



**KAUNAS UNIVERSITY OF TECHNOLOGY
MECHANICAL ENGINEERING AND DESIGN FACULTY**

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**INVESTIGATION OF MATERIAL AND INVENTORY
MANAGEMENT IN MANUFACTURING ENTERPRISE**

Master's Degree Final Project

Supervisor

Assoc. prof. Dr. Rasa Mankutė

KAUNAS, 2016

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Master's Degree Final Project

INDUSTRIAL ENGINEERING AND MANAGEMENT (621H77003)

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**MASTER STUDIES FINAL PROJECT TASK ASSIGNMENT
Study programme INDUSTRIAL ENGINEERING AND MANAGEMENT**

The final project of Master studies to gain the master qualification degree, is research or applied type project, for completion and defence of which 30 credits are assigned. The final project of the student must demonstrate the deepened and enlarged knowledge acquired in the main studies, also gained skills to formulate and solve an actual problem having limited and (or) contradictory information, independently conduct scientific or applied analysis and properly interpret data. By completing and defending the final project Master studies student must demonstrate the creativity, ability to apply fundamental knowledge, understanding of social and commercial environment, Legal Acts and financial possibilities, show the information search skills, ability to carry out the qualified analysis, use numerical methods, applied software, common information technologies and correct language, ability to formulate proper conclusions.

1. Title of the Project

Investigation of Material and Inventory Management in Manufacturing Enterprise

Approved by the Dean Order No.V25-11-7, 3 May 2016

2. Aim of the project

To analyze inventory control management and concentrate on the inventory management process in the sheet metal industries

3. Structure of the project

Abstract, Introduction, 1. Aspects of Inventory Management, 2. Literature Review, 3. Company Profile, 4. Research and Improvement of Inventory Management in Company, Conclusions, References, Annexures

4. Requirements and conditions

For investigation of inventory management in manufacturing company the questionnaire has to be developed, inventory management technics has to be analyzed.
The final project has to be prepared according to KTU regulations and requirements.

5. This task assignment is an integral part of the final project

6. Project submission deadline: 20 May 2016.

Given to the student Hisshore Balaji Ramalingam

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Study area and field: Production Engineering and Manufacturing Engineering, Technological sciences

Keywords: *inventory, materials, management, economic order quantity, ABC analysis.*

Kaunas, 2016. 60 p.

SUMMARY

Inventory management is the stream management of materials into an organization to the degree where those materials are changed over into the organization's final product. This research goes for distinguishing the material and inventory management in Indian manufacturing enterprise AVR Manufacturers.

Analysis of inventory control peculiarities in manufacturing companies disclosed the key principles to successful management of inventory: maintaining a safety of stock, maintaining the required level of inventory and proper recording of the material.

For research of inventory management in the sheet metal company seeking to know the situation and reveal the problems in inventory department, the questionnaire was developed. The analysis of given answers revealed main problems: poor communication and poor execution of inventory management system. Main reason bringing about the abundance in inventory inside the company is no proper forecasting of the demand.

For deeper investigation of inventory management peculiarities, the stock administration analysis was done, stock turnover parameters were calculated.

For inventory management improvement in the company, the EOQ (Economic Order Quantity) and ABC analysis techniques was suggested. EOQ will ensure the optimal level of inventory and therefore will help to improve the forecasting of material demand. Application of ABC analysis will help in ensuring that the items given more priority are always in stock.

Hisshore Balaji Ramalingam. Medžiagų ir atsargų valdymo gamybinėje įmonėje tyrimas. Magistro baigiamasis projektas / vadovas doc. dr. Rasa Mankutė; Kauno technologijos universitetas, Mechanikos inžinerijos ir dizaino fakultetas.

Studijų kryptis ir sritis: Gamybos inžinerija, Technologijos mokslai.

Reikšminiai žodžiai: *atsargos, medžiagos, valdymas, ekonomiškasis užsakymo dydis, ABC analizė.*

Kaunas, 2016. 60 p.

SANTRAUKA

Atsargų valdymas įmonėje – tai valdymas medžiagų, iš kurių pagaminamas galutinis produktas, srautų. Šiame darbe tiriamas medžiagų ir atsargų valdymas Indijos gamybinėje įmonėje “AVR Manufacturers“.

Atsargų valdymo ypatumų gamybinėse įmonėse tyrimas atskleidė svarbiausius sėkmingo atsargų valdymo principus: reikia užtikrinti atsargų saugumą, palaikyti reikalingą atsargų kiekį ir tinkamai registruoti medžiagas.

Tiriant lakštinio metalo apdirbimo įmonės atsargų valdymo ypatumus ir siekiant išsiaiškinti esamą situaciją bei problemas, atsargų valdymo padalinyje buvo atlikta apklausa. Gautų atsakymų analizė atskleidė pagrindines problemas: prasta komunikacija ir neefektyviai veikianti atsargų valdymo sistema. Pagrindinė perteklinių atsargų susikaupimo įmonės viduje priežastis ta, kad jų poreikis prognozuojamas netinkamai.

Siekiant išsamiau ištirti atsargų valdymo ypatumus, buvo analizuota, kaip tvarkomos turimų medžiagų atsargos, apskaičiuoti atsargų apyvartos parametrai.

Siekiant pagerinti atsargų valdymą, gamybinei įmonei patariama taikyti EOQ (ekonomiško užsakymo dydžio) ir ABC analizę. EOQ padės užtikrinti optimalų atsargų kiekį ir pagerins medžiagų poreikio prognozavimą. ABC analizės taikymas padės užtikrinti, kad visada sandėlyje būtų svarbiausių atsargų.

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INTRODUCTION

Inventory management is an important department that decides the soundness of the inventory network and each organization continuously try to keep up ideal stock to have the optimum level of inventory to meet its prerequisites and maintain a strategic difference from over or under stock that can affect the company's progress. To keep away from inactive and low levels of inventories in the organization. To increase consumer satisfaction through short and convenient way. To keep up an adequate inventory in the organization for the smooth production and operations.. The stock is constantly changing. Inventory management requires consistent and cautious assessment of outward and inward variables and control through arranging and review. The majority of the organizations have a different division or employment capacity called stock administrators who persistently screen, control and audit stock and interface with generation, obtainment and fund offices.

Effective stock administration includes making a purchase plan that will guarantee that things are accessible when they are required and monitor existing stock and its utilization. Two regular stock administration techniques are without a moment to spare strategy, where organizations plan to get things as they are required as opposed to keeping up high stock levels, and materials prerequisite arranging, which plans material conveyances taking into account deals figures.

The stock is an unmoving supply of physical products that contain a financial value and are held in different structures by an organization in its protection anticipating pressing, handling, change, use or deal in a future purpose of time.

Aim

To analyze inventory control management and concentrate on the inventory management process in the sheet metal industries

Tasks

1. To analyze the aspects of inventory management in a manufacturing company.
2. To investigate the situation of inventory management in sheet metal company using questionnaire.
3. To investigate the different stock ratio.
4. To investigate the stock administration techniques used in the organization.

1. ASPECTS OF INVENTORY MANAGEMENT

“Effective inventory management is all about knowing what is on hand, where it is in use, and how much-finished product results”[1].-Ashok Tripathi

Inventory management is the procedure of productively taking care of the consistent stream of units into and out of a current store. This procedure, as a rule, includes controlling the move in of units, keeping in mind the target to keep the inventory from turning out to be too high, or reducing to levels that could put the smart operation of the organization into danger. Equipped inventory management also looks to control the money related qualities connected with the inventory, both from the complete perspective estimation of the products included and the taxation rate created by the combined estimation of the store [2]

Working out what is known as safety stock is likewise key to successful inventory management. Basically, safety stock is extra units they are beyond the negligible number needed to keep up production levels. For instance, the administrator may verify that it would be a sound thought to keep a couple extra units of a given machine part available, barely in the event that a crisis circumstance emerges or one of the units turns out to be inadequate once introduced. Making this pad or cradle serves to minimize the chance for production to be stopped because of an absence of basic capacities in the operation supply inventory [3].

Adjusting the different undertakings of inventory management means paying consideration on three key looks of any breed. The main face needs to act with them. In the state of materials obtained for consideration in the total inventory, this implies considering to what extent it takes for a supplier to prepare an order and bring through a legitimate transport. Inventory management additionally orders that a strong understanding of to what extent it will requirement for those materials to exchange out of the inventory be built up. Knowing these two vital lead times makes it conceivable to know when to put in an order and what number of units must be ordered to keep Production running easily. Cycle time is units or products produced in the particular period of time or time take to produce one unit .Lead time is a product of cycle time and work in process [4].

Formula

$$LT = CT \cdot WIP \tag{1.1}$$

Where,

LT – Lead time

CT – Cycle time

WIP – Work in process

Inventory management is not restricted to archiving the salvage of raw materials and the development of those materials into operational strategy. The development of those materials as they experience the different purposes of the technique is equally important. Regularly known as products or work in progress inventory, following materials as they are utilized to make finished goods additionally serves to recognize the need to conform ordering sums before the raw materials inventory gets dangerously low [5] or to an unfavourable level .

Deal with the store smartly and earn higher revenue, regardless of how enormous or small the business is, it is vital to monitor everything including a stock status that occurred at the store and make choices smartly. The changing and quick nature of business have made it more critical to monitor stocks and act appropriately. The stock is an integral part of the profit for resources which gives stability to the business with great stock administration system. It won't be a bad idea to call stock the heart of any business. All business depends on the stock system for proper running of the business. Inventories are the genuine resources of the small business. Inventory system takes a major part in dealing with all products or items it also demonstrates the flow of the process.

Stock administration methods will enhance the Inventory turnover ratio and change immovable resources into cash. The expense of selling products is resolved at the end of the stock. Beginning of the stock, purchasing of the items and finishing decides sale of the items. Overseeing business and the following of the stock is simpler at the initial phase of a business yet once the business begins growing dealing with the stock all the time turns into an extreme undertaking. The stock administration is a must for full usage of accessible assets. Numerous business organizations are depending on inventory management software .In spite of the fact that managing stock is production for a wide range of business, however, it is more production for the people who are included in the retail business. Stock contributes in evaluating the precise status of the production and aides in timely delivery of the items. An appropriate administration of stock makes enormous business effectively reasonable.

A Manufacturing stock contains every information about raw materials, finished goods, and production items. Following stock, all the time could spare the organization from loss and it helps in saving cash too [6].

1.1. MEANING AND DEFINITION OF INVENTORY

The importance of inventory is a "nitty gritty rundown of exchange products, goods, and so on." Many understand the word inventory as the part used for assembling of products and it is the foundation of finished goods. In a manufacturing organization which is notwithstanding the supply of finished goods, there will be a load of some finished goods, delicate materials, and trusts. The collective name of these things is called 'inventory '.

The expression "inventory" points to the in pile of production a firm is putting forth available to be purchased and the parts that sort out up the revenue. The inventory means total of those things of unmistakable individual property which:

1. are held available to be purchased in the standard form of work.
2. are currently producing for such deals.
3. they are to be in the production of products or managements to be accessible available to be purchased.

Inventories are expandable physical items held for resale for utilization in creating an item or for utilization in carrying on the business action, for example, inventory, products bought by the customer base which is prepared available to be purchased. It is the mediator blood who doesn't produce it [7] .

Finished Goods

Products being produced available to be purchased by the people who are prepared available to be purchased.

Materials

Materials, for example, raw materials, semi-finished goods or completed parts, which the strategies for success to consolidate physically into the finished products.

Supplies

"Goods, which will be consumed by the work in its working, The short inventory may be resolved as the material, which is either saleable in the business sector or usable specifically or in a round about way in the manufacturing technique. It additionally incorporates the other things which are prepared for making finished goods in some different procedure or by looking at them either by the business foundation itself and/or by outside gatherings. At the end of the day, the term inventory means the material having any of the accompanying attributes.

Raw materials, stores and overabundance segments, finished goods, and work-in-process have been included in inventories. The firm likewise assembles an inventory of procurements. Supplies included office and plant cleaning materials (cleanser, floor brushes, and so on oil, fuel, lights and the preferences) [8]. These items don't straightforwardly place down into the production process, yet are essential for the production process. Inventory constitutes the most significant piece of current resources of an extraordinary share of organizations in India. For instance, on normal inventories are more than 57 for each cent of current resources openly constrained organizations and just about 60.5 percent of government organizations in India. In this manner, it is totally basic to oversee inventories proficiently and viable keeping in mind the target to maintain a strategic distance from a fabulous interest in them. A company dismissing the management of stores will be risking its long run benefit and may soften up the last stage. It is feasible for an organization to decrease its level of inventories to an impressive amount, e.g. 10 to 20 for every cent with no hostile impact on revenue and gross receipts [9].

1.2. MANAGEMENT OF INVENTORIES

Inventories comprise of new materials, stores, extras, pressing materials, coal, rough items, deeds ahead of time and completed items in inventory either at the manufacturing plant or stores. It is the most vital element of current resources in the bond business and was 42 percent of total current resources of sample organizations as on March 31, 2014. In different commercial ventures to it is an essential piece of total investment [10]. The consideration of inventory means stopping of belief thus it takes the interest and expense of the firm.

In numerous nations mainly in Japan, incredible accentuation is set on inventory management. companies are made to minimize a load of inputs and revenue by fitting planning and generation of interest of differing inputs and creating just that much amount which can exchange the commercial centre. The inventory expense is an expense of store building for capacity, protection and obsolesce and development of inputs from the capacity to the inventory where the materials must be at long last used to win over them into finished goods. In japan commercial ventures have embraced the idea of JIT (Just in Time) and segments, materials are received [11].

There are numerous upcoming organizations who get segments straightforwardly at the get-together level and that too just for 3-4 of prerequisites at once. Indeed, even in the event of mass materials like iron mineral, which is imported from abroad, the base conceivable inventory is kept.

As against this all things considered in India the inventory of coal, raw materials, and pressing materials is genuine high and numerous things get to be garbage or out of date creating overwhelming misfortune to the company [12]. The absence of inventory arranging in India has been put out by different advisory groups, essentially because of vulnerabilities in supplies, the issue of

promising receipt of railroad wagons, the absence of arranging and untrustworthy suppliers the interest in inventory records is very high. The variance popular influences the inventory of completed result of which concrete industry has been a casualty in general.

1.3. OBJECTIVES OF INVENTORY MANAGEMENT

The primary objectives of inventory management are:

1. To minimize the likelihood of burden in the production timetable of a firm for the need of raw material, inventory, and extras.
2. To keep down capital interest in inventories. Subsequently, it is of the substance to have essential inventories. Reasonable inventory is a perfect asset of a business foundation [13]. The worry should depend to maintain a strategic distance. The interest in inventories should be only adequate in the ideal level. The major risks of over the top inventories are:
 - a) The excessive tie-up of the company's trusts and loss of benefits;
 - b) Excessive storing expense;
 - c) The danger of liquidity.

2. LITERATURE REVIEW

Various studies have been done in the field of stock administration by different analysts. Some of these are condensed beneath:

Accomplishment of any mechanical undertaking relies on the 6 m's

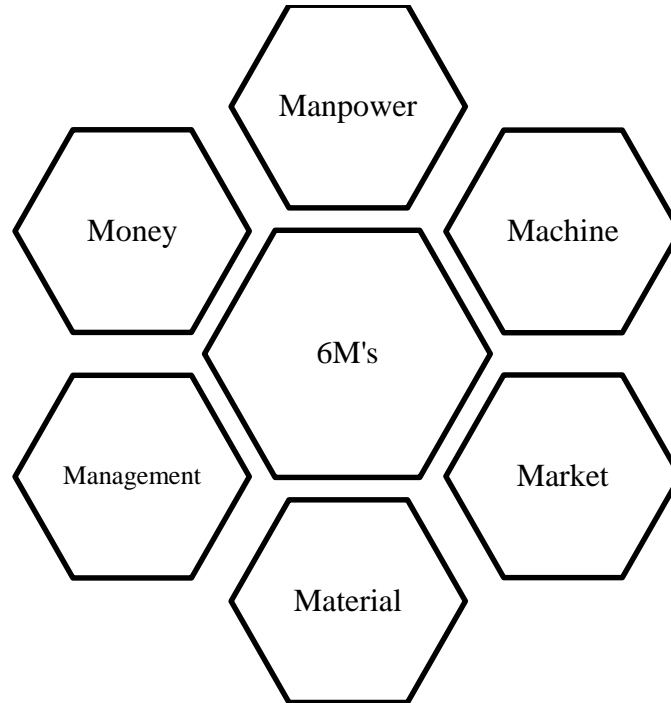


Fig 2.1 Six M's

Materials are of significant at least to some other M's. Issues have their root in material influences the proficiency of all men, machine, cash and advertising choices of the organizations and in this manner turn into the deep worry of administration at all levels. On the off chance that there were a lot of material issues like perfect assets tied up in extreme stock purchasing and inactive stock challenges market weight would emerge. Consequently, the significance of stock administration is figured it out.

Various studies have been done in the field of inventory management by different scientists. Some of them are given underneath.

Author – Arthur Snyder

The base center of stock administration is in transportation and warehousing. The choice taken by administration depends on the conventional strategy for stock control models. The conventional strategy for stock administration is how much helpful in nowadays the author tells about

it [14]. Additionally saying that the conventional technique is not a cost decreasing, it is so much expensive. Be that as it may, dealing with the stock is most critical work for any manufacturing unit.

Author - Jon Schreibfeder

It is anything but difficult to transform money as stock, the test is to transform stock once more into money. In mid-1990's period numerous vendor required help in controlling and dealing with their biggest resource 'stock'. In need of this, a few organizations created far-reaching stock administration modules and systems. These new bundles include huge new products intended to help vendors viably oversaw stockroom items. In the urge of executing this numerous plan vendor don't feel that they have picked up control of their stock [15].

Author - David J. Piasecki

In this, that by dealing with the stock it gets to be less demanding for the organization to meet the benefit objectives, shorter the money cycle, keep away from stock deficiency, plan unnecessary storing costs for inactive stock, and enhance productivity by reducing money transformation and receive JIT system. As per this book, organizations need to get the sleeve out about the stock. Boosting money related approach is another advantage that originates from better stock administration [16]. An expansive number of manufacturers appreciate funds and better execution by picking the methodology of stock decrease. For this the company needs to expand the profit and productivity and this includes keeping a careful perceiving eye on the charge in supply and order.

Author - Max muller

The greater part of the manufacturing organization vendors have to arrange and booking item which expects either vast production limit for figuring amounts of raw material and work in Process (WIP) necessities or interminable amounts of raw material and WIP materials for ascertaining production limit. There are numerous issues with this methodology and how to maintain a strategic distance from these by ensuring that the item you are purchasing surely considers limited amounts of required materials and in addition limited limits of work focus in the production department [17].

Author - Michael H.Hugous

In this book, that stock improvements perceives that various industry has distinctive stocks and necessities. Research has shown that arrangements are valued in an expansive extent from countless Euros. In this exclusive market area, the cost is certainly not a point of the nature of the arrangement, return of investment and convenience are vital [18].

Author - Mathew A. Waller, Terry Lesper

The setting of an amount of items for which the EOQ determination holds impressively well. However every now and then the trade out practices there is a total limitation that applies to the masses in general. Two normal types of problems are [19]:

- 1) The presence of approaching the plan to be assigned among loads of the items and
- 2) The production department having the capacity to prepare at most a specific number of production every year. On account of the important, the personnel regenerated amounts can't be picked freely.

Authors - P.Narayan, Subramaniyan Jaya

The stock administration and review of stock levels. According to this, stock administration needs to address two issue [20]:

Part I. The most effective method to advance normal stock levels.

Part II. The most effective method to survey (assess) stock levels.

This research tells about what is to be done and not to be done , and whatever the the amount of items should order in one complete order. average stock can be ascertained by oversimplified technique:

$$\text{Average Stock} = \frac{SI+EI}{2} \quad (2.1)$$

Where

SI – Starting Inventory

EI – Ending inventory

Author - Richard J tersiene

A bunch of work has been done however now on the off chance that will need to proceed and should have great permeability upon this field of exploration. That is the reasons given around end work for a complete review on the issue of store network administration with stock inappropriateness [21]. The author said that the point in this work is additional to exhibit the most critical foundation that allows a quality between the various sorts of dealing with the stock.

3. COMPANY PROFILE

AVR Manufacturers was started in the year 2003, with a huge industry experience of 30 years, have flourished an remarkable position in the manufacturing and supplying of sheet metal segments, squeezed parts and car segments. These include sheet metal parts, extraordinary sort washer, accuracy sheet metal press segments, profoundly drawn segments, and oil seal internal shells. In the update of the most recent innovation, these are broadly utilized as a part of assembly in the industries, for example, Automobile, Automotive, furthermore in other manufacturing firms. With learning and aptitude, AVR Manufacturers expanded its perspectives into manufacturing of car sheet metal parts in the wake of reviewing and examining both specialized and showcasing angles. In the time period of the most recent 10 years, the organization has accomplished a special spot in the manufacturing sector. It has a solid and fully satisfied customers. The company channels their work towards accomplishing total consumer loyalty by offering the customers with quality items. Items, inferable from its usefulness, strength, productivity, and cost viability are favored by a wide rundown of customers crosswise over India. Notwithstanding displaying finest quality, the whole item range is aggressively estimated, empowering us to acquire massive validity and confidence of the company's esteemed customers [22].

Quality Policy

The company has qualified professionals for examination of parts and products who keep a strict measure of the nature of the raw materials being acquired and also on the manufacturing procedure of the items. Further, the company provides guarantee to check the items at different phase / levels of manufacturing like [22]:

- Raw material test,
- Dimensional estimations amid generation,
- Hardness tests,
- Finished test like plating and powder covering,
- Final Inspection according to customer necessities.

Infrastructure

A great foundation is made with an incredible range of 10,000 square feet, which grant us to meet with the huge number of orders inside set time span. Infrastructure includes the accompanying machines [22]:

- Lathe machine,
- Welding machine,

- Mechanical power presses,
- Surface grinding machine,
- Fly press,
- Drilling machine,
- Round bar/Pin cutting machine.

Products range and feature are given in Table 3.1, product pictures – in Fig. 3.1.

Table 3.1 Products range and feature

Product range	Product feature
Sheet Metal Components for Automotive industries	Long service life
Sheet metal assemblies	Temperature resistant
Deep Drawn Parts	Durable
Pressed parts for Automotive industries	Corrosion resistant
Metallic Gaskets	Dimensionally accurate
Metal Inserts	
Automotive Jack Parts	
Special type Washers	
Fine Blanked Components	



Fig 3.1 Finished products pictures [22]

Different Types of Inventory

The stocking of goods happens in various stages and departments of an organization. A manufacturing organization holds stock of raw materials and consumables required for production. It additionally holds stock of semi-finished products at different stages in the plant with different offices. Finished goods stock is held at the plant, finished goods stores, circulation focuses and so forth. Further both raw materials and finished goods those that are in travel at different areas additionally shape a piece of stock contingent on who claims the stock at the specific crossroads. Finished goods stock is held by the organization at different stocking points or with vendors and stockist until it achieves the business sector and customer end. Other than raw materials and finished goods, organizations additionally hold inventories of extra parts to benefit the items. Damaged items, blemished parts and scrap likewise frames a piece of stock the length of these things are stocked in the books of the organization and have financial quality [23].

Main departments in the company, working with inventory, are presented in Fig. 3.2

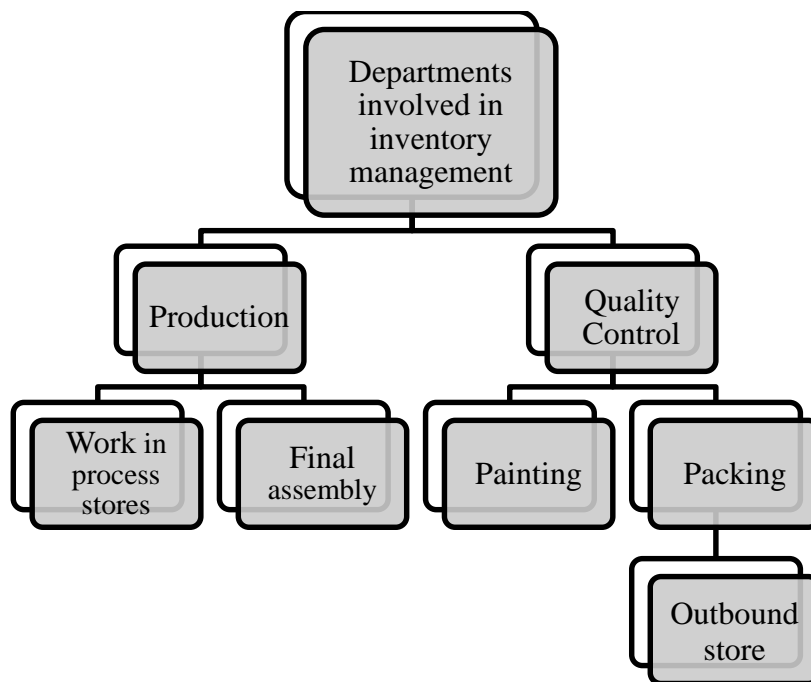


Fig. 3.2 The organizational structure of company

Table 3.2 Types of inventory by function [23]

INPUT	PROCESS	OUTPUT
Raw Materials	Work In Process	Finished Goods
Non production materials required for production process. Eg : fuel, stationary, bolts & nuts etc. required in manufacturing	Semi-finished products in different stages , lying in various departments (Fig 3.2)	Finished goods at delivery department throughout supply chain
Maintenance items/consumables	Production waste and scrap	Finished goods in transit
Packing Materials	Rejections and defectives	Finished goods with delivery department and dealers
Items purchased within local area required for production		Spare parts stocks & bought out items Defective reject and sales returns Repaired stock and parts Sales promotion & sample stocks

4. RESEARCH AND IMPROVEMENT OF INVENTORY MANAGEMENT IN COMPANY

The examination approach is one of the primary parts of extreme research. This clarifies how the analyst leads this undertaking. The word examination demonstrates the mode or the method for fulfilling an end. The cutting edge world is loaded with experimental productions and looks for an investigative viewpoint to everything. Any experimental methodology should have a technique or diagram to be taken after to accomplish a specific objective. Through methodological, methodical strategy, they can consider exactness and an obvious conclusion. There is no order without a philosophy. The approach received in this study is talked about beneath to sum things up.

Research design

An examination outline is the game plan of conditions for the gathering and investigation of information in a way that intends to consolidate pertinence to the exploration reason.

Research study

Clear sort of exploration has been received for this examination and portrayal of a marvel or qualities connected with the popularity are likewise managed.

Sample size

The example strategy is utilized for the exploration is a Judgmental examining system. Universe size is 380, the sample size is 50.

Research Type

Constructed a structured questionnaire for data collection. The questionnaire developed is given in the annex ,the questionnaire is given more thought to improving the inventory management in the firm.

Method of collection of data:

- Primary Data
Essential information is gathered through Questionnaire.
- Secondary Data
Production information has likewise been recorded from past examination of the company

Percentages

Percentages allude to a specific kind of extent. Parts are utilized as a part of drawing examinations of two or more arrangement of information. Percentages are utilized to portray connections, it is communicated as.

$$\text{Percentage} = \frac{SE}{TE} \cdot 100 \quad (4.1)$$

Where,

SE – number of sample employees

TE – Total number of employees

Charts

Charts are sensible presentations of data for the straightforward perception of relative positions that is not by and large possible with clear words or numbers. The forms of chart generally used as a business' division data presentation are bar and pie.

Bar charts

The bar chart is frequently utilized for presentation of subjective information. The information can be relentless or discrete data, which are plotted against discrete data intervals.

4.1. ANALYSIS AND INTERPRETATION OF INVENTORY MANAGEMENT DATA

Qualification of the employees

Here the data of the qualification of the employees is taken to know the degree of the company how they employ professionals and workers qualification how qualified are their employees. From the Fig 4.1, it is commenced that, 44% of the respondents are a degree holder and 20% of the respondents are Postgraduate (PG) and higher secondary (HSC) 16 % are diploma holders, from which the degree holders are the members needed for the firm.

Experience

This data is collected to know the experience of the employees in the company, how is the proportion the fresh employees and experienced employees this will help in developing new ideas and execute those ideas in the proper way the blend of fresh and experienced employees will give this advantage to the company From the Fig. 4.2 it is commenced that, 30% of the respondents are 1-2 years, 24% of the respondents are 0-1 years and 20% of the respondents are 3-4 years.

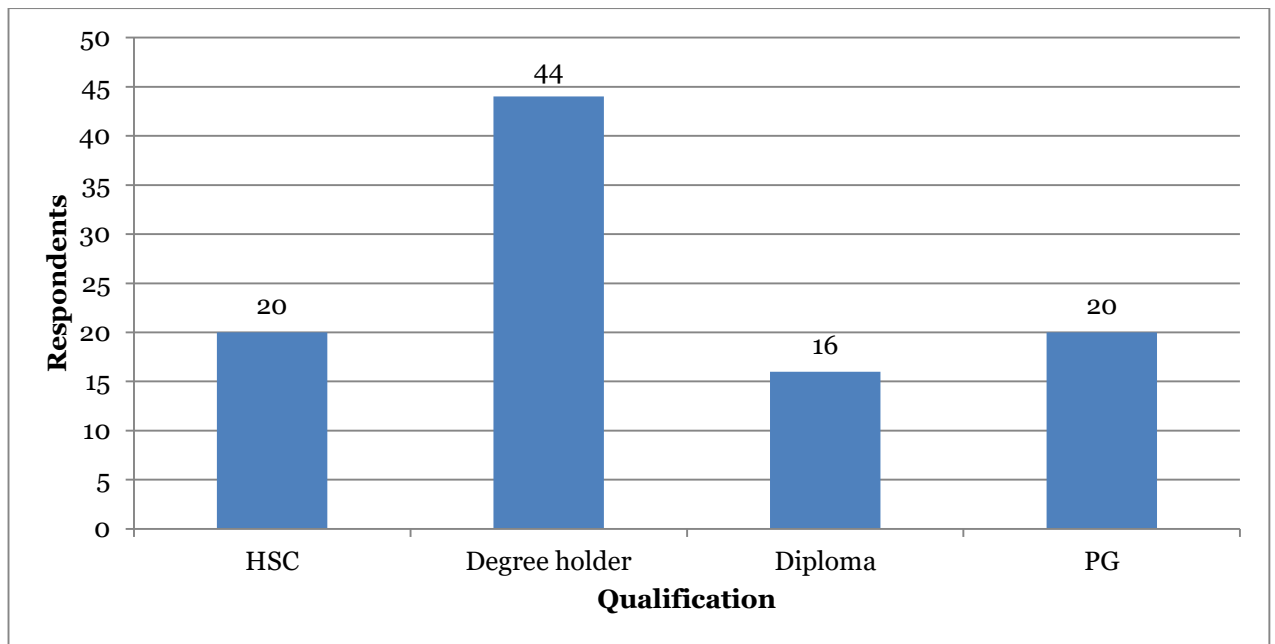


Fig.4.1 Qualification of employees

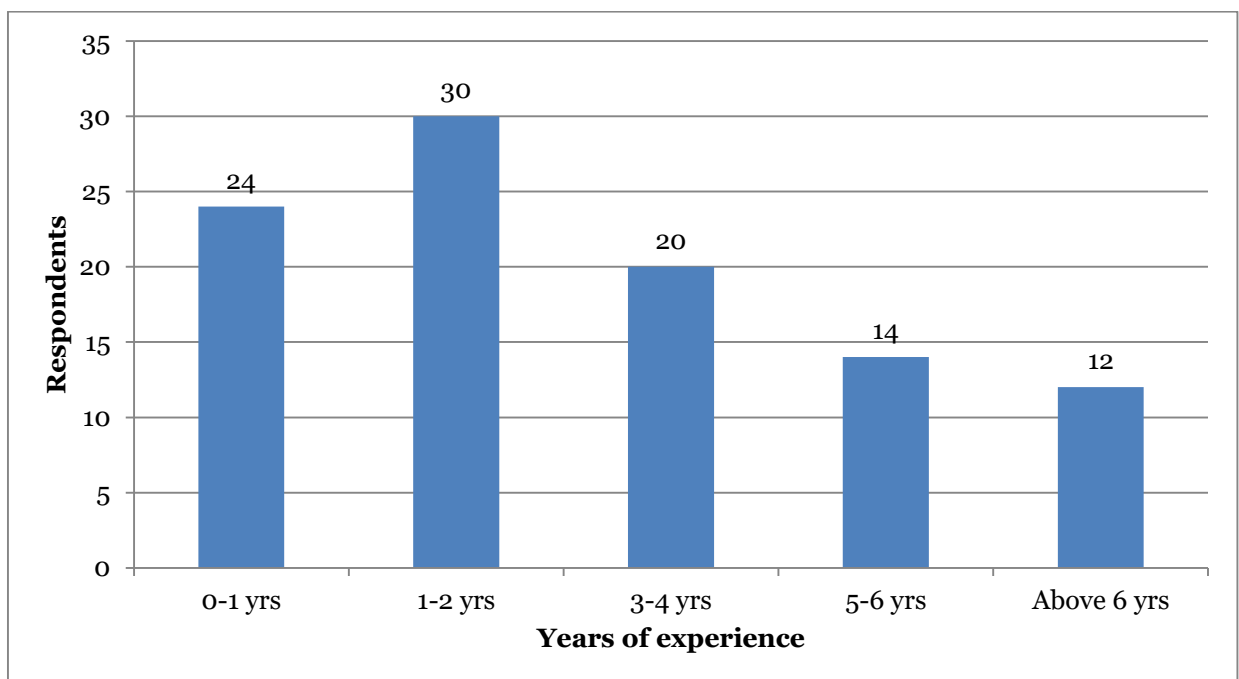


Fig. 4.2. Experience of employees

Department

The departments where the employees are chosen to answer the questionnaire this is the mixture of all departments but mostly the employees who work closely to the inventory. From the Fig 4.3 , production department is where the number of employees is questioned because this the department is which work closely to the inventory and which is followed by Purchase, packaging, delivery, sales, finance Departments.

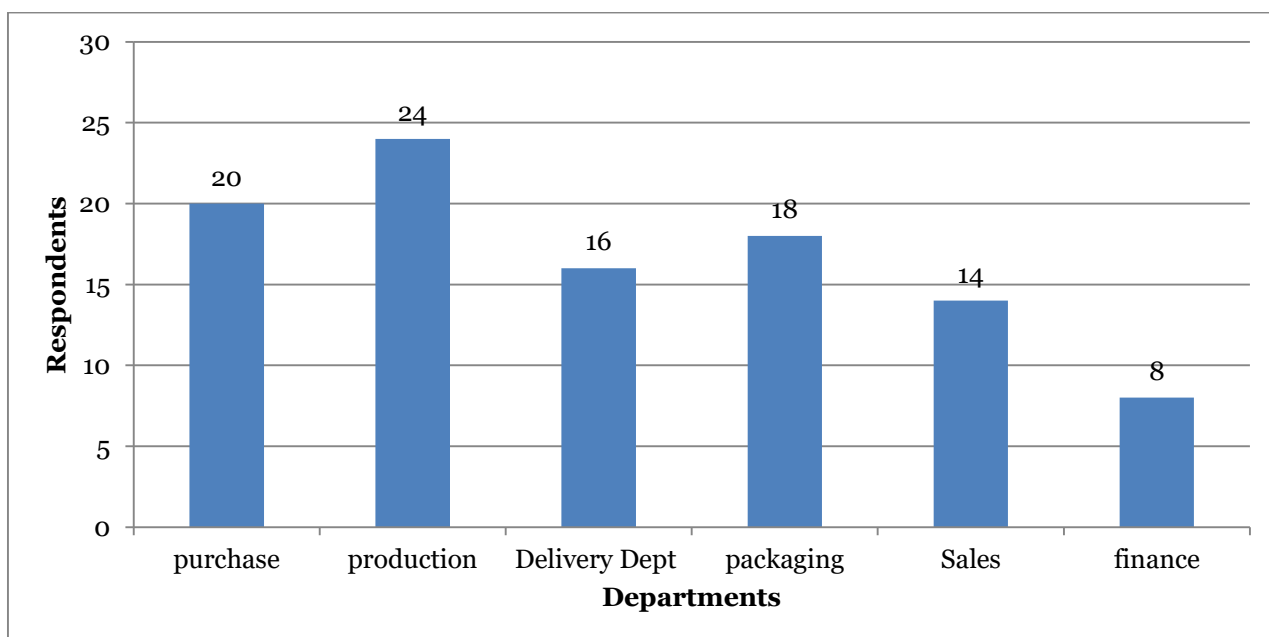


Fig 4.3 Departments in the organization

Types of method do the company use to check inventory

The employees answered what are the effective methods that are used by the company to make inventory more effective and which will be the best way to reduce the inventory cost and improved stock administration. From the Table 4.1 and Fig 4.4, it is clear that employees think Just in Time (JIT) method is more effective followed by Economic Order Quantity (EOQ), Kanban, Pareto analysis.

Table 4.1 Methods the company use to check inventory

S. NO	PARTICULARS	RESPONDENTS	PERCENTAGE
1	ABC analysis	15	30
2	Kanban	10	20
3	Pareto Analysis	2	4
4	EOQ	18	36
5	Other	5	10
	Total	50	100

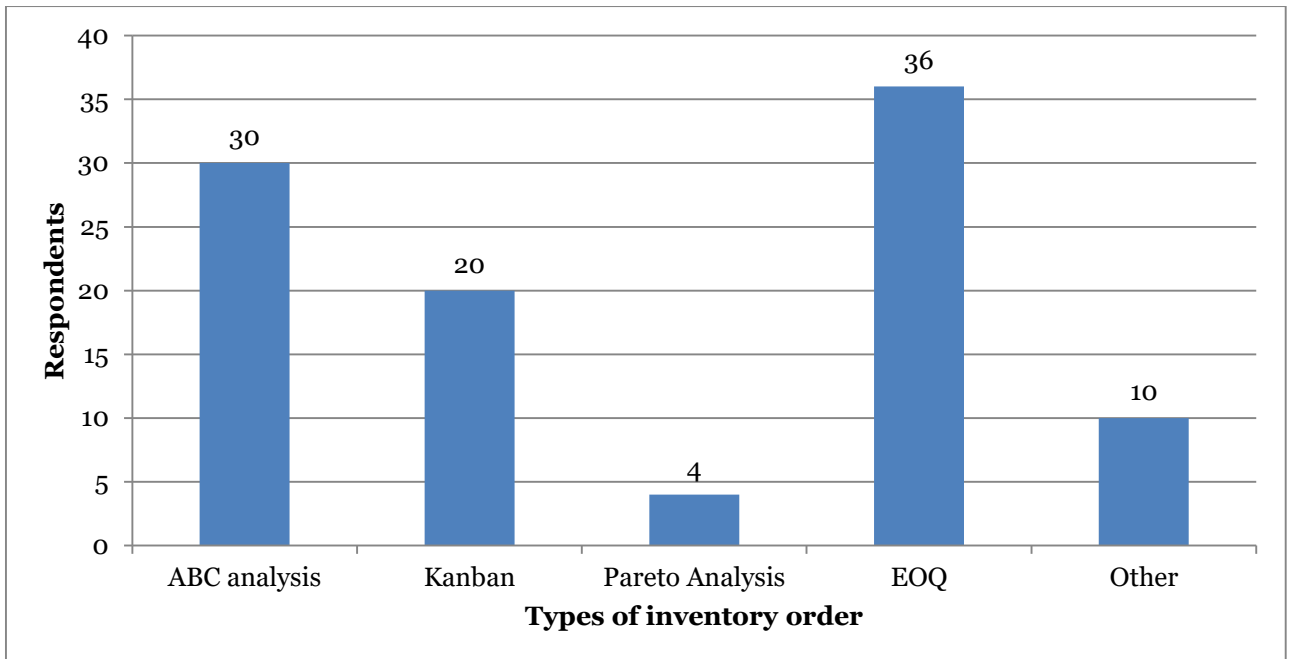


Fig 4.4 Types of method the company use to check inventory

Inventory locations are customizable

Location of the inventory should be customizable, if the business expands and orders are increased the need for inventory will be automatically more, if the inventories are not customizable it will lead to the problem of less space are no space for inventory so the production can be done in low quantity to expand the production the company should expand the inventory, so there should be more space and the inventory should be customizable. From this 70 % of employees agree that that the existing inventory is customizable and 30 percent don't agree because they feel the inventory is not spacious to do the alteration if the production increases.

Method of inventory order

There are four methods of inventory order:

1. FIFO - First in first out, the material came in first should be given primary priority;
2. LIFO - Last in first out, ie the material came in last should be given primary priority;
3. LILO - Last in last out, ie the material came last should be given least priority;
4. FILO - First in last out, ie the material came in first should be given least priority.

Table 4.2 Method of inventory order

S. No	PARTICULARS	RESPONDENTS	PERCENTAGE
1	FIFO	24	48
2	LIFO	15	30
3	LILO	5	10
4	FILO	6	12
5	TOTAL	50	100

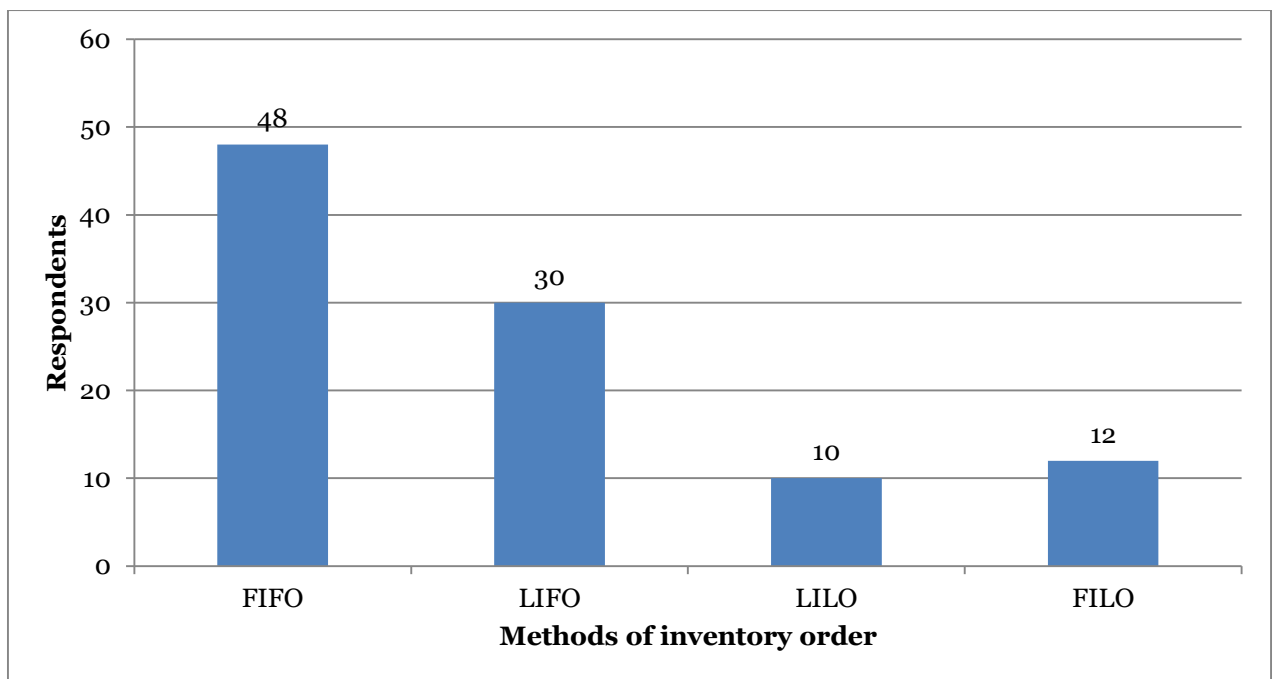


Fig.4.5 Method of inventory order

Management review and follow up reports of inventory turnover and inventory adjustments

Inventory administrators must follow up and review the inventory turnover and inventory adjustments to keep the track on inventory levels and make sure that inventory does not exceed the optimum level optimum level differs from company to company based on the size and production of the company. From the Table 4.3, 82 % of the respondents have agreed that following up and review report is done and 18 % respondents disagree because the inventory turnover is a little high and review is not done properly.

Table 4.3 Inventory report following

S. No	PARTICULARS	RESPONDENTS	PERCENTAGE
1	Strongly Agree	10	20
2	Agree	16	32
3	Neutral	15	30
4	Disagree	9	18
5	Strongly Disagree	0	0
	Total	50	100

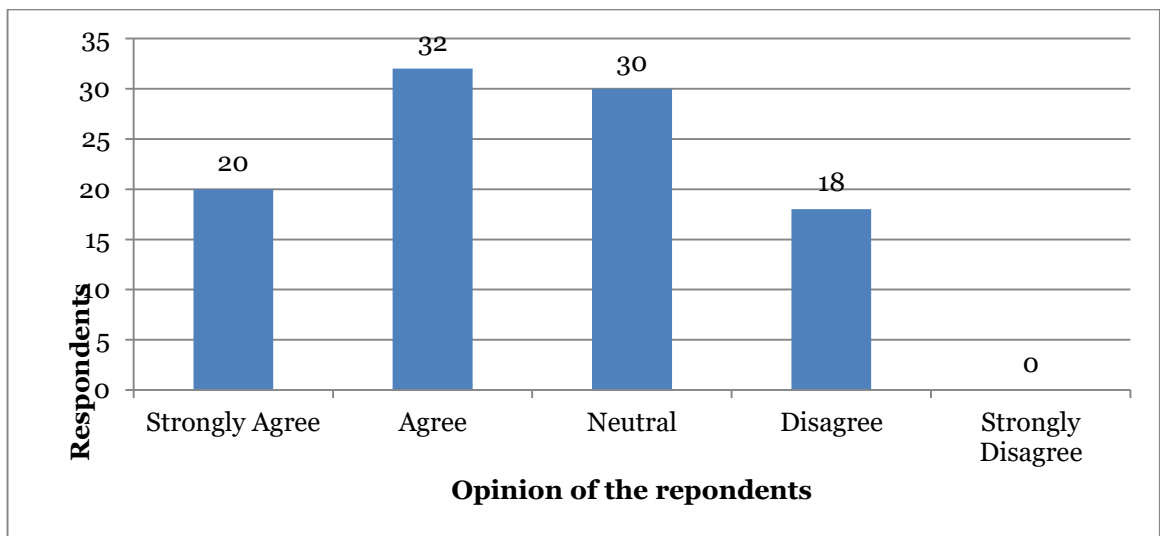


Fig.4.6 Inventory report following

Document procedure for inventory out

Documents should be maintained for the receiving of inventory for production, non – production materials, this is to keep a track of which material is used more and which is less which is fast moving and which idle or slow moving, and average moving materials so that the purchasing department can place the order according to the movement and usage of the material. 90 % respondents answered that documenting of materials is done correctly and 10% respondents feel the material taken out are not documented properly because the materials are missing when the cycle count is performed.

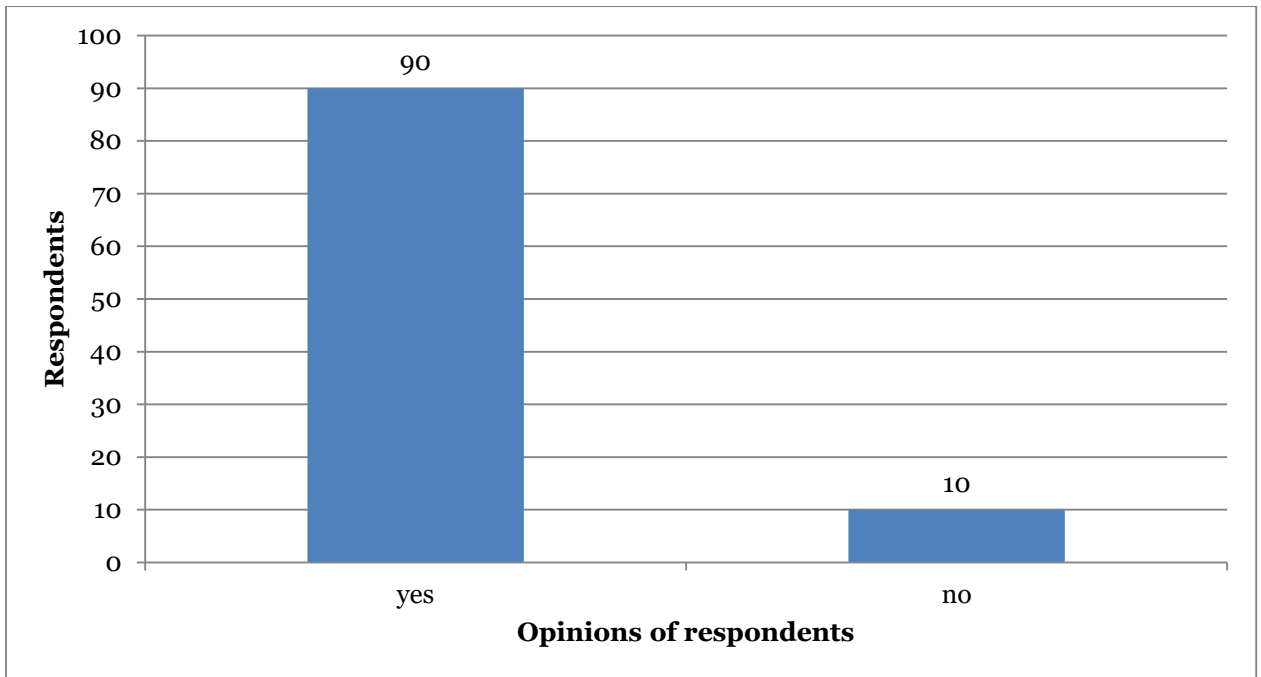


Fig.4.7 Document procedure for inventory out

Receiving, issuing, and target responsibilities properly segregated

Material receipt is checked once the material arrives from the vendor whether the order is received correctly and if the quality of the material is not as expected it is returned to the vendor ,everything is perfect about the order the material is stored in the respective places in the inventory ,material issued is done with the company for the production process and non-production, these materials is segregated based on their status .From the answers to the questionnaire, 70 % of the respondents are agreeing with the process and 30 % disagreed because the low-quality material is stored and issued for the production which leads to a lot of complaint from the customers so the inspection should be improved and material segregation should do after proper inspection.

Comparison quantities received against receiving reports

This comparison should be done daily to make sure that the received quantity and quantity entered in the report should tally each other ,comparing it in daily basis will help to avoid confusion in the quantity of the material received and entered in the report ,it helps in making work easier when the quantity is in large amount. From Fig 4.8 most of the respondents answered it is done monthly and weekly but it is to be done on the daily basis.

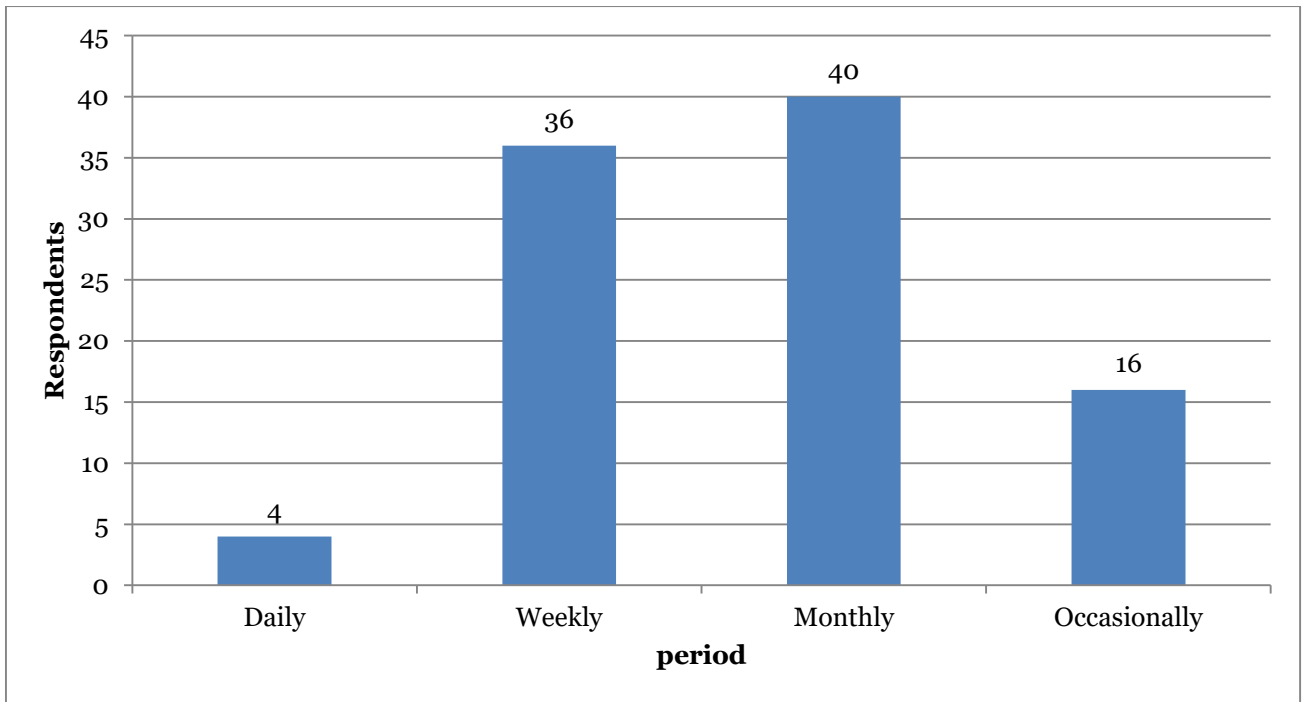


Fig.4.8 Compare quantities received against receiving reports

ABC analysis

It is categorizing inventory method where A items have more priority and it is used 70 to 80 % from the inventory and it is often reordered ,B items have average priority which is used from 40 to 50 % ,C items is the least priority and ordering this is very rare. From answers to the questionnaire, 76 % of respondents answered the company follows ABC analysis and 24 % answered that Priority for the items is not segregated they often find an ordering of A items and B items are not done at the correct time which makes the delay in the production.

Monitoring and approving the write-offs of obsolete and inactive inventories

Monitoring of damaged and inactive inventory is production because a certain amount of investment is struck with this kind of material so at the right time it should use in the production without compromising the quality by altering the material or by the making a good deal by selling it as the scrap material. From the questionnaire, the respondents answered negatively that that damaged and inactive inventories are not used properly in the profit of the company this occupy the space and wasting the investment of the company so the inactive material and damaged should be sold as scrap or to find a method to use it in the production.

XYZ analysis

This is something like ABC analysis where the materials are classified under X, Y, Z here X items are of high priority and expensive where it holds only 10 to 20 % of inventory careful monitoring of this item is required and frequent checking for the availability is required as this the production material from production where Y items are of average importance that holds 50 percent of the inventory and Z items is of least priority. From the questionnaire, 76% of respondents responded positively and the rest needs improvement in the analysis as the production is paused for the top priority items are delayed in receiving.

Management of lost material

Rank the factor by which the company should take necessary steps to safeguard the good from theft. Adequate steps to stop theft are given in Table 4.4 and fig 4.9

Adequate insurance coverage provided in all the units

From the answers to the questionnaire, 84% of the respondents are accepting that they have adequate insurance for all the units, 16% of the respondents are not accepting the statement they want more secure insure as they feel insurance is ineffective.

Table 4.4 Adequate steps to stop theft

S.NO	FACTORS	5	%	4	%	3	%	2	%	1	%	TOTAL
1	Adequate written instructions	15	30	20	40	5	10	10	20	0	0	50
2	Adequate supervision	10	20	10	20	20	40	5	10	5	10	50
3	Use of pre-numbered tags which are accounted for	5	10	3	6	22	44	20	40	0	0	50
4	Careful investigation of significant overages and shortages	2	4	25	50	13	26	10	20	0	0	50
5	The signing and dating of inventory count sheets by the person supervising the count	6	12	14	28	5	10	20	40	5	10	50
6	Clearly marking damaged and obsolete inventory	15	30	20	40	5	10	10	20	0	0	50
7	Prompt adjustment of records for inventory discrepancies after approval by a responsible official other than stores personnel	20	40	30	60	0	0	0	0	0	0	50

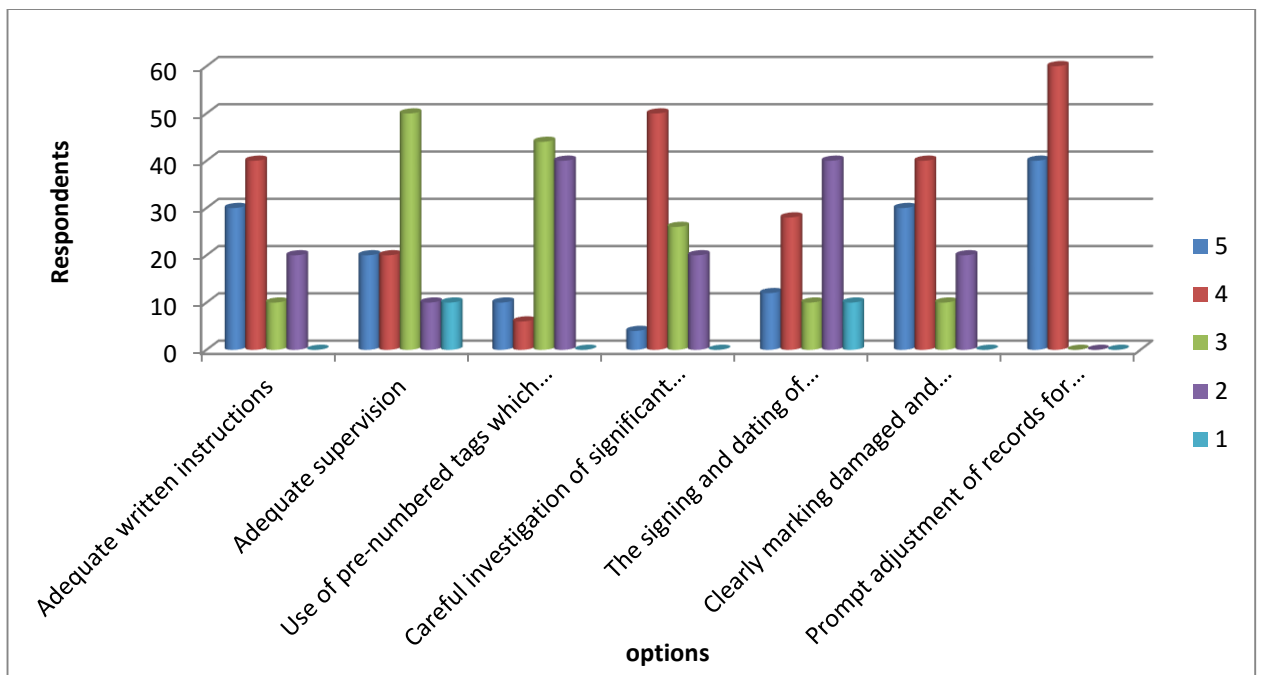


Fig. 4.9 Adequate steps to stop theft

Adequate arrangement for obsolete and inactive items are made

Packaging and production made good arrangements for the inactive and obsolete materials where other departments are below par in the arrangement. Delivery department should improve the arrangement process where lots of inactive inventories are stored and management should clear this material then and there to make more space for finished goods.

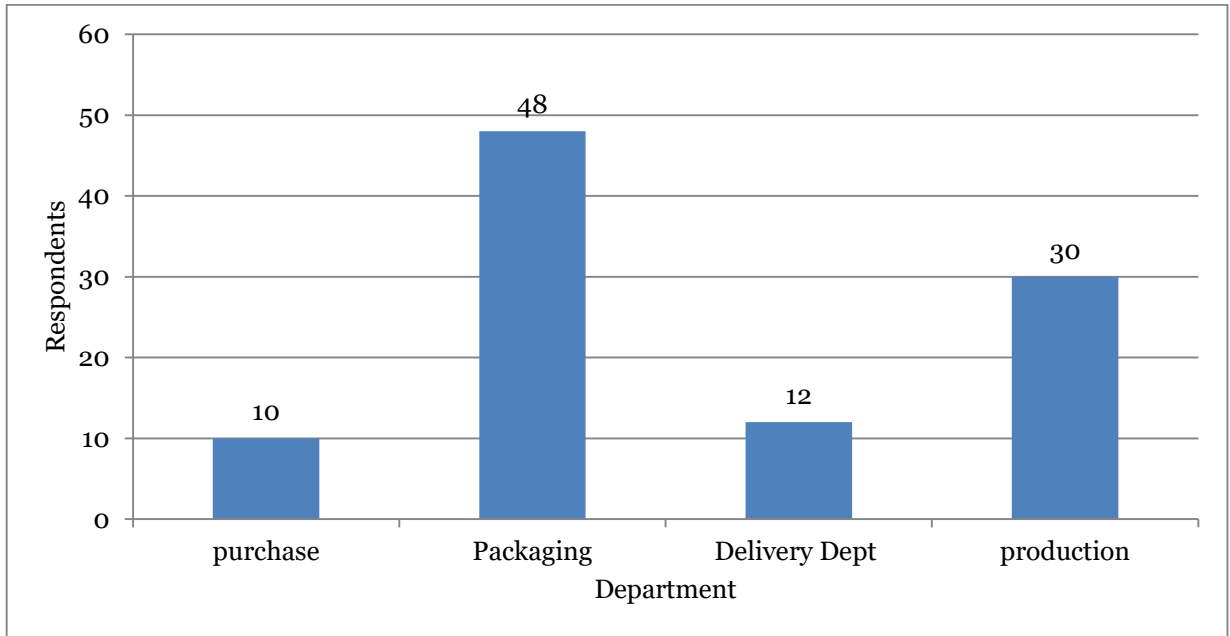


Fig 4.10 Adequate arrangement for obsolete and inactive items are made

Inventory items maintained in a secure location

Hazardous materials should be maintained in the proper condition. 76 % of respondents feel it is maintained safe and 24 % feel unsafe because the acids petrol and diesel should be kept in safer place to avoid accidents and while it is used by employees the safety measures should be taken by wearing appropriate safety costume, acids should be kept in more sand comparing to the current position.

Physical inventory conducted at least annually

Physical inventory is the time-consuming method and lot of resources are used as well the pre-printed sheets are used to check the count of inventory, by planning well the annual physical inventory is effective .Almost 92 % of respondents agree that physical inventory is handled annually and 8% disagree annual physical inventory is not conducted .negative answer is very low comparing to the positive it is taken into least concern.

Satisfaction level with the company's inventory control management

Satisfaction of the inventory management is 90% and only 10% of the respondents are dissatisfied with inventory management with some small improvements and suggestions it may reach 100%.

Table 4.5 Satisfaction of inventory control management in company

S. No	PARTICULARS	RESPONDENTS	PERCENTAGE
1	Highly satisfied	10	20
2	Satisfied	30	60
3	Neutral	5	10
4	Dissatisfied	5	10
5	Highly Dissatisfied	0	0
	Total	50	100

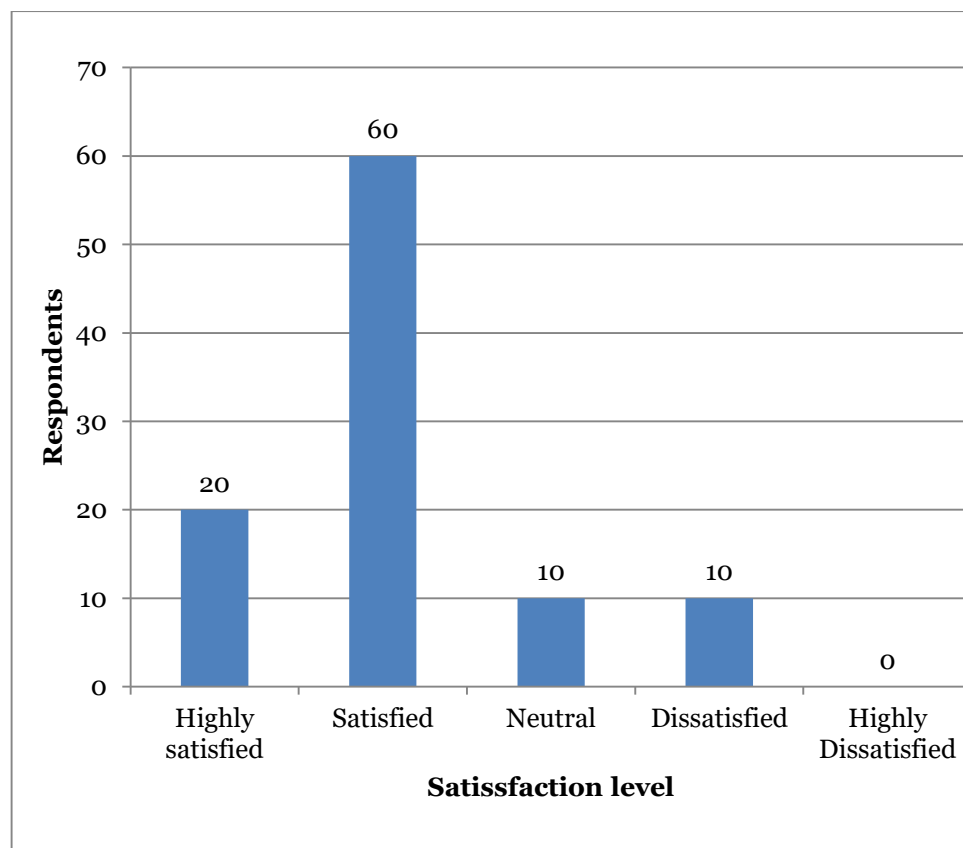


Fig 4.11 Satisfaction of inventory control management in company

Suggestions

- As the majority of the respondents are not using XYZ analysis, the company can guide them about the effectiveness of XYZ analysis.
- Management can promote the usage of different tools and methods have to be implemented to get a better output.

4.2. RESEARCH METHODOLOGY FOR STOCK ADMINISTRATION ANALYSIS

To figure out how the organization keeps every one of the information of stock flawlessly. This venture will help the organization to discover the effect of stock on working capital. It will read the stock administration and its viable control through different strategies. It will increase the measures for enhancing the stock level. It will help to keep up adequate stock in the organization for the smooth production and self-Operations. It will help to maintain the business operations of the organization in the smooth and coefficient way.

Scope of this research methodology

Stock administration being an important idea in all the organization's having a void scope regularly requires the administrative consideration. In the cutting edge times, stock administration has turned into the vital part of all organizations. So all the firm gives uncommon significance for stock administration. This research is to analyze the adequacy of stock administration system received by AVR Manufacturers; the data primarily concentrates on the systems utilized by the organization to control the stock. The data additionally covers different territories like the money related proportions for the time of 2011 to 2015.

Methods of Data Collection

The information is gathered from the regarded persons of the organization. The data is collected from the monetary record, tables, diagrams, graphs, and the organizations report.

Data Analysis Techniques

With the target of examination of the information and the report, it reminds the target and broke down every last information gathered at every phase of the report. It is utilized numerous instruments for investigating the information and the distinctive proportions utilized for it are as per the following:

- Raw materials turnover proportion;
- Work in process turnover proportion;
- Finished products turnover proportion;
- ABC Analysis;
- Economic order quantity (EOQ).

4.2.1. Data interpretation and its analysis

Valuation of Inventories in the company is at the plant and at the field.

At Plant

- Stores and Spares – At weighted normal expense.
- Raw Materials, Finished Goods and Work in Process – At Lower of Cost or Net Realizable Value. Yearly cost is processed on full ingestion costing strategy including material expense and transformation costs.
- Automobile parts of Substandard Quality – At Lower of Cost or Net Realizable Value as assessed by the Company. Yearly cost is figured on full ingestion costing strategy including material expense and transformation costs.

At Field

- Finished Goods – At Lower of Cost or Net Realizable Value. Yearly cost is registered on full retention costing technique including material expense and transformation costs. Expenses of field stocks incorporate cargo to the destination.
- Automobile parts of Substandard Quality – At Lower Costs or Net Realizable Value as evaluated by the Company.

Note

All the data was in Rupees (Indian currency since the firm is based in India), The data is changed from Rupees to Euros which is approximately 1 Euro = 0.013 Rupees on April 25 the, 2016)

4.2.2. Analysis of Stock Management

The total Stock management of the company includes the raw materials, Stock, work in process Stock, finished goods Stock. The total Stock of the company in 2014-2015 is 52.882 million Euros. AVR manufacturers have total of approx. 214683 different types of inventories.

The total stock of the company during 2010-2015 is given in Table 4.6 in Fig.4.12 demonstrates the total stock administration of the organization different parts during 2010-2015.

Table 4.6 Total stock of the company

PERIOD	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Total (in million)	35.20	52.46	50.4	56.24	52.882

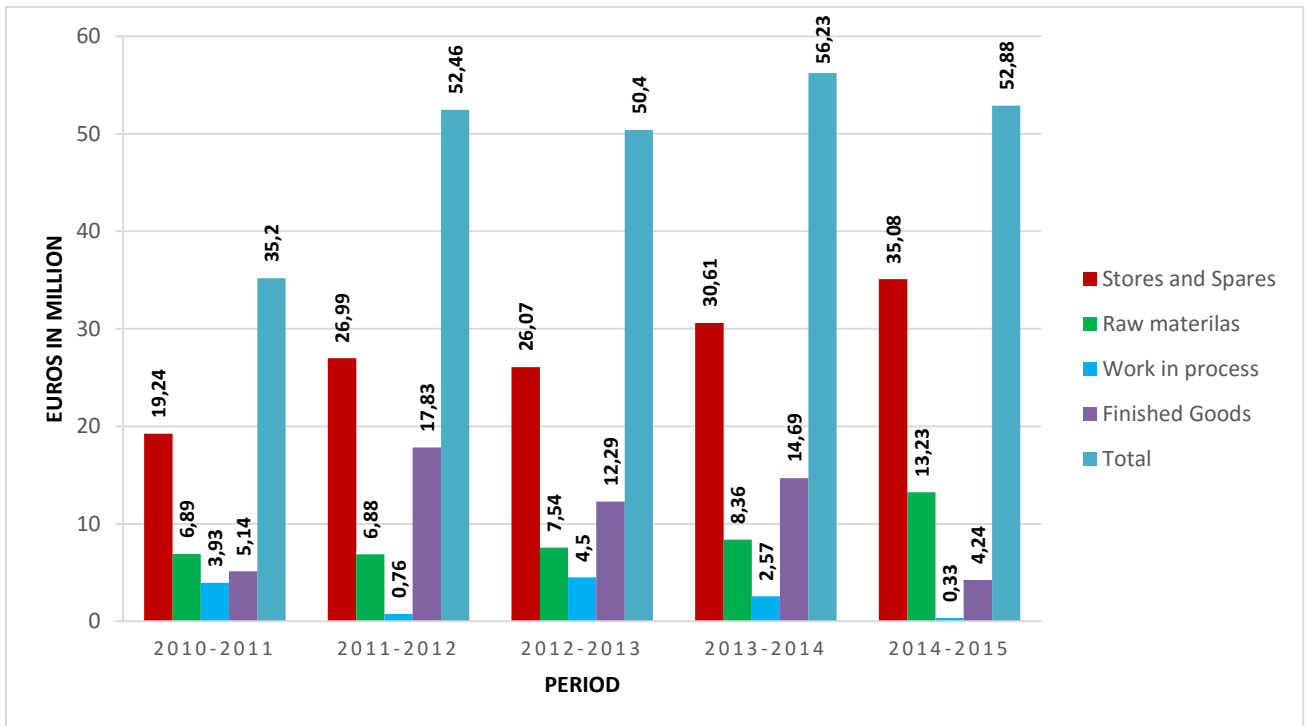


Fig. 4.12 Total stock administration of the organization different parts during 2010-2015

The research incorporates diverse parts of investigation of the stock administration at AVR Manufacturers which is as per the following:

- Analysis of the piece of stock;
- Effects of the different stock proportions;
- Study of the diverse stock administration systems;
- Find out the stock administration and control.

4.2.3. Examination of stock administration

Stock change period is firmly identified with the stock administration. The administration should look into how long it takes to change the materials in the inventory, more often the inventory

change the more the company grows economically and production is increased as the inventory is used often and changed often.

Analysis of networking cycle

Stock change is the part of the net operating cycle (Fig. 4.13):

- Raw material (RM) conversion period;
- Work in process (WIP) conversion period;
- Finished goods (FG) conversion period.

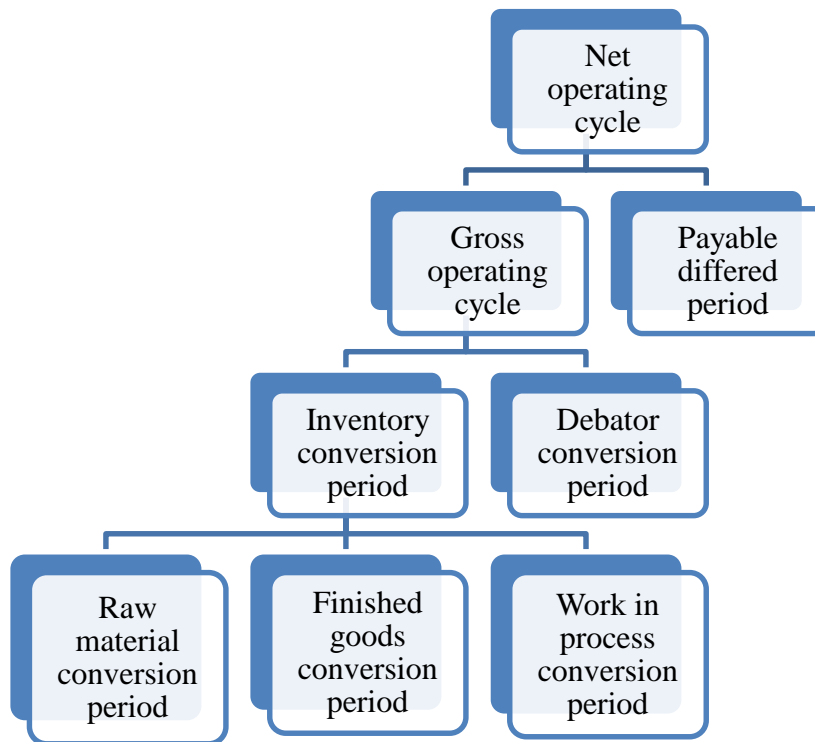


Fig. 4.13 The structure of Net operating cycle

1. Raw Material Conversion Period

Raw material change period is the time period between accepting the raw material and sending them for production. It is the time of stocking the raw materials for use. So higher the proportion lower will be the benefit

Raw Material Conversion Period (*RMcp*):

$$RMcp = \frac{RMs}{RMa} \tag{4.1}$$

where:

RM_{cp} – raw material conversion period, days;

RM_s – average raw material stock, Euros

RM_u – absolute raw material utilization Millions of Euros.

Table 4.7 Raw material conversion period

PERIOD	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Average Raw material Stock (in millions)	5.28	6.89	7.21	7.95	10.8
Total Raw material utilization (in millions)	0.28	0.38	0.45	0.45	0.45
Raw material Conversion Period	19 days	18 days	16 days	18 days	24 days

Interpretation raw material conversion period

In the above diagram, raw material change period lies between 15 to 19 days throughout the previous five years. In 2010-2011, it is 19 times which is bad for the organization in light of the fact that higher the proportion the lower will be the benefit. In 2013-2014, the proportion is 18 times which is likewise high thus not useful for the organization. So organization should try to decrease it.

2. Work in Process Conversion Period

Work-in-advancement change period is the time period when the raw materials are gotten for generation and the ideal opportunity for their dispatch. The higher the proportion the lower will be the productivity

Work in Process Conversion Period (WIP_{cp})

$$WIP_{cp} = \frac{WIP_{as}}{CP} \tag{4.2}$$

Where :

WIP_{cp} – Work in process conversion period

WIP_{as} – Average work in process stock

C_p – cost of production

Table 4.8 work in process conversion period

PERIOD	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Average WIP Stock	3.19	2.36	2.65	3.56	1.46
Cost of Production (in million)	0.68	0.92	1.07	1.10	0.65
W.I.P Conversion Period	5 days	3 days	2 days	3 days	2 days

Interpretation of work in process conversion period

In 2012-2013, the proportion is 2 days which is too low thus it is useful for the organization. In any case, in 2010-2011, the proportion is 5 days which is too high. Be that as it may, in 2013-2014 the proportion is 3 days which is low thus useful for the organization. In any case, the company has not contracted it and different organizations any choice can't be taken.

3. Finished Goods Conversion Period

Finished goods conversion period is the season of the capacity of finished goods in the stockroom until they are sold. The higher the proportion the low will be the benefit. On the off chance that stores the enormous stock in inventory then the company is losing the open door cost.

Finished Goods Conversion Period was calculated according to formula:

$$FGcp = \frac{\text{days in year}(365)}{FGtr} \quad (4.3)$$

Where

FGcp – Finished Goods conversion period

DY – 365 days

FGtp – Finished Goods turnover ratio

Table 4.9 Finished Goods Conversion Period

PERIOD	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Days in a period	365	365	365	365	365
Finished goods turnover ratio (in million)	42	28	27	26	34
Finished Goods Conversion Period	9 days	13 days	13 days	14 days	11 days

Interpretation of finished goods conversion period

In 2010-10, the proportion is 9 days which expanded by 5 days i.e. 39 days in 2013-2014 which is bad. Be that as it may, in 2014-2015 the proportion is 11 days which shows that gigantic stock in laying at the store thus the organization is losing its benefit thus the benefit in that year is low.

5. Stock Conversion Period

Stock conversion period demonstrates in a number of days our stock gets changed over. In this proportion, the company will consider the whole stock ratio. The company will also consider all kind of inventories i.e. raw materials, work in process and finished goods. The higher the proportion the higher will be the benefit.

Stock conversion period is calculated according to formula

$$S_{cp} = \frac{DY}{Str} \quad (4.4)$$

Where

Scp – stock conversion period

DY – Days in a year

Str – Stock turnover ratio (this is calculated in the next par)

Table 4.10 stock conversion period

PERIOD	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Days in a year	365	365	365	365	365
Stock turnover ratio	7	7	8	7	6
Stock conversion period	51 days	51 days	46 days	51 days	61 days

Interpretation of stock conversion period

In 2011-2012, the proportion is 9 days which demonstrates that in this year gigantic measure of benefit the organization has earned. So in this year, the benefit is high when contrasted with another year. Be that as it may, in 2013-2014 the proportion is 7 days which is exceptionally enormous in light of the fact that the finished goods transformation period are tremendous.

Table 4.11 All conversion period

PERIOD	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Raw material conversion period	19 days	18 days	16 days	18 days	24 days
Work in process Conversion Period	5 days	3 days	2 days	3 days	2 days
F.G. Conversion Period	9 days	13 days	13 days	14 days	11 days
Stock Conversion Period	51 days	51days	46 days	51 days	61 days

Analysis of different stock ratios

- A. Total Investment in Stock
- B. Total Stock Turnover Ratio
- C. Work in Process Turnover Ratio
- D. Finished Goods Turnover Ratio

A. Total Investment in Stock

This demonstrates the measure of stock with the organization. The lower the sum the higher will be the benefit, however, higher the sum the lower will benefit. There is a converse connection in the middle of profit and stock.

Table 4.12 Total investment in stock

PERIOD	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Stock(in million)	35.45	51.09	50.76	56.65	53.27

Interpretation of total invests in stock

From the above diagram, it can be seen that in 2013-2014 the measure of stock is € 56.67 (in million) because of which the benefit additionally decreased thus the benefit is low in 2010-2011.

B. Total Stock Turnover Ratio

Total stock turnover proportion is concerned with the expense of products sold and normal stock.Total stock turnover proportion is shown how often stock is changed amid the year typically,

Inventories speak to suppliers of readymade products or raw materials that are should have been kept with a specific target to have the capacity to meet the orders of customers. The higher the proportion the higher will be the benefit and lower the proportion lower will be the profit

$$TStr = \frac{CGS}{As} \quad (4.5)$$

Where

TStr – Total stock turnover ratio

CGS – cost of goods sold

As – Average stock

Table 4.13 Stock turnover ratio

PERIOD	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Cost of Goods sold (in thousands)	2426.87	3263.48	4075.02	3582.64	4075.02
Average Stock (in thousands)	350.74	435.20	512.19	540.16	552.75
Stock Turnover Ratio	7 days	7 days	8 days	7 days	6 days

Interpretation of stock turnover ratio

The stock turnover proportion for the year 2014-2015 is 6 times which is most minimal and came about into low productivity. The most elevated proportion is found in 2012-12 which is 8 times and it is useful for the organization. Be that as it may, any choice can't be taken for it since company have recently looked at the information on recent years of AVR Manufacturers just and not of four to five different organizations proportions which are going to this industry.

C. Work in Progress Turnover Ratio

Work in process turnover proportion is concerned with the expense of products sold and normal work in process stock. Work in process turnover proportion indicates how a frequent function in procedure stock is supplanted amid the year. Work in the process shows the stock pulled back from the distribution center and are yet to get changed over into completed stock. The higher the proportion the higher will be the administration proficiency. Typically,

$$WIPtr = \frac{CP}{WIPas} \quad (4.6)$$

Where

$WIPtr$ – work in process turnover ratio

CP – cost of production

$WIPas$ – Average work in process stock

Table 4.14 work in process turnover ratio

PERIOD	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Cost of production (in million)	0.68	0.92	1.07	1.10	0.65
Average WIP (in million)	3.19	2.36	2.65	3.56	1.46
Work in Process Turnover Ratio	0.21 days	0.39 days	0.40 days	0.31 days	0.45 days

Interpretation of work in process turnover ratio

In 2012-2013, the proportion is approximately 0.40 times which demonstrates great gainfulness for the organization. Yet, it decreased to 0.31 times in 2013-2014 which indicates diminish in productivity, the organization is taking more opportunity to deliver finished goods which are bad for the organization.

D. Finished goods turnover ratio

Finished goods turnover ratio is concerned with the expense of products sold and average finished goods stock. Finished goods turnover ratio shows how frequently finished goods are supplanted amongst the year. Typically,

$$FGtr = \frac{CPS}{FGas} \tag{4.6}$$

Where

$FGtr$ – Finished goods turnover ratio

CPS – cost of products sold

$FGas$ – Average finished goods stock

Table 4.15 Finished goods turnover ratio

PERIOD	2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
Cost of goods sold (in millions)	241.29	324.47	405.15	356.20	327.83
Average finished goods	5.72	11.57	15.17	13.59	9.54
Finished Goods Turnover Ratio	42 times	28 times	27 times	26 times	34 times

Interpretation of finished goods turnover ratio

Finished goods turnover proportion shows the amount of time finished goods gets a turnover. The higher the proportion the more will be the deals and the other way around. However, after it thusly diminishes and keeps going to 26 times in 2013-2014 which is not a decent sign for the organization. It demonstrates that organization is holding enormous stock at the distribution center.

4.3. ABC ANALYSIS

At the point when ABC Analysis is connected to a stock situation, it decides the significance of items and the level of controls on the item. By separating an organization's Inventory into various classifications – A, B, C; directors can concentrate on the things that record for most of the stock. The adjustment of Pareto's Law of the indispensable few and inconsequential numerous takes after an example:

A stock records for around 20% of the item and 80% of the cash utilization;

B stock records for around 30% of the item and 15% of the cash utilization;

C stock records for around half of the item and 5% of the cash utilization.

These rates are estimated and shift from organization to organization. Ordinarily the arrangements are based upon yearly cash utilization, yet other criteria can be utilized, for example, transaction use, unit cost, lead time, and others.

The progressions in doing the ABC analysis are: decide annual utilization of every Item, multiplying the annual use by the cost of the product to get the total annual expense, add the total money use of all items to get total annual amount stock use, divide the total expense of every item by the total

stock consumption to achieve the rate of percentage use for any item, list the in rank order by the percentage of total use, and survey annual use distribution and order things as A, B, or C. While doing an ABC order, separate analysis should be performed for various sorts of stock. ABC investigation gives the way to distinguishing those things that have the biggest effect on an organization's general stock cost execution. Distinctive controls are utilized for every arrangement to enhance stock execution. "A" Items have more tight controls on stock records and more frequent surveys of estimating, forecasting, demand requirements, order quantities, safety stocks, and cycle counts. "B" items have comparative controls to "A" items are less frequent. "C" things have the least complex controls. They are just vital if there is a deficiency of one of them. Along these lines, "C" items can be ordered in bigger amounts [24].

ABC analysis for the period 2011-2015 is given in Fig. 4.14 and Table 4.16.

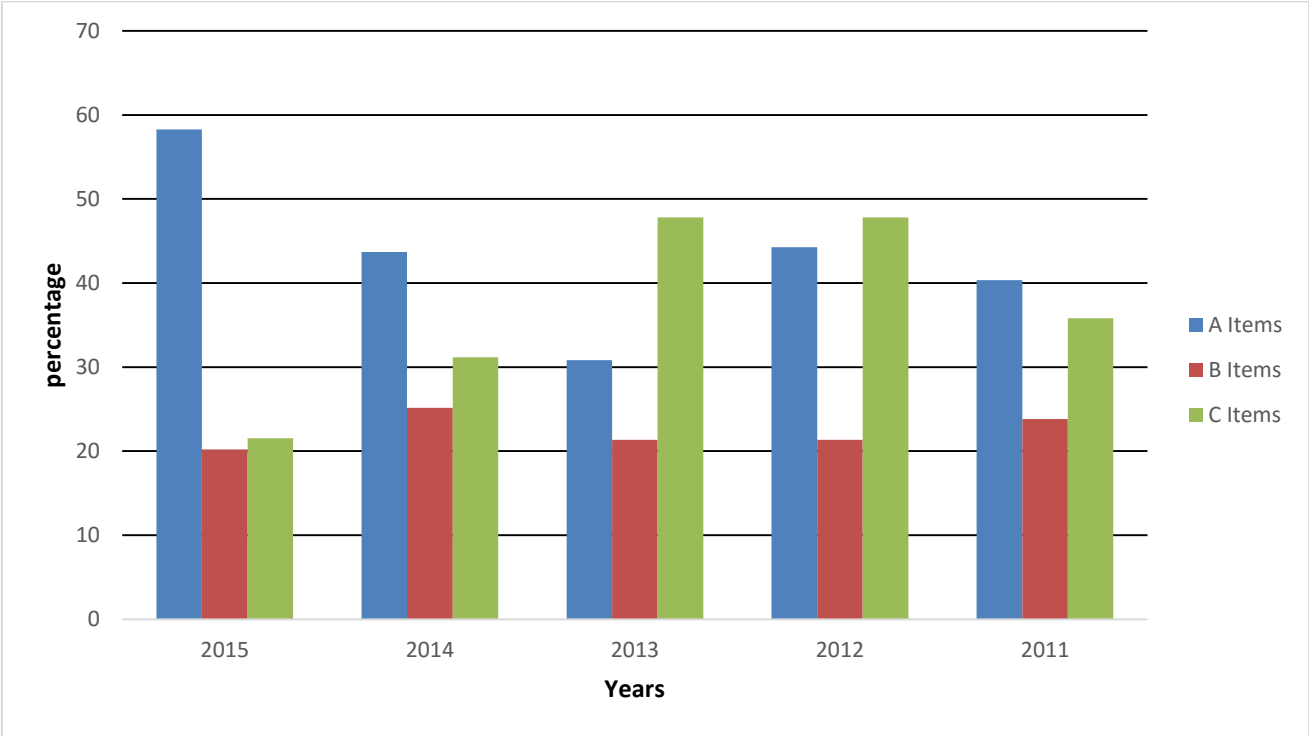


Fig 4.14 ABC analysis for the period 2011-2015

Table 4.16 ABC analysis for the period 2011-2015

NO	INVENTORY	2015		2014		2013		2012		2011	
		€	%	€	%	€	%	€	%	€	%
	A items										
1.	Spindle Unit Assembly (1)	92055.3	5.6	97500	4.36	88400	3.37	117000	5.93	106600	5.57
2.	Brush,Plate,Plug,Switch,Cover,Ass embly	52603	3.2	78000	3.49	73918	2.81	77025	3.90	72800	3.80
3.	Cover Assembly K 200 M	130902.6	9.18	126854	5.67	132600	6.05	72800	3.69	109200	5.71
4.	Spindle Unit Assembly	62466.09	3.84	65325	2.92	62777	2.39	29900	1.51	26000	1.36
5.	Gear Boxing (Hyundai)	55325.23	3.40	78650	3.52	47164	1.80	80600	4.08	31837	1.66
6.	Mounting Bracket Assembly	112110.20	8.05	113971	5.10	81718	3.11	117000	5.93	94432	4.93
7.	Wiping System (Indica)	193329.27	11.90	197613	8.84	55796	2.12	15028	8.58	137644	7.19
8.	Assembly Bracket	48960.27	3.01	49699	2.22	15626	0.60	52260	2.65	44460	2.32
9.	Wheel Box Assembly	39925.70	2.45	78780	3.52	112996	4.30	77675	3.93	65000	3.40
10.	Brush Plate Assembly	401361.1	2.47	40300	1.80	39000	1.49	40300	1.80	40300	1.80
11.	Gear Box Assembly	401361.1	2.34	37830	1.69	37336	1.42	21450	1.09	23400	1.22
12.	Brush Plating Assembly	3077.28	2.85	26000	0.58	35997	1.37	23400	1.19	26325	1.38
	TOTAL for A	1462574.5	58.29	990522	43.71	783328	30.83	724438	43.30	777998	40.34
	B items										
13	Link end assembly	36986.10	2.14	60866	3.77	13000	0.50	36400	1.84	26000	1.36
14	Limit switch	27724.83	1.70	37700	1.69	12441	0.47	36140	1.83	33800	1.77
15	Shaft link and pin assembly	29705.18	1.82	67600	3.02	65000	3.48	65000	3.29	70200	3.67
16	Bundy tube	23104.03	1.41	25454	1.35	25519	0.97	33800	1.71	31824	1.66
17	Brush plate	30365.29	1.86	40300	1.80	39000	1.49	35529	1.80	34190	1.79

Table 4.16 ABC analysis for the period 2011-2015 (continue-1)

NO	INVENTORY	2015		2014		2013		2012		2011	
		€	%	€	%	€	%	€	%	€	%
18	Primary tube assembly	29259.38	1.61	60866	3.77	49400	1.88	29796	1.51	39000	2.83
19	Ball bearing	24820.33	1.52	39221	1.75	38454	1.46	27300	1.38	24570	1.28
20	Thermal cut	25770.89	1.58	13000	0.58	37336	1.42	6500	0.33	12285	0.64
21	Shaft link pin assembly	25454.04	1.56	72800	3.02	65000	3.48	65000	3.29	70200	3.67
22	yoke	27936.07	1.71	72800	3.26	87100	4.97	67600	3.42	74100	3.87
23	Rear mounting bracket	53587.09	3.28	25220	1.13	32500	1.24	24232	1.23	24700	1.29
	TOTAL for B	334713.23	20.19	515827	25.14	464750	21.35	427297	21.63	440869	23.83
	C items										
24	Washer	7142.45	0.43	8177	0.37	34502	1.3	6812	0.34	6812	0.36
25	Steel ball	7432.90	0.45	13000	0.58	22360	0.9	10400	0.53	9100	0.48
26	screw	7010.42	0.42	16250	0.73	26650	1.0	17784	0.90	16900	0.88
27	Bolt	7908.18	0.48	19045	0.85	19500	0.7	19500	0.99	13000	0.68
28	Nut	7234.86	0.44	6019	0.27	6500	0.2	5200	0.26	9100	0.48
29	Pressure Pad	6838.79	0.41	6500	0.29	12779	0.5	6045	0.31	5460	0.29
30	Spring clip	6812.39	0.41	9490	0.42	8957	0.3	4160	0.21	6500	0.34
31	Con and bush assembly	7353.68	0.45	16705\	0.75	18200	0.7	12454	0.63	13000	0.68
32	Felt washer	6759.58	0.42	7982	0.36	10075	0.4	9425	0.48	9490	0.50
33	Ferrule	9188.80	0.56	10140	0.45	11700	0.4	8164	0.41	4251	0.22
34	Label	7459.30	0.45	15951	0.71	18200	0.7	17264	0.87	13364	0.70
35	Switch unit	7446.1	0.44	19890	0.89	11570	0.4	10764	0.55	12051	0.63
36	Final gear assembly	11089.93	0.68	10920	0.49	5772	0.2	10556	0.53	15600	0.82
37	Bearing bush	10707.07	0.65	10543	0.47	97500	3.7	11596	0.59	13143	0.69

Table 4.16 ABC analysis for the period 2011-2015 (continue-2)oi

NO	INVENTORY	2015		2014		2013		2012		2011	
		€	%	€	%	€	%	€	%	€	%
38	Magnet	12555.37	0.77	12363	0.55	50700	1.9	12376	0.63	11700	0.61
39	Pole	14390.51	0.88	14170	0.63	24700	0.9	11700	0.59	19500	1.02
40	commutator	8660.71	0.53	8528	0.38	8944	0.3	7150	0.36	6500	0.34
41	Primary link assembly	10192.18	0.62	10036	0.45	10114	0.4	4225	0.21	3900	0.20
42	Carbon bush	8053.40	0.52	20800	0.93	19838	0.8	15600	0.79	14300	0.75
43	Rotator link	12938.26	0.50	47580	2.13	49140	1.9	39000	1.98	35100	1.83
44	Bearing pin	10060.15	0.80	9906	0.44	10660	0.4	9100	0.46	37700	1.97
45	Rubber pad	8489.08	0.50	89700	4.01	111800	4.3	87100	5.41	78000	5.08
46	Armature insulator	8198.63	0.90	23413	1.05	117000	4.5	27066	1.37	27300	1.43
47	Bundy tube with insul	13202.30	0.80	19500	0.87	23400	1.42	26000	1.32	22100	1.15
48	Crank pin	8211.83	0.89	22100	0.99	20228	0.8	15600	0.79	13000	0.68
49	Crank plate	100469.52	0.72	11180	0.50	53560	2.0	10660	0.54	11700	0.61
50	spindle	14707.36	0.49	14300	0.64	19500	0.7	7787	0.39	7800	0.41
51	Needle bearing	14641.35	0.48	22217	0.99	12350	0.5	2340	1.19	15600	0.82
52	Plug moulding	11868.87	0.41	11700	0.52	56550	2.2	7800	0.40	20800	1.09
53	Nozzle Holder	8040.20	0.44	15600	0.76	19500	0.7	13000	0.66	6175	0.32
54	Self tap screw	8000.59	0.45	5668	0.25	13000	0.5	5564	0.28	5551	0.29
55	Lock Nut	7234.86	0.44	8307	0.37	10101	0.4	6838	0.35	10400	0.54
56	Spring washer	7307.47	0.48	7150	0.32	78000	3.0	7800	0.40	13000	0.68
57	Circlip	7439.5	0.44	7800	0.35	49400	0.0	4550	0.23	3250	0.17
58	Rivet	7211.76	0.44	4550	0.20	18200	0.7	11700	0.59	12480	0.65
59	Seal	7842.17	0.48	12584	0.56	26975	1.0	13000	0.66	13000	0.68

Table 4.16 ABC analysis for the period 2011-2015 (continue-3)

NO	INVENTORY	2015		2014		2013		2012		2011	
		€	%	€	%	€	%	€	%	€	%
60	Protective cover	7399.89	0.43	13741	0.61	23400	0.9	4186	0.21	6500	0.34
61	Breather Plug	7340.48	0.44	6240	0.28	65000	2.5	21125	1.07	13000	0.68
62	Thrust Screw	7888.38	0.48	21671	0.97	17862	0.7	26650	1.35	22100	1.15
63	Gasket	7305.5	0.43	65000	2.91	54600	2.1	67600	3.42	61100	3.19
64	Trust Pad	6951.01	0.43	10855	0.49	10855	0.4	8541	0.43	10400	0.54
65	Screw cover Plate	6812.39	0.45	8307	0.37	10101	0.4	8138	0.41	16900	0.88
	TOTAL for C	463798.17	21.52	678873	31.15	1289743	47.82	632320	34.09	666627	35.83

4.4. ANALYSIS OF ECONOMIC ORDER QUANTITY

Economic order quantity

Small organizations require a productive, effective and quality inventory system to increase profit. The Economic Order Quantity is a primarily utilized system of a regular survey of the inventory system. There is a formula for EOQ which figures the optimum quantity of Products a company must order to reduce the expense of the company and increase the value when stocking the materials again. Small entrepreneurs should assess the pros and cons of this inventory type before executing it in the company. Target stock is expensive for Small entrepreneurs. The most important advantage of the EOQ is the customized suggestions which are provided in regards to the most economical number of units per order. The EOQ propose purchasing a bigger amount in less order to make an immense advantage of mass purchasing and reducing the expense of order costs. Then again, it might indicate more order of fewer items to minimize holding costs which is important in inventory cost, that are high and ordering expenses are generally low [25].

The inputs of EOQ are [25]:

- A. Annual usage of material
- B. Ordering cost
 - 1) Ordering cost of purchasing item
 - 2) Ordering cost of manufacturing
- C. Carrying cost
 - 1) Interest
 - 2) Insurance
 - 3) Tax
 - 4) Storage cost

Formula

$$EOQ = \sqrt{\frac{2 \cdot U \cdot CO}{MC \cdot SCR}} \quad (4.7)$$

Where

U – Annual material requirement

CO – Cost per order

MC – Material cost

SCR – Stock carrying rate.

In economic order quantity stock carrying cost percentage is calculated by a formula, Most Details and data like stock carrying cost, inventory capital cost are confidential for the company which the company never provided for calculation, because of for calculating these data like debt, tax, capital asset pricing model all these are needed, so for maintain confidentiality the company didn't provide these details for the result. The Stock carrying cost of the item is provided directly for ten items, which are B and C type Items which is of less importance but purchased in a mass quantity, so to calculate the optimum quantity to be ordered the EOQ is calculated for ten items ,which is purchased in high numbers ,and occupying more space in the inventory, the following formula are used to calculate stock carrying cost, since the data is not provided the following formula is not used to calculate ,just to explain the how it is calculated the formulas from 4.8 to 4.10 are given,

Formula storage carrying cost [26].

$$SCC = \frac{COIPY}{IV} \quad (4.8)$$

Where

SCC – Stock carrying cost,

$COIPY$ – cost of carrying inventory per Year,

IV – Inventory value.

$$COIPY = ICC + ISC + IStC + IRC \quad (4.8.1)$$

Where

ICC – Inventory Captial Cost,

IST – Inventory Service Cost,

$IStC$ – Inventory Storage Cost,

IRC – Inventory Risk Cost.

$$ICC = WACC + CAPM + \beta \quad (4.8.2)$$

Where,

$WACC$ – Weighted Average Cost of Capital,

$CAPM$ – Capital Asset Pricing Model,

β – Systematic Risk.

$$WACC = WD \cdot CD \cdot (1 - MTRF) + WE \cdot CE \quad (4.8.3)$$

Where,

WD – Weight for Debt,

CD – Cost of Debt,

MTRF – Marginal Tax Rate of the Firm,

WE – Weight of Equity,

CE – Cost of Equity.

$$CAPM = RFR + \beta \cdot (EMR - RFR) \quad (4.8.4)$$

Where,

RFR – Risk Free Rate,

EMR – Expected Market Rate.

$$\beta = \frac{CARR}{VMR} \quad (4.8.5)$$

Where,

CARR – Capital Asset Return Rate,

VMR – Variable Market Rate.

$$ISR = IC + PHC + T \quad (4.9)$$

Where,

IC – Insurance Cost,

PHC – Physical Handling Cost,

T – Taxes.

$$IRC = O + D + S + Dt + R \quad (4.10)$$

O – Obsolescence,

D – Damage,

S – Shrink,

Dt – Deterioration,

R – Relocation

Calculation of EOQ for selected items:

1. Material code 2608135

Annual Requirements = 24000 units

Cost of materials = € 0.15

Cost of placing and receiving order = € 0.65

Annual carrying Cost of Stock 10% of Stock value

$$EOQ1 = \sqrt{\frac{2 \times 24000 \times 0.65}{0.15 \times 0.1}} = 1442 \text{ units}$$

2. Material code 2657842

Annual Requirements = 84000 units

Cost of materials = € 0.14

Cost of placing and receiving order = € 0.65

Annual carrying Cost of Stock 8% of Stock value

$$EOQ2 = \sqrt{\frac{2 \times 84000 \times 0.65}{0.14 \times 0.08}} = 1549 \text{ units}$$

3. Material code 2606592

Annual Requirements = 4800 units

Cost of materials = € 0.22

Cost of placing and receiving order = € 0.16

Annual carrying Cost of Stock 20% of Stock value

$$EOQ3 = \sqrt{\frac{2 \times 4800 \times 0.16}{0.22 \times 0.2}} = 187 \text{ units}$$

4. Material code 2565173

Annual Requirements = 3000 units

Cost of materials = € 0.19

Cost of placing and receiving order = € 0.13

Annual carrying Cost of Stock 10% of Stock value

$$EOQ4 = \sqrt{\frac{2 \times 3000 \times 0.13}{0.19 \times 0.1}} = 203 \text{ units}$$

5. Material code 2606967

Annual Requirements = 9000 units

Cost of materials = € 0.19

Cost of placing and receiving order = € 0.13

Annual carrying Cost of Stock 10% of Stock value

$$EOQ5 = \sqrt{\frac{2 \times 9000 \times 0.13}{0.19 \times 0.1}} = 351 \text{ units}$$

6. Material code 2671583

Annual Requirements = 24000 units

Cost of materials = € 0.13

Cost of placing and receiving order = € 1.95

Annual carrying Cost of Stock 30% of Stock value

$$EOQ6 = \sqrt{\frac{2 \times 24000 \times 1.95}{0.13 \times 0.3}} = 1549 \text{ units}$$

7. Material code 2766194

Annual Requirements = 12000 units

Cost of materials = € 0.14

Cost of placing and receiving order = € 0.65

Annual carrying Cost of Stock 8% of Stock value

$$EOQ7 = \sqrt{\frac{2 \times 12000 \times 0.65}{0.14 \times 0.08}} = 1180 \text{ units}$$

8. Material code 2867229

Annual Requirements = 9600 units

Cost of materials = € 0.17

Cost of placing and receiving order = € 0.65

Annual carrying Cost of Stock 10% of Stock value

$$EOQ8 = \sqrt{\frac{2 \times 9600 \times 0.65}{0.17 \times 0.1}} = 857 \text{ units}$$

9. Material code 2710654

Annual Requirements = 9000 units

Cost of materials = € 0.22

Cost of placing and receiving order = € 0.65

Annual carrying Cost of Stock 8% of Stock value

$$EOQ9 = \sqrt{\frac{2 \times 9000 \times 0.65}{0.22 \times 0.08}} = 815 \text{ units}$$

10. Material code 2618402

Annual Requirements = 9000 units

Cost of materials = € 0.14

Cost of placing and receiving order = € 0.15

Annual carrying Cost of Stock 20% of Stock value

$$EOQ10 = \sqrt{\frac{2 \times 9000 \times 0.15}{0.14 \times 0.2}} = 311 \text{ units}$$

Interpretation of Economic orders quantity

Above table speaks to the EOQ of every item for 1 month a percentage of the items, the amount size is not said EOQ. This shows the offer of the item is low. Hence, the order is set when it is required.

Table 4.17 Economic order quantity

S.NO	MATERIAL CODE	MATERIAL DESCRIPTION	ANNUAL REQUIREMENT (U)	COST			EOQ EVERY 6 DAYS
				MATERIAL (MC)	PER ORDER (CO)	STOCK CARRYING RATE (SCR)	
1	2608135	Steel Ball	24000	0.15	0.65	10%	1442
2	2657842	Bearing bush	84000	0.14	0.65	8%	1549
3	2606582	Crank pin	4800	0.22	0.16	20%	187
4	2565173	Brush plate	3000	0.19	0.13	10%	203
5	2606967	Limit Switch	9000	0.19	0.13	10%	351
6	2671583	Linkend assembly	24000	0.13	1.95	30%	1549
7	2766194	Needle bearing	12000	0.14	0.65	8%	1180
8	2867229	commutator	9600	0.17	0.65	10%	857
9	2710654	Ball bearing	9000	0.22	0.65	8%	815
10	2618402	Magnet	9000	0.14	0.15	20%	311

Observation

A sample of 10 items is taken and a comparison between quantities ordered in the year 2015 without economic order quantity calculation and the quantities that will be ordered after the Economic order quantity calculation since the optimum level for the sample items are found in the table 4.17 .since the inventory turnover ratio is 6 days the inventory is changed every 6 days in the period of 2014- 2015 so a year has 61 six days in it. Number of days in a year to the inventory turnover ratio.

Formula

$$TCb = NQO \cdot CpU \quad (4.11)$$

Where,

TCe – Total Cost before economic order quantity calculation,

NQO – Number of Quantity Ordered,

CpU – Cost per Unit.

$$TCa = OL \cdot CpU \quad (4.12)$$

Where,

TCa – Total Cost after economic order quantity calculation,

OL – Optimum Level.

$$TCp = \frac{TCb}{TCa} \cdot 100 \quad (4.13)$$

Where,

TCp – Total cost percentage .

$$RCp = 100 - Tc p \quad (4.14)$$

Where,

RCp – Reduction in cost percentage.

Table 4.18 cost comparison

S.NO	ITEMS	COST per UNIT €	NO OF QUANTITY ORDERED IN 2015	OPTIMUM LEVEL for 61 weeks (EOQ)	TOTAL in 2015 €	TOTAL EOQ €
1	Steel ball	0.15	49553	87962	7432.90	13194.30
2	Bearing Bush	0.14	76479	94489	10707.07	13228.46
3	Crank pin	0.22	37327	11407	8211.83	2509.54
4	Brush plate	0.19	159816	12383	30365.29	2352.77
5	Limit switch	0.19	145920	21411	27724.83	4068.09
6	Link end assembly	0.13	284508	94489	36986.10	12283.57
7	Needle bearing	0.17	104581	71980	14641.35	12236.60
8	commutator	0.22	50945	52277	8660.71	11500.94
9	Ball bearing	0.14	112820	49715	24820.33	6960.10
10	Magnet	0.13	89681	18971	12555.37	2466.23
Grand Total					182105.00	80800.60

$$TCp = \frac{80800.6}{182105} \cdot 100 = 44.37\%$$

$$RCp = 100 - 44.37 = 55.63\%$$

Here the total cost reduction percentage is 55.63 that is € 101305 could be saved by using economic order quantity method, this amount is just the sample of ten items if the company follows EOQ method for all the items purchased a lot of money can be saved. This method also gives optimum level so purchasing of optimal quantity saves space in the inventory, holding cost insurance cost.

Interpretation of the research methodology:

The investigation of stock administration at AVR Manufacturers is led to know the different strategies took after by organization to control the stock administration of the organization:

- In the organization the total stock change period for the year 2014-2015 which is 208 days.

- The stock turnover proportion in the year 2012-2013 (7.95 times) is high.
- Raw material turnover proportion is most minimal in 2014-2015 since most recent five years i.e. 30 times.
- Work in process turnover proportion is high in 2014-2015 which is 224 times. Finished products turnover proportion is high in 2010-2011 which is 42 times.
- In ABC examination, the A Category constitutes more than 70% of total venture made of the raw materials. B and C class is not genuinely extensive interest in this classification is then 30% and which warrant the base consideration.
- The EOQ of every item for 1 month demonstrates that the offer of the item is low. In this way, the organization should put in the order at whatever point it is required.

Table 4.19 Loss calculation

S.NO	ITEMS	QUANTITY LOST IN 2015	COST per UNIT	VALUE(€)
1	Steel Ball	469	0.15	70.35
2	Bearing bush	986	0.14	138.04
3	Crank pin	252	0.22	55.44
4	Brush plate	2859	0.19	543.21
5	Limit switch	1764	0.19	335.16
6	Link end assembly	3345	0.13	434.85
7	Needle bearing	1007	0.17	171.19
8	commutator	322	0.22	70.84
9	Ball bearing	1928	0.14	269.92
10	Magnet	105	0.13	13.65
Non production items				
11	Stationary	655	0.45	294.74
12	Printer cartridges	12	10	120
13	Paper bundle	56	3	168
14	Tool kit	15	23	345
TOTAL				3030.39

Expected Results of the research

The following results are expected when the company follows the proposed research:

1. Questionnaire gave positive feedback from employees about the inventory management, but still there are some problems. The loss of items in the inventory would be reduced by maintain a proper register: the store keeper should keep the items in track by registering the items which are taken out. Now the workers themselves are handling the items in the inventory just taking them and not registering it in the register. This will be avoided by making an order that only store keeper should handle the items in inventory and employees should request the items to the store keeper. So request register and store register can be maintained this will give two data of items that are going out of the store. Maintaining a proper register the company can save this considerable amount and can invest it in some other department. Also the employees can't waste time in searching the material in store by which they concentrates on production more which helps to improve the production efficiency.
2. Using ABC analysis technique the most expensive items (group A) are given more importance and are taken care more, by which they fail to take care of the less expensive items (groups B and C) that are purchased in mass. Due to carelessness of the store in charge these less expensive items, which are of occasional use or used very rarely, are damaged. These items from group C (like magnets, labels, commutators, pressure pads, screws, nuts, bolts etc.) are purchased in bulk due to fall in their prices. They are small in size and occupy the large space. To make space for expensive items the less expensive items are handled roughly, they are thrown to the corner or wherever they find the space. This leads to damage or loss of those materials from table 4.19 the year 2015 the loss of amount in damaged and lost items was € 3030.39 which was 1.67% of the total inventory cost. This can be saved by proper arrangements implementing the proposal of ordering a rack with six steps, which will contain all these less expensive items. The arranging the material size wise in the rack will save time in searching these small items. The rack cost around € 1469 which is a onetime investment.
3. The analysis of Economic Order Quantity (EOQ) made good contribution in the company's inventory management since the data is given only for ten items due to confidentiality. All the ten items are not ordered in optimal level either ordered high or low in the period 2014-2015. All are all average moving items in the inventory so these items are ordered more, but the space these items occupy is huge which lead to increase in inventory carrying cost, damage, inactive items, because of these items the frequently used items don't get space in the inventory. A suggestion is given to order these items

just in time since the manufacturers of these items are in the local area and the lead time for these items are less and frequency of usage is medium. Implementation of just in time method will reduce the inventory carrying cost, inventory will never occupy the space. Purchasing fewer amounts of materials at once will decrease the storing cost yet expands the ordering expense. Along these lines ideal ordering amount is fundamental, which minimizes the expenses. The organization should keep up a security level furthermore reordering point so they come to know at what time they should arrange for the supply of material and need not to experience the ill effects of the shortage of required material.

4. Research revealed that in the year 2014-2015 the number of days for holding raw material is more, it is bad for the organization since it eats pointless venture. To keep away from this issue the accompanying focuses will offer assistance:
 - Purchase raw materials when the stock achieves the base level. The purchase should not cross the limit, generally, the stock kept in stores unmoving.
 - Quantity should be ordered according to the interest. The company can accept the interest for the products from past experience.
 - Company can have more raw materials which are imported from different nations, however, transport production stocks are accessible locally.

CONCLUSIONS

1. Analysis of inventory control principles in manufacturing companies disclosed the key aspects to successful management of inventory: maintaining a safety stock, maintaining the required level of inventory and proper recording of the material.
2. The investigation of inventory management in sheet metal Company using developed questionnaire revealed the main problems: poor communication and poor execution of inventory management system. The opinion of the workers: most of them (92%) are satisfied by the inventory control management in the organization. Main reason bringing about the abundance in inventory inside the company is no proper forecasting of the demand.
3. Research of the stock turnover ratio shows that is approximately one week for all 5 years' time period which is good sign for the company, but still it can be improved by increasing the amount of production, and since the flow of material is good, the company can have the capacity to handle more orders and can definitely invest in expanding the business.
4. For inventory management improvement in the company the Economic Order Quantity and ABC analysis techniques are suggested. EOQ will ensure the optimal level of inventory and therefore will help to improve the forecasting of material demand and reduce the cost especially holding cost and ordering cost. Application of ABC analysis will help in cycle counts, ensuring that the items given more priority are always in stock. Proper frequency of reordering will reduce lead times. Both techniques can decrease the inventory management cost till 57.3 %.

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ANNEXURE

Questionnaire

INVESTIGATION OF MATERIAL AND INVENTORY MANAGEMENT IN MANUFACTURING ENTERPRISE

Qualification:

- a. +2
- b. Degree Holder
- c. Diploma
- d. PG

Experience:

- a. 0-1 years
- b. 1-2 years
- c. 3-4 years
- d. 5-6 years
- e. Above 6 years

Department:

- a. Finance
- b. Packaging
- c. Delivery Dept
- d. Consultancy
- e. Sales
- f. Purchase

1. What type of method does the company use to check inventory?

- a) JIT
- b) Kanban
- c) Pareto Analysis
- d) EOQ
- e) Other

2. Are Inventory locations are customizable?

- a) Yes
- b) No

3. Management review and follow up reports of inventory turnover, aging, and inventory adjustments?
 - a. Strongly Agree
 - b. Agree
 - c. Neutral
 - d. Disagree
 - e. Strongly disagree
4. Is there a document procedure for inventory taking?
 - a) Yes b) No
5. Does the receiving, issuing, accounting and target responsibilities properly segregated?
 - a) Yes b)No
6. How often do departments compare quantities received against receiving reports, etc?
 - a. Daily
 - b. weekly
 - c. Monthly
 - d. Occasionally
7. Does management monitor and approve the write-offs of obsolete and inactive inventories?
 - a. Yes
 - b. No
8. Rank the factor by which the company should take necessary steps to safeguard the good from theft?

SL. No	Factors	5	4	3	2	1
1	Adequate written instructions					
2	Adequate supervision					
3	Use of pre-numbered tags which are accounted for					
4	Careful investigation of significant overages and shortages					
5	The signing and dating of inventory count sheets by the person supervising the count					
6	Clearly marking damaged and obsolete inventory					
7	Prompt adjustment of records for inventory discrepancies after approval by a responsible official other than stores personnel					

9. Is adequate insurance coverage provided in all the units?
 - a. Yes
 - b. No
10. Mainly in which department does adequate provision are made for obsolete and inactive items in inventories?
 - a. Finance
 - b. Packaging
 - c. Delivery Dept
 - d. Consultancy
11. Are inventory items maintained in a secure location?
 - a. Yes
 - b. No
12. Is a physical inventory conducted at least annually?
 - a. Yes
 - b. No
13. Rank the factor by which the company has a Low inventory Turnover Ratio?
 - a) More Dead Inventory
 - b) More Fast moving items
 - c) Good Rotation of Funds
 - d) Poor Rotation of Funds
14. Rank the factor by which factor has a excess Inventory Causes the organization?
 - a) Increase in interest incurred
 - b) Low parts maintenance
 - c) High Labor Costs
 - d) High Customer Satisfaction
15. Are you satisfied with the Company's inventory control management?
 - a. Highly Satisfied
 - b. Satisfied
 - c. Neutral
 - d. Not satisfied
 - e. Highly not satisfied