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Development of Material Handling System in a Manufacturing Company

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ABSTRACT: In the last several years material handling has become a new, complex, and rapidly evolving science. Material handling cannot be avoided in logistics, but can be reduced to minimum levels. Material handling system (MHS) design has a direct influence on the logistics cost. Therefore, improvement of the efficiency of material handling system gets more and more people's attention. The paper deals with a case study of ginning machine manufacturing company. This work is to locate and identify the wasteful activities regarding the material handling, and to streamline the activities to reach a minimum of material handling.

KEYWORDS: Logistic, materials handling, efficiency, logistic cost.

I. INTRODUCTION

Logistics is all about getting the right product to the right place at the right time to the right person for the least cost. The raw material enters the mill gate, get converted and goes out of the mill gate in the form of finished products; it is handled at all stages within mill boundaries such as within and between raw material stores, various section of departments, within machines and finished product. Material handling involves the movement of materials, in batches or one item at a time within the plant. Material handling system provides transportation and storage of materials, components and assemblies. Material handling activities start with unloading of goods from delivery transportation, the goods then passed into storage, machining, assembly, testing, storage, packaging, and finally loading onto transport. Each of these stages of the process requires a slightly different design of handling equipments.

There are two major functions of material handling section:

1. To select production machinery and assist in plant layout so as to eliminate as far as possible the need of material handling
2. To choose most appropriate material handling equipment which is safe and can fulfill material handling requirements at the minimum possible overall cost.

The average material handling cost is estimated roughly 10-30% of the total production cost depending upon product to process. By reducing the material handling, cost of production can be reduced considerably.

II. LITERATURE REVIEW

The function of material handling is to move the right material to the right place, at right time, in right quantity, in sequence and in the in order to achieve optimum production cost[5]. In a typical manufacturing plant material handling comprises of 25% of all employees, 55% of all company space, 87% of the production time, and 15-75% of the total cost of a product [6]. Therefore, material handling looks for effective utilization of workforce and facility space, with minimum lead times, high efficiency of material flow, increasing productivity, and reducing the total cost. Materials handling involves the movements of materials through the operations within an organization. It moves materials from stores to the required point. The aim of materials handling is to have optimum movements, with shortest distance with no damage. This might even lead to changing the factory layout to improve the material handling systems [7]. Inefficient Material Handling Symptoms are Aisles are cluttered, High handling of products, confusion in loading/unloading, involving more labors, stock out on parts and supplies, lack of standardization damage, excess scrap, flow inefficiencies, confusing products storage, excess motion, excessive indirect and labour cost, idle cube storage, frequent long hauls, dirty facilities and excess employees [8].

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III. PROBLEM DEFINITION

The problems identified in the company are described below.

- The shelves are not well organized.
- The materials stored is away from the required area.
- Insufficient material handling equipments.
- Lack of awareness in material handling among the staff.
- High inventories in production stations.
- Lack of space at loading bays.
- Shortage of manpower
- Lack of communication devices – material handling staff

IV. METHODOLOGY

The objective of the study was to improve the efficiency of material handling system. The company selected for this study was established in 1985 has different units in its campus. The company is manufactures ginning machine and various types of agricultural products. During study of ginning machine manufacturing unit it was found that there were many problems related to material flow and material handling system. To reach this given objective, the following specific methodology was adopted:

- (i) Define purpose
- (ii) Gather data to establish a baseline and data for further analysis.
- (iii) Analyse the data to detect connections between different factors.

V. DATA COLLECTION

The data that is used in qualitative research is collected through observations, discussions, interviews etc. The collected data that has the ability to be measured a type of “baseline” can be established and used for further analysis. This baseline can be used to display the situation before any changes were done to it. The collected data are mapped on the value stream map. Here the value added activities and non-value adding activities are spotted out and the non value added activities are eliminated.

Transportation:

Transport of materials is considered as one of the non value added activity. It also damages the materials if it not safely handled, so long and unnecessary transport of materials should be avoided. This can be avoided by placing machines closer to each other. The raw materials are to be off loaded in and stored in a specified area. If there is not enough space at this area then the goods are offloaded and stacked at the available areas around the building. Sometimes this area is too far from the usage area. This results in damage of the materials due to improper storage of materials. These materials are transported to the required area by forklifts. The materials travel long distance if they are stored far away from the stock yard.



Fig.1. material in stock yard

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The company involves many processes involving high cost and time. This processes/ work can be done simple tools. Planning these processes will ensure a company to avoid heavy burden work and enables to perform the task easily. It is necessary to avoid using equipment that is more complicated, heavier and takes more time to use.

Waiting:

There are two different forms of waiting. One when the raw materials are not available at the required time both man and machines wait for the arrival of the materials. The second form is when the materials are available but the machines got breakdown, or the man is absent then the materials wait for the machines to get ready or for the available of man.



Fig.2. Materials waiting in machine shop

Unutilized creativity:

The company needs to take advantage of these skills and the creativity of its employees. This can be directed to the service personnel that are willing to take a forklift license to be able to work faster and easier. Company can use these skills and the creativity of its employees to attain higher productivity which benefits the company.

VI. ANALYSIS

By analysing the observations and other information gathered, the causes for errors can be found. A supporting tool in this phase is the Cause and Effect Diagram (Fishbone diagram).

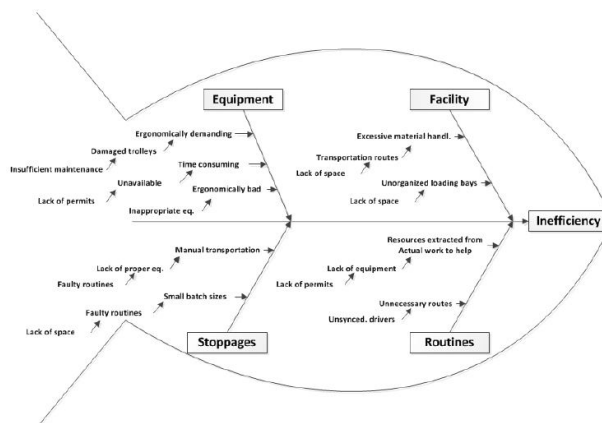


Fig.3. Cause and Effect Diagram

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From the Cause and effect diagram:

Facility:

Facility comprises of excessive material handling due to long and unnecessary transport of materials in long routes and unorganized loading bays. The storage of materials is away from the required area.

Equipment & Stoppages:

The equipments used for transporting material within the facility are not modern and often outdated and are not efficient. Currently the materials are transported using a pallet truck which takes more time and causes damages to the work piece.

Routes:

No definite transportation routes for materials have been developed so far. The off-loading procedure is confusing and often the responsible staffs are not present when the truck arrives.

The following are the problems identified in the company

- The shelves are not well organized.
- The material stored is away from the required area.
- Insufficient material handling equipments.
- Lack of awareness in material handling among the staff.
- High inventories in production stations.
- Lack of space at loading bays.
- Shortage of manpower
- Lack of communication devices – material handling staff

Suggestions for improvement:

The alternatives have been developed to offer the company from low cost to high cost for implementation, feasibility. These alternatives were chosen since they were the most logical ones after the use of Fishbone diagram.

The following were Suggestions for improvement□

- Modification of shelves within the facility.
- The transport of materials should be in consuming minimum time with least distance.
- The material handling equipments must be modernized. Material handling equipments such as advance forklift truck can be utilized.
- The Kanban systems like visual Kanban, Kannban signals can be developed for effective communication

VII. RESULTS AND DISCUSSIONS

The suggestions were step by step implemented. After implementing all the suggestion the materials placed on their respective shelves. Since the materials were placed near the required area the distance travelled by the materials was much reduced. The modern material handling equipments improves the material handling systems. The implementation of Kanban systems improved the effective communication among the staffs.

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Fig.4. Materials in stores



Fig.5. New material handling system

VIII. CONCLUSIONS

This paper concludes that the materials handling systems plays a vital role in a manufacturing industries. The elimination of non value added activities in these material handling system reduced the production cost and improves the productivity of an organization

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