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Analysis of Supply Chain Management - Inventory Management and Rejection of Materials at Pump Manufacturing Company, Pune

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Abstract: *Supply chain Management has assumed a significant role in firm's performance and has attracted serious research attention over the last few years. In this paper an attempt has been made to review the Supply Chain Management and Inventory Management practices. Research is also conducted to analyze rejection of material and to find causes of rejection of material.*

This research paper gives a comprehensive insight into the different techniques used to optimize Operations – Supply chain management and inventory management. It also includes various reasons which are causing delays in the process. Research conducted on Supermarket concept in inventory management.

Keywords: *Supply Chain Management, Inventory Management, Rejection of Materials.*

I. INTRODUCTION

Operations Management is the management of the conversion process which transforms inputs such as raw material and labor into outputs in the form of finished goods and services. Supply Chain Management is the integration of the activities that procure materials and services, transforms them into intermediate goods and final products, and delivers to the customer. Inventory management is a scientific technique, concerned with Planning, Organizing & Control of flow of materials, from their initial purchase to destination.

In the current competitive scenario supply chain management assumes a significant, as companies are challenged with finding ways to meet ever-rising customer expectations at a manageable cost. To do so, businesses must search out which parts of their supply-chain process are not competitive, understand which customer needs are not being met, establish improvement goals, and rapidly implement necessary improvements.

Formulating a suitable inventory model is one of the major concerns for an industry. This paper gives insight into modern methods used in inventory management to store lakhs of components in highly secure systems.

II. BUSINESS OBJECTIVES

- A. To find out flaws or errors in current process of supply chain and inventory management which are causing inefficiency, delays in processes & modify the same for getting the higher efficiency along with the greater speed and accuracy.
- B. To analyze rejection of material and to find causes of rejected material.
- C. To decrease the failure cost by reducing rejection of material to increase profit of the organization

III. OBJECTIVES OF RESEARCH**i. To study and analyze Supply Chain Management in pump manufacturing sector.**

The purpose of this objective is to understand detailed view of different process flows under operations management hence to study complete cycle from product order booking to product delivery. Understanding of different techniques used in SCM is expected and optimization at different levels should be carried out if necessary.

ii. To study and analyze Inventory Management in pump manufacturing sector.

The purpose of this objective is to understand different techniques of inventory management. It is expected to optimize the inventory by new techniques so that efficiency of the plant can be increased.

iii. To analyze rejection of materials and to find causes of rejection for reducing the rate of rejection of materials.

The purpose of this objective is to analyze how much of material is getting rejected in one year and after analyzing, it is expected to find the causes for rejection and to reduce the rate of rejection in future. Failure cost can be reduced by reducing the rejection hence profit of the organization can be increased.

IV. RESEARCH METHODOLOGY

Research methodology is the process used to collect information and data for the purpose of making business decisions. The methodology may include publication research, interviews, surveys and other research techniques, and could include both present and historical information.

The research methodology adopted in this project is a combination of qualitative, quantitative and descriptive research. It is an internal research carried out through the company.

Data Type:

The information required for the study was collected in the form of both primary and secondary data through the company.

- Primary data: Interactions with departmental managers, operators and workers
- Secondary data: Departmental Manuals, Reports

*Nature of Study:**Qualitative research:*

Emphasis on quality in the data collection and analysis to know how and why things happens to develop in depth understanding of a situation.

Quantitative research:

Emphasis on quantification in the data collection and analysis to know what and how often (frequency) things happens.

Descriptive research:

Emphasis on describing the characteristics of a particular entity, or of a group. Studies concerned with specific predictions, with narration of facts and characteristics concerning individual entities, group or situations are all examples of descriptive studies.

V. ANALYSIS OF SUPPLY CHAIN MANAGEMENT

1. Supply Chain Management is optimized with the help of Kaizen and 5S systems. Kaizen and 5S are used for development of traditional production system.

2. Complete layout of plant is designed as per the Kaizen and 5S systems. Hence location of every machine is fixed as per its operation. Due to which 'Material handling' is reduced.
3. Before implementation of Kaizen system material handling was about 1.5 km and after implementation material handling is reduced to 100 m only.
4. Run card monitoring system is used for every single operation. This card contains detailed process flow of each operation. Due to this system every process can be followed and also monitored.
5. All departments and their systems are integrated by SAP system. SAP is System Application Product through which different operations of various departments are carried out.
6. Due to SAP system identification of problem at any stage can be easily located and hence further actions to solve that problem can be implemented readily.

VI. ANALYSIS OF INVENTORY MANAGEMENT

1. KARDEX system is the new development in the inventory management. It is an automated stores where large quantity of material can be securely placed with less space requirement.
2. Benefits of Kardex system are as follows:
 - a) Faster access times
 - b) Increased turnover of goods
 - c) Larger storage space using significantly less floor space
 - d) Precise inventory levels through integration with internal warehouse management systems
 - e) Greater safety and protection for operators and stored goods
 - f) Improved ergonomics
3. The Shuttle XP vertical lift system has been designed to meet a broad range of storage and retrieval applications in manufacturing, distribution, retail and warehouse operations.
4. The combination of optimal storage density, flexible, efficient storage strategies, ergonomics and security makes the Shuttle XP from Kardex Remstar a unique storage solution.

VII. ANALYSIS OF REJECTION OF MATERIALS

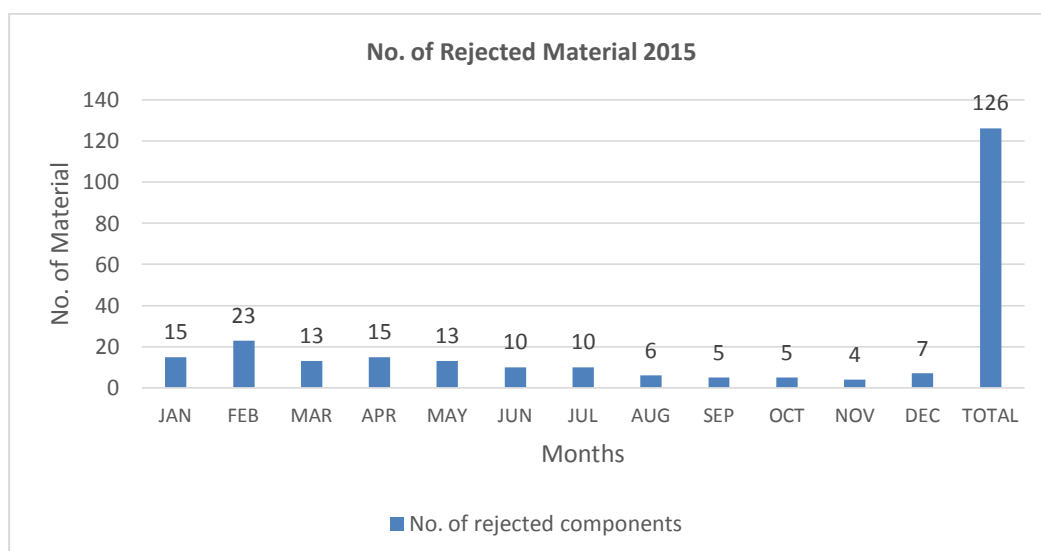


Fig. 1 A bar graph showing number of rejected material for every month throughout the year.

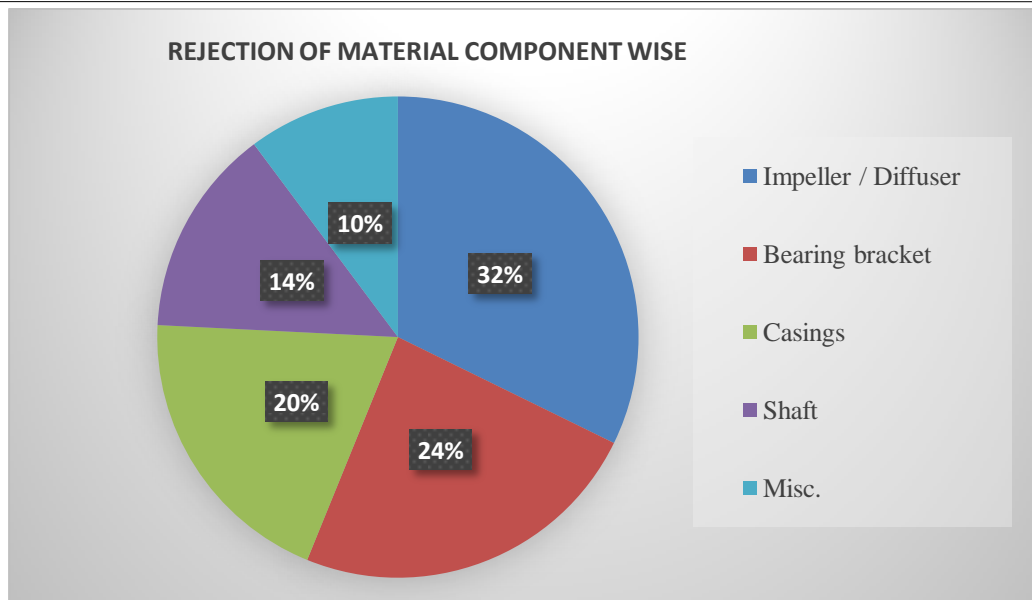


Fig. 2 A pie graph showing component wise rejection

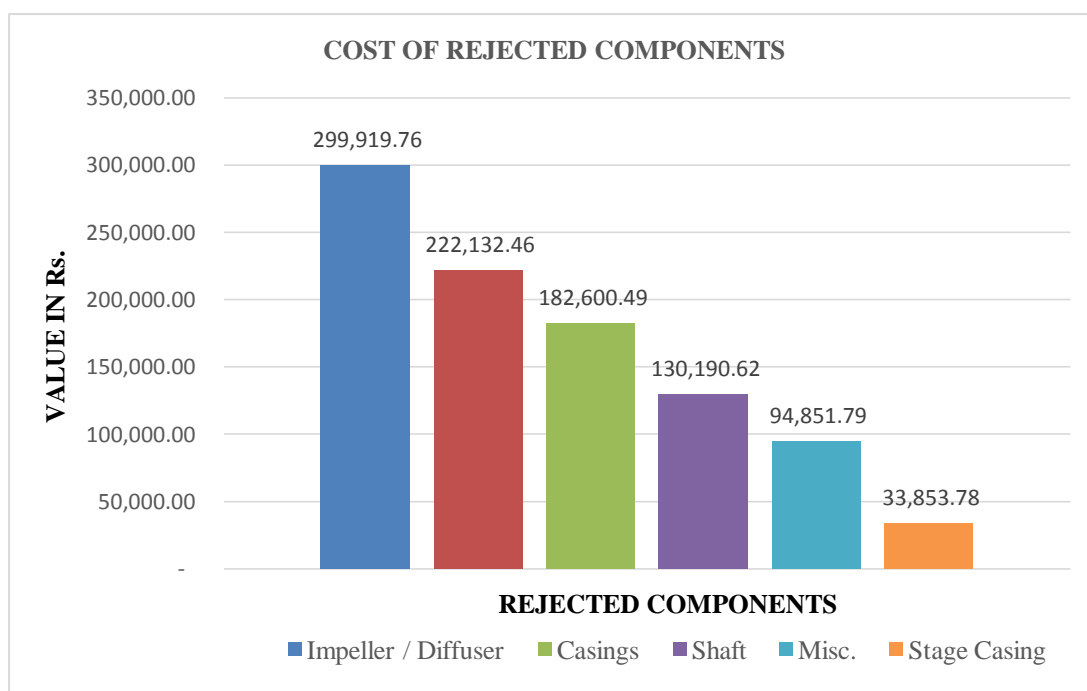


Fig. 3 A bar graph showing cost of rejected material component wise

1. Analysis of Rejection of material is shown as above. As per the analysis, as rejection of material increases failure cost increases and this is a loss for the company. Hence rejection should be as minimum as possible.
2. To reduce reduction first of all reasons behind rejection should be found. Following are the findings under rejection of material:-
 - A. Foundry defects
 - B. Casting defects
 - C. Blow holes
 - D. Heavy blow
 - E. Heavy cracks
 - F. Dimension defects

5. These defects can be divided into three categories: Machine defects, Operator defects, other defects.
6. Machine defects are due to errors in machinery. Sometimes machine's calibration if altered it cause errors. Machines which are old and can't be calibrated perfectly are one of the causes of defects.
7. Operator defects include careless attitude from operator, negligence and over confidence of operators etc. For this a check point or inspection should be done while different jobs are in process.
8. Other defects include important reasons such as environmental factors. Temperature is one of the most important reasons for material rejection.

VIII. RECOMMENDATION

1. Flexibility of kardex system should be increased i.e. height of tray in kardex should be changed as per the material then large material with more height and weight can be stored in kardex.
2. Capacity of each tray is 725kg. This capacity should be utilized so that material from storage racks can also be moved into kardex system. Hence storage racks can be emptied and more space can be freed for other operations.
3. Use of another Kardex system is one more suggestion for inventory management. If one more kardex system is used, most of the material can be stored in it and a lot of space can be freed. Hence security of the material can also be increased.
4. The material to be issued to assembly section from stores department is missing due to misplacement in stores section. This results in delay in issuing inadequate material to assembly section. Assembly cannot be completed with even single part is missing.
5. Many times the number of components present in stores shown by SAP System is more than the number of components actually present in stores. This leads to issuing the Production order but as Material is actually absent it cannot be issued resulting into delay. This whole delay is just because of 'not entering' the components withdrawals in system time to time. So it leads to mismatch in number of components shown by system & actual number of components present.
6. Sometimes 'not entering' the components arrivals occurs leading to delay in system display, resulting into delay in issuing of production order even though sufficient material is present in plant.
7. Supermarket rearrangement was another suggestion and it is implemented successfully. It will now increase efficiency of the workers and hence the plant.
8. Tool stores can be converted into an automated kardex system. Due to this, tools can be stored more securely and system will become faster and hence lead time for further operations can be reduced.
9. This suggestion for Tool stores is accepted by the management and it will be implemented soon.
10. Due to changes in temperature metals get expand or contract and hence readings for dimensions which are in microns changes. Diameter and other specifications changes and micron readings get affected the most.
11. Hence temperature of the plant should be maintained at proper level. For this a system should can be developed which can maintained the temperature of plant at some range.

IX. BENEFITS

Under inventory management: Supermarket concept:

Results after Implementation:

1. Material is arranged as per requirement of worker and job.

2. Material unavailability is reduced.
3. Due to which additional time required for material unavailability is reduced.
4. Hence lead time for job completion is reduced.
5. Ultimately efficiency of worker and hence production is increased.

X. CONCLUSION

In this paper the attempt has been made to review Supply Chain Management and Inventory Management in manufacturing firm and how its integration can affect the overall operations of the firm. This research paper highlighted the vital role of supply chain management and inventory management in a firm's performance.

Processes under supply chain management and inventory management are integrated with each other hence both should go hand in hand for achieving organization's goal.

Network Planning, Inventory Control, Supply Contracts, Distribution Strategies, Production Design, Integration and Strategic Partnering, Outsourcing & Procurement Strategies are the key issues of supply chain management.

To create an effective supply chain following steps are needed:

1. Develop strategic objectives and tactics
2. Integrate and coordinate activities in the internal supply chain
3. Coordinate activities with suppliers with customers
4. Coordinate planning and execution across the supply chain
5. Form strategic partnerships

Research paper gives insight into Supermarket concept and its rearrangement. Its successful implementation resulted in improvement of efficiency of Inventory Management and hence ultimately increasing efficiency of the plant.

This paper also gives analysis of rejection of material. Causes of material rejection are successfully found. Recommendations for reducing the rejection by eliminating causes are given which will positively result in reduction of material in future and hence failure cost can be minimized and ultimately profit of the company can be increased.

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