1 Data on Responses for the questionnaire

Questionnaire	Strongly Agree (5)	Agree(4)	Neutral(3)	Disagree(2)	No comments(1)	%
Training on Inventory Management	0	17	0		2	89
Inventory Management Practices	0	17	0	0	2	90
On time delivery supplies	0	16	0	0	3	84
Inventory cost control Technics	0	11	0	0	8	58

Interpretation: Out of 29 employees 19 employees responded. The responded percentage is 66 and Inventory cost control awareness percentage was 58. Primary data was not fully responded hence study was carried out with secondary data.

Effectiveness of Inventory Management Analysis – Table and Chart

(The study was done on Secondary Data provided by department- MIS)

ABC ANALYSIS:

ABC Classification, is a vital part of Inventory Management. It allows business owners to distinguish the products in their stock and focus on managing them based on their worth. The main objective of ABC analysis is to make maximum out of minimum investment without wasting any resources or inventory.

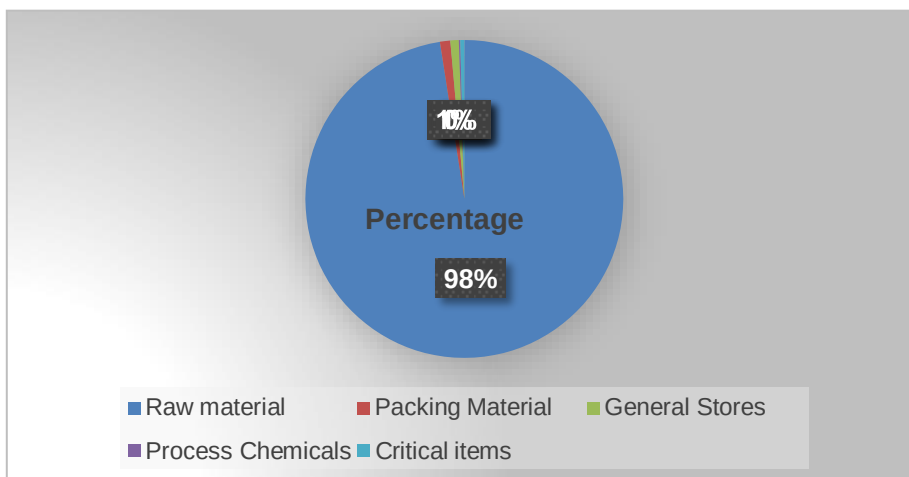
The study intended to identify the consumption cost of raw material and other inventory in order to analysis the cost involved. The period of study is from April-22 to Dec-22 data.

4.2 ABC Analysis: classification on inventory consumption costs.

Table- 2 Data Analysis on Inventory Consumption

Description	Inventory Value (lacs)	Percentage
Raw material	166008	97.54
Packing Material	1793	1.05
General Stores	1460	0.86
Process Chemicals	245	0.14
Critical items	687	0.40

4.2 Table-2 Chart -1 on Total Inventory Consumption



Inference:

Table – 4(1) and chart shows the Inventory consumption for the period April-22 to Dec-22.

Interpretation:

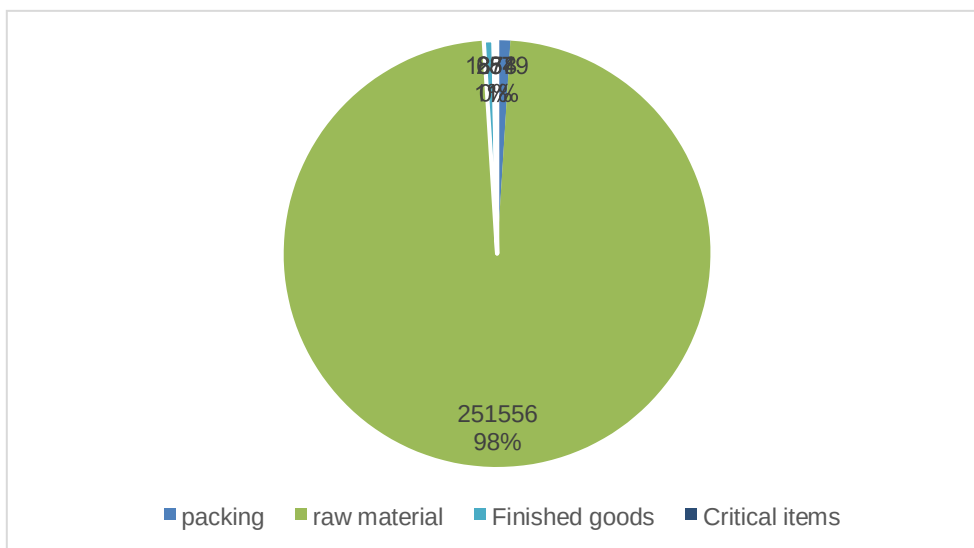
It is evident that Table – 4(1) and chart shows that Raw Material consumption holds the higher percentage. Next to Raw Material Packing material holds the second highest percentage for Analysis.

4.3 ABC Analysis on Inventory Stock Position.

Table- 3 Data Analysis on Inventory Stock

Description	Inventory Value (lacs)	Percentage
Packing	2549	0.99
Raw material	251556	98.01
Finished goods	1878	0.73
Critical Items	687	0.27

4.3 Table-3 Chart -1 on Inventory Stock Position.



Inference:

Table – 4(2) and chart shows the Inventory Stock Position for the period April-22 to Dec-22.

Interpretation:

It is evident that Table – 4(2) and chart shows that Inventory Stock Position holds the higher percentage. Next to Raw Material Packing material holds the second highest percentage for Analysis.

Since principal raw material is imported and has control over management Strategies' and consolidation with other units the study aimed to carry out analysis on packing materials which holds the second highest consumption and Inventory Stock value.

Hence the study intended to identify the effectiveness of Inventory Management techniques and cost reduction on packing material Inventory.

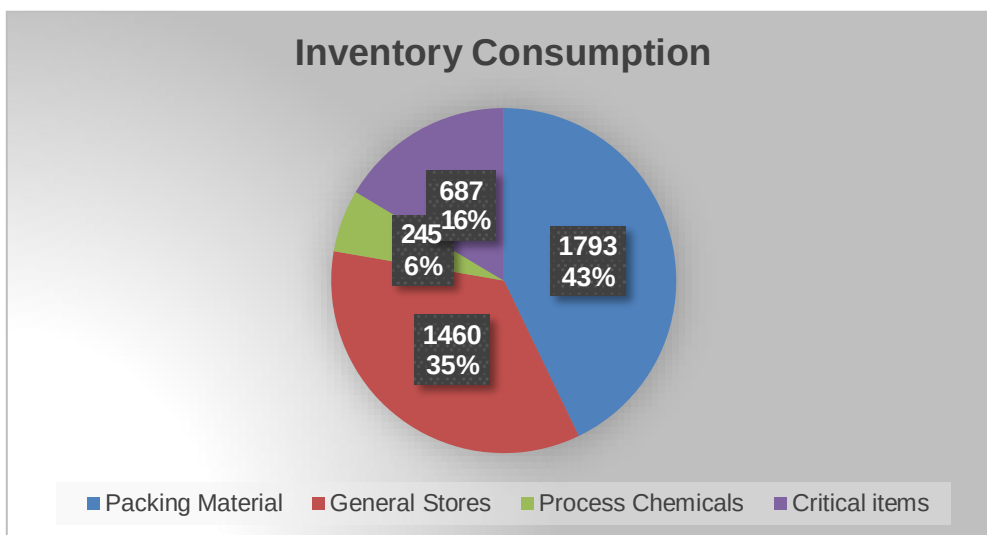
4.4 ABC Analysis on Inventory Other than Raw Material.

Data Analysis on Inventory Consumption Cost.

Table 3. ABC Analysis other than Raw Material

Description	Inventory value (lacs)	Percentage
Packing Material	1793	43.
General Stores	1460	35
Process Chemicals	245	6
Critical items	687	16
Total e	4185	100

4.4 Table-3 Chart -1 on Inventory Other than Raw Material



Inference:

Table – 4(4) and chart shows the Inventory Consumption other than Raw Material

Interpretation:

It is evident that Table – 4(4) and chart shows that Inventory consumption other than Raw Material where Packing material holds the higher percentage.

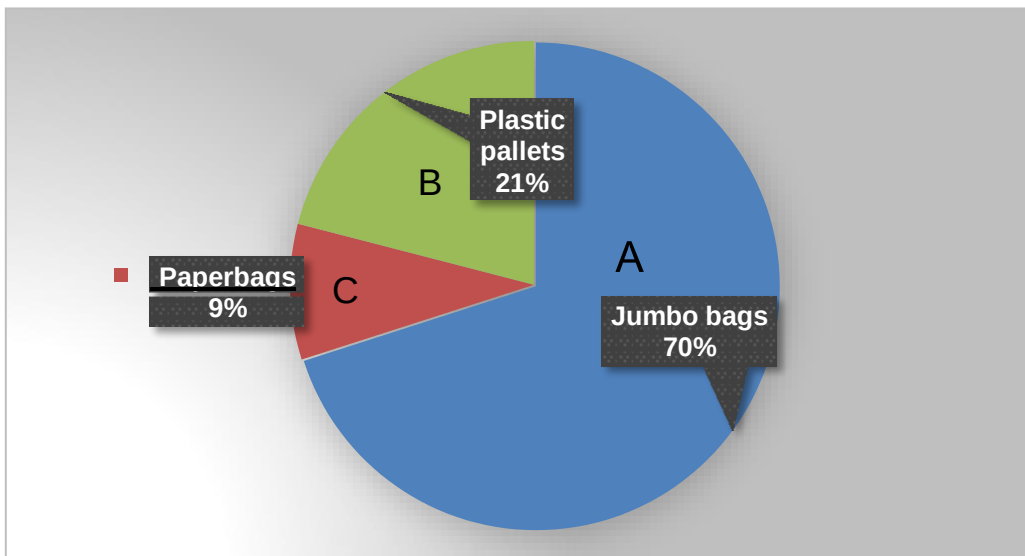
4.5 ABC Analysis on Inventory Packing material

A study on Packing material Inventory is taken to understand the Inventory control and Tools and Techniques used in reducing the Inventory cost.

Table-4 ABC Analysis on packing material consumption.

Packing material	Values (lacs)	Percentage	Category
Jumbo bags	1256	70.05	A
Paper bags	161	8.98	C
Plastic pallets	376	20.97	B

Table-4 Chart -4 on Inventory packing material consumption



Interpretation:

The ABC Analysis on table-4 further classification of packing material and examined that jumbo bags records higher percentage and hence this study is attempted on Jumbo bags for further data analysis and interpretations.

Table 5 Economic order quantity (EOQ) Approach on Jumbo Bags

4.6 EOQ Theoretical Analysis on Packing Material

EOQ is an Inventory management Tool for determining optimum order quantity which is reduces total of carrying cost and order. It is to minimize

the inventory cost which includes holding cost and order costs.

The study intended to identify Inventory management techniques used in Birla Carbon on economic order quantity (EOQ) Inventory methods.

The formula to measure economic order quantity is:

$$EOQ = \sqrt{2 \times \text{Demand quantity} \times \text{Ordering cost} / \text{Holding cost}}$$

D = Annual Consumption.

O = Ordering costs (per order, including shipping and handling)

H = Holding costs (per year, per unit which includes storage costs, insurance.

Formula	$\sqrt{2 \times \text{Demand quantity} \times \text{Ordering cost} / \text{Holding cost}}$					
Item	Packing Material	Order Cost	Cons / month	Holding cost per unit	constant	EOQ*
Jumbo Bag	BC-JB-1100*150	\$853.00	7800	\$85.00	2	396

Interpretation:

The economic order quantity to be ordered at one time to maintain minimum inventory is 396 Nos. However, since the no of orders increases in this aspect it is observed that the company is raising order with schedules given and to maintain VMI at suppliers end in order to reduce the Inventory holding cost and multiple orders.

4.7 Reorder level analysis (ROP) on Jumbo Bag

The study intended to identify the reorder level quantity on jumbo bags to be ordered which helps reduction inventory cost, reduces stock outs and improves forecasting.

Table-4.7 Data on monthly consumption analysis on Jumbo Bags

Month	consumption	per day
Jan-22	7800	260
Feb-22	7850	262
Mar-22	7725	258
Apr-22	6950	232
May-22	7925	264
Jun-22	7810	260
Jul-22	7650	255
Aug-22	8200	273
Sep-22	7750	258
Oct-22	7920	264
Nov-22	7850	262
Dec-22	7750	258
Total	93180	
Average/month	7765	
Average /day	259	
Max consumption	270	
Average Lead time	2	
Max Lead time	4	
Recorder level		
maximum consumption /month	269.6	
Maximum lead time	4.0	
Average consumption	258.8	
Average lead time	2.0	
Safety stock	560.7	
Recorder level	1078.4	4.17

Interpretation:

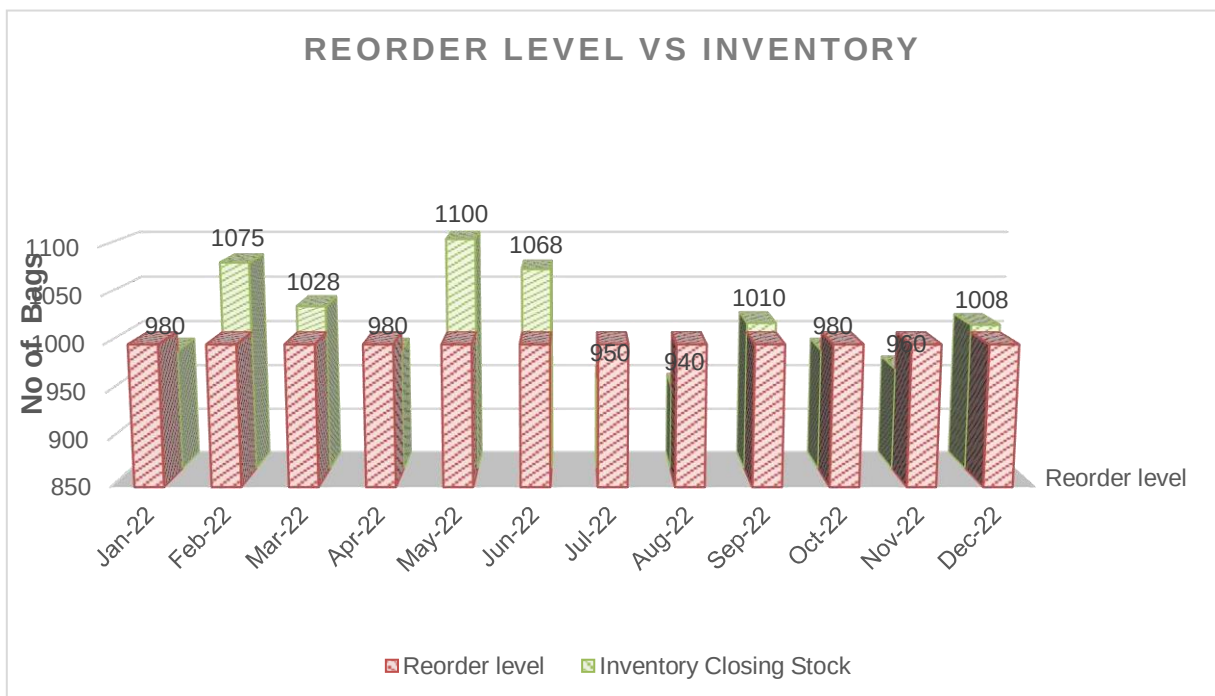
From table-4.7 it is examined that Inventory turnover on jumbo bags is kept at Reorder point. With the average lead time and alternative suppliers the company is effectively maintaining Inventory on packing material and Inventory cost is kept under control.

4.7 The study intended to Measure the Reorder Level vs Inventory on Jumbo Bags.

Table-7 Data on Reorder Level vs Inventory on Jumbo Bags

Month	Avg Consumption/ day	Reorder level	Inventory Closing Stock
Jan-22	260	1000	980
Feb-22	262	1000	1075
Mar-22	258	1000	1028
Apr-22	232	1000	980
May-22	264	1000	1100
Jun-22	260	1000	1068
Jul-22	255	1000	950
Aug-22	273	1000	940
Sep-22	258	1000	1010
Oct-22	264	1000	980
Nov-22	262	1000	960
Dec-22	258	1000	1008

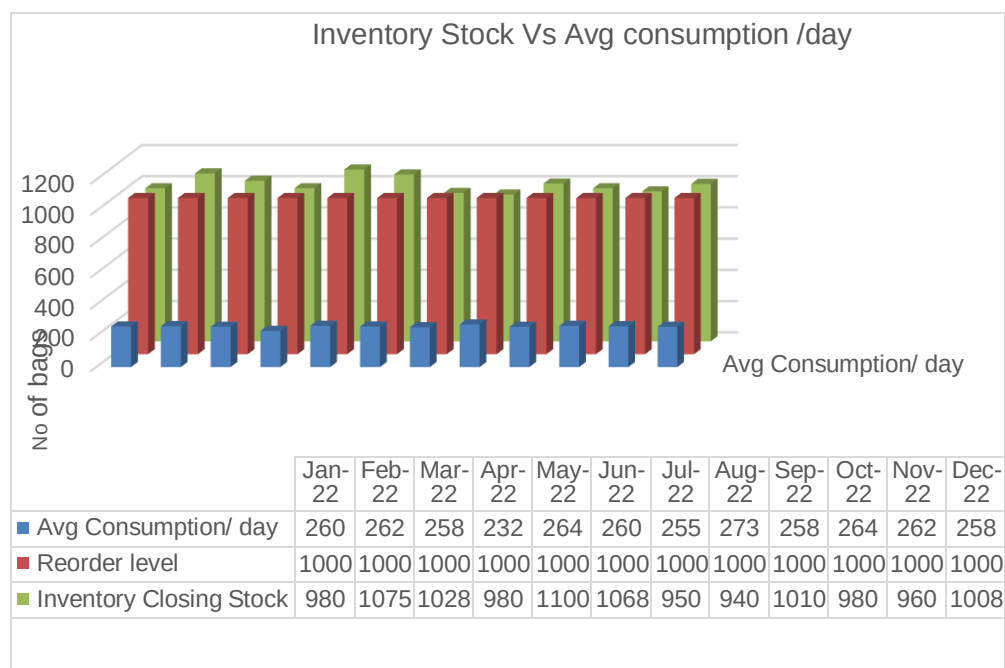
Table-4.7 Chart (1) showing Reorder Level vs Inventory on Jumbo Bags



Interpretation 1:

From the above table- 4.7 and chart-4.7 it is evident that the reorder level set on jumbo Bags is effectively maintained. The graph shows reorder level and Inventory stock for 4-7 days which shows that the company is effectively handling Inventory and maintaining good supply chain practices in order to reduce Inventory cost. The Inventory turnover is maintained for 4-6 days stock which shows that company has best practices and standard procedures which leads to overall results in planning and execution.

Table-7 Chart-7(2) showing Reorder Level vs Inventory on Jumbo Bags



Interpretation 2:

Results in Reorder level Analysis on Jumbo Bags

The table 4. 7 and 4.7(2) graph is evident that the company is adopting its best practices in Inventory control and reduction in cost effectively. The inventory Turnover ratio is 4-6 days at average which shows standard operating procedure is set and re-order level is maintained effectively.

4.8 Data Analysis on General Store Inventory, Critical and Insurance items

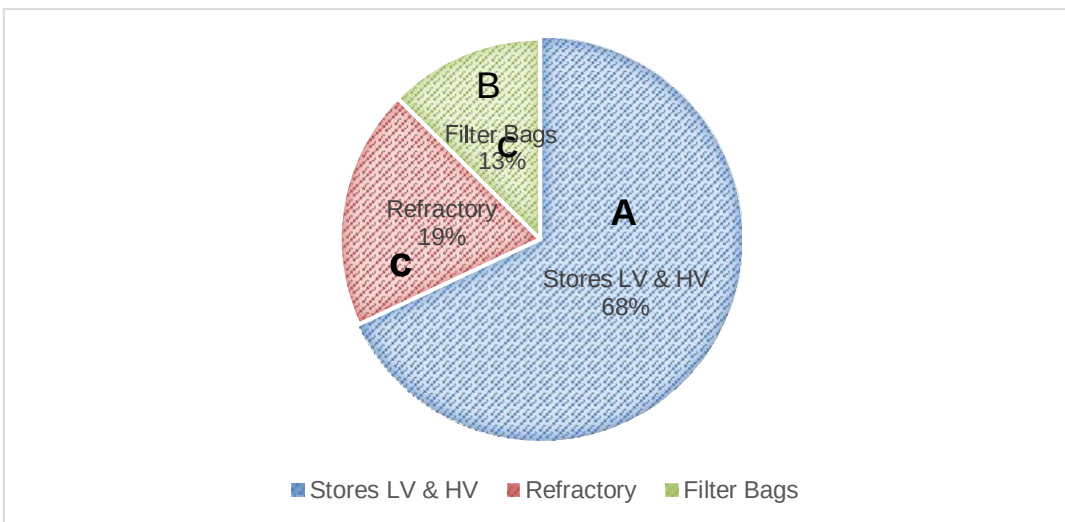
Table – 4.8 Data on General stores Inventory Consumption

MONTH	Inventory Stock	Optimum level
Apr-22	777.25	797.4
May-22	789	797.4
Jun-22	750	797.4
Jul-22	808.2	797.4
Aug-22	780	797.4
Sep-22	800	797.4

Oct-22	810	797.4
Nov-22	850.58	797.4
Dec-22	811.57	797.4

ABC Analysis of General Stores Categorized Based on Consumption Value

Table-4.8 chart- 1 showing General Stores Inventory, critical and insurance Items.



Interpretation:

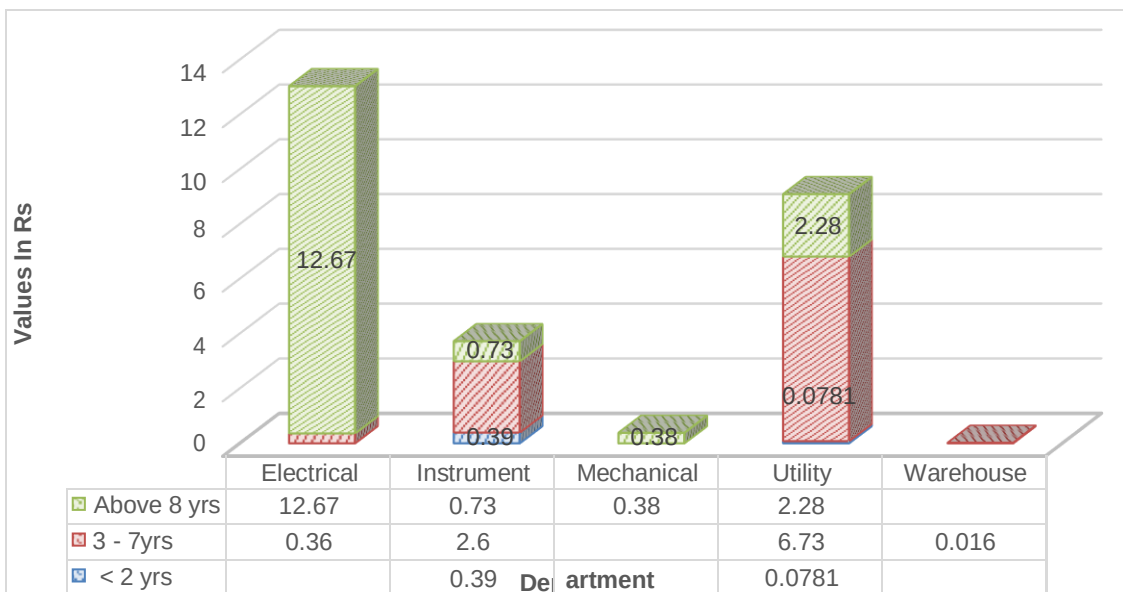
From the above it is evident that 68% of the consumption value is on general stores and other critical imported items is kept at constant level.

4.9 Data Analysis on Non-Moving Inventory

Table-4.9 shows Non-Moving Inventory Value With department wise and Ageing.

Departments	< 2 yrs.	3 - 7yrs	Above 8 yrs.
Electrical		0.36	12.67
Instrument	0.39	2.6	0.73
Mechanical			0.38
Utility	0.0781	6.73	2.28
Warehouse		0.016	

Table-4.9 Graph- 1 Shows Non-Moving Inventory with Ageing



Interpretation:

The Study observed Non Moving Inventory lying for more than 8 years which adds Inventory cost which was one of the finding in the study on Effectiveness of Inventory Management System.

4.10 Data Analysis on Interpretation of Finished Goods Inventory

Finally a study was attempted to find out the Inventory turnover ratio on finished goods. As a result the data on sales and Inventory stocks were analyzed to find out the Inventory turnover ratio.

A comparative study was attempted to find out the result and level of turnover ratio Table-8 shows the sales and Inventory stocks for the period Apr – Dec 2020 -2021 & 2021 – 2022 the study was examined on below formula to find out average days of Inventory which company has maintained.

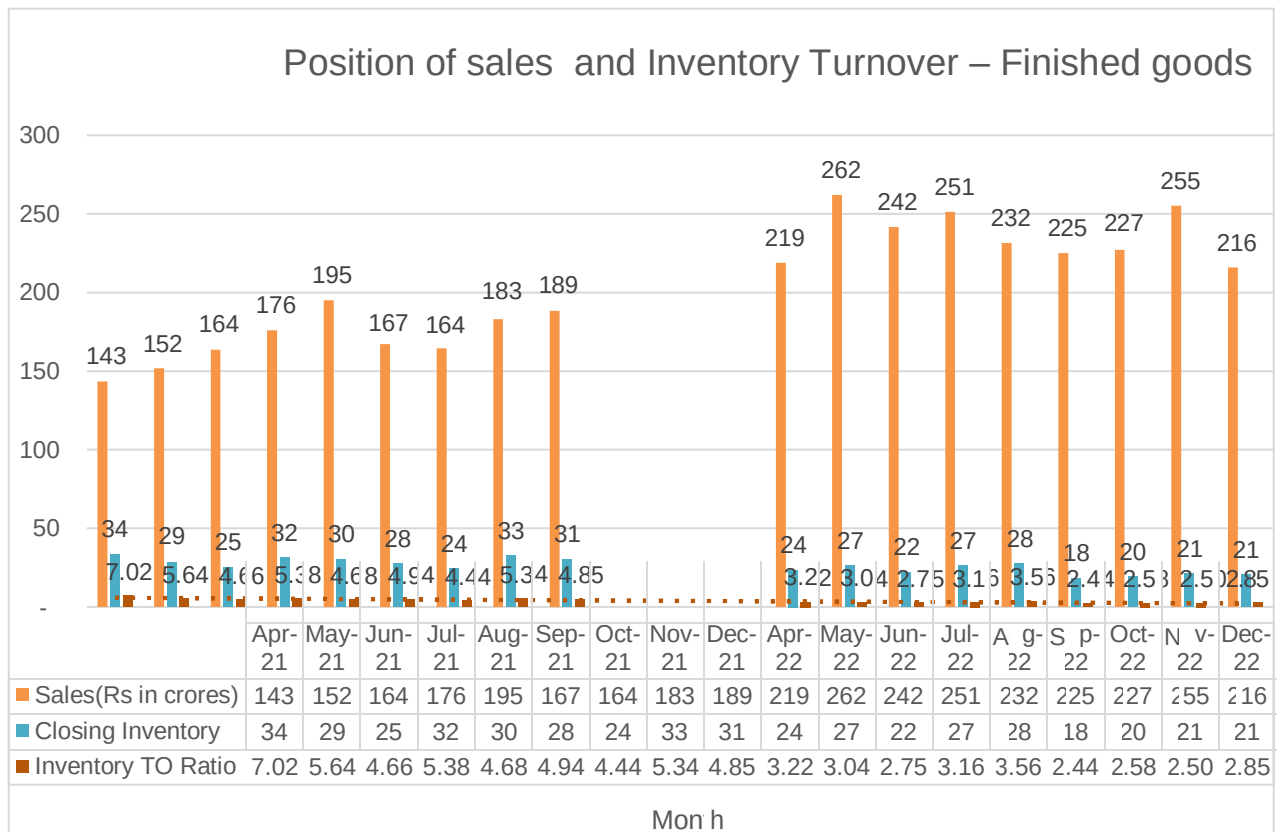
Inventory Turnover ratio = $\text{COGS} / \text{Avg. Inventory}$

Average Inventory = $\text{Opening Inventory} + \text{closing inventory} / 2$

Table-4.10 Analysis on Finished goods Inventory Turnover Ratio

Study Analysis on Finished Goods with Sales and Inventory											
Details of sales made during th				COGS Rs.in Crores							
Descrrption	FY	April	May	Jun	jul	Aug	Sep	oct	nov	Dec	Total
Carbon black	2020-2021	143	152	164	176	195	167	164	183	189	1,533
Carbon black	2021-2022	219	262	242	251	232	201	208	255	216	2,086
Finished Goods Inventory stock											
	Mar-21	25.65									
	Mar-22	24.89									
Description	FY	April	May	Jun	jul	Aug	Sep	oct	nov	Dec	Total
Carbon black	2020-2021	33.56	28.52	25.42	31.56	30.42	27.56	24.36	32.56	30.50	264
Carbon black	2021-2022	40.50	35.00	32.00	38.00	36.00	35.00	28.00	38.00	35.00	318
Average Inventory											
	Opening Inventory + closing inventory / 2										
2021-2022		28.075									
2022-2023		29.945									
Inventory Turnover ratio											
	COGS/Avg.Inventory										
2021-2022		6.07									
2022-2023		7.74									

Table- 4.10 Chart (1) on Inventory turnover ratio based on the data for a period of 12 months study.



Interpretation:

From the above table-9 it is evident that the Company has good balance in Inventory turnover which is 4 – 7 days which indicates the good practices and control over Inventory and its cost reduction. A good Inventory turnover ratio helps business to make smarter decisions in variety of areas including pricing, manufacturing, marketing, purchasing and warehouse management.

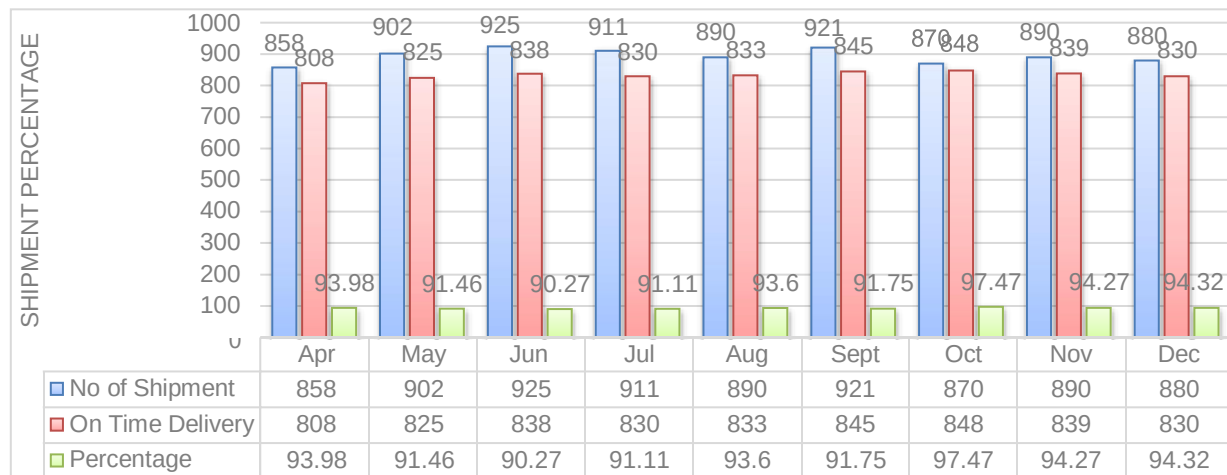
From Table-9 Graph-9 Inventory Turnover ratio comparative studies with previous year shows increase in sales trend and optimum Inventory Stock which is good sign on effectiveness of Inventory management.

4.11 Table-11 Just in Time Analysis approach (JIT)

In addition, the study attempted to know whether the company used just in time techniques effectively. Below table-10 shows the total no of shipment with on time delivery for the period April-2022 to December 2022. The result indicated an overall average of 93% on time delivery which indicates reduction in Inventory holding cost and increase in inventory turnover. The increased trend in sales indicates the best practices and control over Inventory.

Month	No of Shipment	On Time Delivery	Percentage
Apr	858	808	93.98
May	902	825	91.46
Jun	925	838	90.27
Jul	911	830	91.11
Aug	890	833	93.6
Sept	921	845	91.75
Oct	870	848	97.47
Nov	890	839	94.27
Dec	880	830	94.32

Table-14.11 Chart-4.11 (2) Showing JIT Delivery Performance



Interpretation:

On time delivery performance rating to the customers is Avg of 92% which indicates supply chain functions handled extremely at good level and meeting customer needs on time and maintaining its relationship at higher level.

CHAPTER - V

5.1 Findings of the study

- ✓ Principal Input and major contribution in inventory are imported raw material which involves higher lead time, the company has adopted storing of raw material at two levels port stock and factory stock which always would avoid running out of stock.
- ✓ It is found that company is following Standard operating procedures effectively and sets standards in inventory management. The tools and techniques EOQ, reorder point and inventory turnover ratio is good which reduces the cost.
- ✓ Overall, the systems adopted sets standards and regularly conducts internal audits which adds value to supply chain functions.
- ✓ The study examined obsolete stock with ageing more than 8 years which adds Inventory Costs.

5.2 Suggestions and Recommendations:

- ❖ Non Critical Items in General Stores observed which increases Inventory cost and there is a source for reduction of Inventory cost.
- ❖ Regular Fast, slow and nonmoving inventory reports and analysis would be ideal which would help to prioritize inventory and information to management.
- ❖ Observed dependency on physical counting to determine the stock level and trace for material on finished goods. Integrated barcoding solutions software's would be ideal option determine stock counts for inventory data more and more accurate.

5.3 Limitations of the study:

Limitations are experienced in main raw material research such as detailed information on inventory cost, market demand, SOP confidential documents were not permitted for study.

5.4 Conclusion:

This study was attempted to examine the effectiveness on inventory management principles through primary data and secondary data.

The study evaluated the effectiveness of inventory management practices and its challenges in manufacturing industry Birla Carbon and found that the Company has well execution planning and also standardized its inventory stock level.

From the data study it is evident that Birla Carbon is managing its Inventory very effectively, the procedures and techniques followed helps in continuous flow of its activities and cost reduction with optimum inventory level.

Analysis based on Primary Data reveals that the majority of employees were experienced in procurement, inventory handling and supply chain functions smoothly.

The overall performance of the organization is satisfactory because of its prominent increase in sales and control over Inventory and its cost.

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