



To Study Material Handling Systems in Order to Improve Productivity

G.D. P. R Sainath¹, Mr. M. Padmanabham²

¹M.Tech Student, Sanketika Vidya Parishad Engineering College Sanketika

²Asst. Professor, Mechanical Department, Sanketika Vidya Parishad Engineering College

ABSTRACT

The main aim of this paper is to study various materials handling equipment & systems used in an Industry for various materials handling and so to study various Modern Techniques. Material Handling is required by many safety regulations, national consensus standards and manufacturers. It is the purpose of the daily condition usage to ensure that the overall equipment mechanical and electric components of the equipment have been maintained in a safe and serviceable condition and are functioning properly according to the original equipment manufacturer's specifications. The study recommended that Paper industry organizations should invest in material handling equipment like cranes, conveyors, industrial tracks, and others to enhance operational efficiency and also recommended that organizations should prioritize the material handling function since it is a very vital cost center. The paper concluded that every successful manufacturing organization must have efficient materials handling department and also give keep an interest in the other factors that influence the profitability of the organization.

INTRODUCTION

The efficiency of any activity for the production of goods and services depends to a great extent, on the supply of materials equipment, and manpower made available in their right proportions. Therefore, in order to meet the needs of customer while meeting the set objectives there is a great need for continuous production schedule which is only made possible by holding of the aforementioned ingredients inform of stock. Materials handling is that aspect of business activity that deals with planning for purchasing, receiving, handling, storing, and releasing of materials for use in production with effective control measures.

Materials handling has been defined by Lee and as the total of all those tasks, functions and routines which are concerned with the transfer of external materials and services into the organization and the administration of same until they are consumed or used up in the process of production, operation or sales. Materials handling includes all the activities relating to the acquisition, handling and control, and movement of materials and supplies used in the production for a firm's final product.

Materials handling is a tool to optimize performance in meeting customer service requirements at the same time adding to profitability by minimizing costs and making the best use of available resources. The basic objective of materials handling as explained by and Jacobs, Chase, and is to ensure that the right item is bought and made available to the manufacturing operations at the right time, at the right place and at the lowest possible cost.

It is articulated that improvement in continuity of supplies with reduced lead times, reduction in inventories with reduced obsolescence and surplus, improvement in cooperation and communications with reduced duplication of effort, reduction in materials costs, improvement in quality control, improvement in status control, and quicker identification of problems are the main benefits of materials handling in organization. Major competition has shifted from the market to the production floor where manufacturing costs can be cut down and profitability boosted for firms to compete favorably.

Backed by advanced technology, firms are closely monitoring their manufacturing costs and embarking on efficient handling of materials. The introduction of computers as a great boost to the adoption of materials management, as materials functions have many common databases. Therefore, efficient materials handling is fundamental to the survival of business, industry and economy.

Previous research's have shown that materials account for more than fifty percent of the annual turnover in the organization. This shows clearly that priority should be given to handling and should be no longer be viewed as a drain-pipe, but as a serious stabilizing and economic growth potential factor.

NEED OF THE STUDY

In the earlier years, materials handling was treated as a cost Centre, since purchasing department was spending money on materials while store was holding huge inventory of materials, blocking money and space. However, with the process of liberation and opening up of global economy, there has been a drastic change in the business environment, resulting in manufacturing organizations exposed to intense competition in the market place. The manufacturing companies' worldwide have been forced to work out various strategies to face the challenges and to cut down manufacturing costs to remain competitive. One major area of emphasis is materials handling whereby companies are no longer compromising on efficiency of the material handling function in the organization.

Understanding that the primary goal of organizations is to make profits; the research is intrigued by recent emphasis on materials handling by organization; compelling her to investigate the effect of materials handling on the profitability of an organization.

SCOPE OF THE STUDY

Material handling involves short-distance movement within the confines of a building or between a building and a transportation vehicle. It uses a wide range of manual, semi-automated, and automated equipment and includes consideration of the protection, storage, and control of materials throughout their manufacturing, warehousing, distribution, consumption, and disposal. Material handling can be used to create time and place utility through the handling, storage, and control of material, as distinct from manufacturing, which creates form utility by changing the shape, form, and makeup of material. For the safety and ease in productivity of your employees and workplace, it's of critical importance to know that new or newly repaired or modernized material handling equipment is in proper working order—before you put it into service. This section defines required pre-service operational testing and load testing. How to load test your equipment. Generally, load testing of any equipment is required by safety regulation and standards to make sure the equipment is installed right according the designing specifications. The owners and operators of equipment should be pay attention to the following: All material handling equipment should be installed on designing specifications. All such should be proof tested once every four years after original proof testing. All equipment should be proof tested and operationally tested after modifications and repairs. The inspection and load test do not consider the duty factor of the equipment. The frequency of performing a load test can vary depending on regulatory jurisdiction. The CCAA recommends that Load testing be performed at least once every four years. Please keep in mind that the original equipment manufacturer may have more stringent Requirements and these requirements must take precedence. A certification issued is not a license to use a equipment beyond the original designed duty factor. Owners and operators should always be aware of the equipment's duty factor.

Factors affecting the profitability	Strongly Disagree		Agree		Not Sure		Disagree		Strongly Disagree		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
Level of competition	16	40	20	50	2	5	2	5	-	-	40	100
Demand trends	25	62	13	33	2	5	-	-	-	-	40	100
General economic situation	30	75	8	20	-	-	2	5	-	-	40	100
Level of advertisement	28	70	8	20	-	-	4	10	-	-	40	100
Relative costs of operation	20	50	16	40	-	-	4	10	-	-	40	100
Economies of scale	25	62	8	20	4	10	3	8	-	-	40	100
Level of production and Management efficiency	30	75	8	20	-	-	2	5	-	-	40	100
Firm's objectives	16	40	20	50	2	5	2	5	-	-	40	100
Price discrimination	25	62	13	33	2	5	-	-	-	-	40	100

Factors affecting the profitability of JK paper industry

Material Handling System	Response											
	Strongly agree		Agree		Not sure		Disagree		Strongly disagree		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
Conveyors	30	75	10	25	-	-	-	-	-	-	40	100
Cranes	32	80	8	20	-	-	-	-	-	-	40	100
Industrial trucks	36	90	4	10	-	-	-	-	-	-	40	100
Positioning equipment	38	95	2	5	-	-	-	-	-	-	40	100
Unit Load Formation Equipment	30	75	10	25	-	-	-	-	-	-	40	100
Storage equipment	40	100	-	-	-	-	-	-	-	-	40	100

Types of material handling systems and the employees acceptance on there requirement of their usage

Relationship between materials handling and profitability of an organization.	Response											
	Strongly agree		Agree		Not sure		Disagree		Strongly disagree		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
Material Handling facilitates a shorter operating cycle	16	40	20	50	2	5	2	5	-	-	40	100

Material Handling reduces in handling cost	25	62	13	33	2	5	-	-	-	-	40	100
Material Handling eliminates unproductive handling of materials	30	75	8	20	-	-	2	5	-	-	40	100
Material Handling reduces idle machine capacity	28	70	8	20	-	-	4	10	-	-	40	100
Material Handling reduces idle time for labor	20	50	16	40	-	-	4	10	-	-	40	100
Material Handling eliminates factory hazards	25	62	8	20	4	10	3	8	-	-	40	100
Material Handling maintains quality of materials	30	75	8	20	-	-	2	5	-	-	40	100
Material Handling enables optimum usage of space	16	40	20	50	2	5	2	5	-	-	40	100
Material Handling facilitates Materials issues	25	62	13	33	2	5	-	-	-	-	40	100
Material Handling facilitates better customer care	30	75	8	20	-	-	2	5	-	-	40	100
Material Handling facilitates better quality of products	28	70	8	20	-	-	4	10	-	-	40	100
Material Handling facilitates Timely production	20	50	16	40	-	-	4	10	-	-	40	100

Relationship between Materials Handling and Profitability of the Organization.

Period of employment	Frequency	Percentage
Over 10 yrs.	4	10%
6 – 10 yrs.	30	75%
3 – 5 yrs.	4	10%
Less than 2 yrs.	2	5%
Total	40	100

Work experience of the current employees

Level of Education	Frequency	Percentage
Certificate	4	10
Diploma	5	13
Bachelor's Degree	25	62
Masters	4	10
PhD	2	5
Total	40	100

Level of education of current employees

Category	Population	Sample Size	Percentage	Method of Selection
Managers	30	10	25%	Purposive
Finance department	40	10	25%	Cluster and Simple Random
Stores	50	20	50%	Cluster and Simple Random
Totals	120	40	100%	

Sample Size and Selection of Respondents

LITERATURE REVIEW

According to Hornby (2005) unit load formation equipment is used to restrict materials so that they maintain their integrity when handled a single load during transport and for storage. If materials are self-restraining (e.g., a single part or interlocking parts), then they can be formed into a unit load with no equipment.

A slip sheet is a thick piece of paper, corrugated fiber, or plastic upon which a load is placed and has tabs that can be grabbed by special push/pull lift truck attachments. They are used in place of a pallet to reduce weight and volume, but loading/unloading is slower (Lee et al. 2007).

According to Hines (2004) storage equipment is used for holding or buffering materials over a period of time. The design of each type of storage equipment, along with its use in warehouse design, represents a trade-off between minimizing handling costs, by making material easily accessible, and maximizing the utilization of space (or cube).

Jacobs et al (2009) says that the use of racks becomes preferable to floor storage as the number of units per item requiring storage decreases.

According to (Hines, 2004) the essence of profitability is a firm's revenue – costs with revenue depending upon price and quantity of the good sold. These factors will all determine the profitability of firms.

According to Adeloje (2008) a successful advertising campaign can increase demand and make the product more inelastic demand; however, the increased revenue will need to cover the costs of the advertising.

Oba (2008) says that if there are many substitutes or substitutes are expensive then demand for the product will be higher.

According to Johnson (2003) an increase in costs will decrease profits, this could include labor costs, raw material costs and cost of rent.

Ademeyi et al (2010) if a firm is not dynamically efficient then overtime costs will increase. For example, state monopolies often had little incentive to cut costs, e.g. get rid of surplus labor. Therefore, before privatization they made little profit, however with the workings and incentives of the market they became more efficient leading to higher profitability.

According to Rihinde (2008) if the firm can price discriminate it will be more efficient. This involves charging different prices for the same good, so the firm can charge higher prices to those with inelastic demand. This is important for airline firms.

According to Zanto (2008) successful management is important for the long-term growth and profitability of firms. For example, poor management can lead to decline in worker morale, which harms customer service and worker turnover. Also, firms may suffer from taking wrong expansion plans. For example, many banks took out risky sub-prime mortgages, but this led to large losses. Tesco suffered from expanding into unrelated business, like garden center. This led to over-stretching the company and losing site of core-business (Oba, 2008).

According to Zanto (2008) successful management is important for the long-term growth and profitability of firms. For example, poor management can lead to decline in worker morale, which harms customer service and worker turnover. Also, firms may suffer from taking wrong expansion plans. For example, many banks took out risky sub-prime mortgages, but this led to large losses. Tesco suffered from expanding into unrelated business, like garden center. This led to over-stretching the company and losing site of core-business (Oba, 2008).

RECOMMENDATIONS

- Preventing deficiencies in handling and storage will reduce paper damage and minimize losses and production difficulties arising from deformed rolls and local paper weaknesses on the edges and surface. Safe storage of paper products requires a well-designed plant, comprehensive documented procedures that are implemented as part of best practice. Regular training of staff involved in cargo handling, fire safety and/or warehouse maintenance helps to ensure a good warehousing standard. A well maintained, clean and correctly run warehouse offers a significant first impression to a client, whether new or prospective. A printer's paper store is an integral part of its manufacturing operations.
- Automated Paper Warehouse Some paper mills, logistics companies and very large printers may have highly automated paper handling and internal logistics such as automated truck roll unloading, conveyor systems, heavy storage and cranes. For printers this might also include automated splice preparation with AGV or rail transport of the roll to the press. These systems are dedicated to a given site and are, therefore, outside the scope of this guide. A key automation requirement for printers is to establish the precise specifications and tolerances for paper rolls and their packaging with the equipment suppliers concerned because successful automation requires consistency in materials.
- Markings & Working Safely Traffic routes should be clearly marked on the floor by lines and symbols to ensure safe working and to provide a visually efficient workplace. Aisles, storage zones and machine operating areas should be defined by 75 mm (3 in) wide yellow paint/tape on floors. Storage bays should be numbered to facilitate placement and retrieval. Dedicate an area for damaged paper to be evaluated and repaired. Adequate space is needed between rolls for roll clamp truck access. Corner and hanging ball mirrors and other safety equipment are required for dangerous places to ensure safer working.
- High risk areas must be restricted by painted lines or separated by fixed or moveable barriers. A minimum safety distance of 50 cm (20") should be left in front of walls as a damage and fire protection measure. Vulnerable features like pillars, electrical cabinets etc. must be protected by guard rails or sand filled boxes painted as hazards.
- Loading Ramps must have sufficient space for movement of forklift trucks and be designed to take the weight of the machinery and handled goods. Vehicles being loaded must be secured to prevent them from moving or tipping — manual or automatic restraining systems can be used for this. Semi-trailers that are loaded without the tractor unit attached must use adequate trailer supports. Loading and unloading of vehicles should take place inside the warehouse or under cover of the warehouse canopy to protect paper from adverse weather.
- All personnel working in the warehouse should be trained to use the firefighting equipment and regular drills held to maintain their skills. Joint exercises with the local fire department are highly recommended. All machinery should be equipped with both an automatic extinguishing system and a portable extinguisher.
- Rolls should be:
 - Stacked on their ends, evenly in straight lines, with the same unwind direction.
 - Place additional roll end shields on bottom roll (wrapping material).
 - No overlapping — leave a safety gap between the roll columns.
 - Space between rolls for clamp access.
 - Space in gangways for lifter turns.
 - Outer and corner rolls protected with roll guards.
 - Use paper on FIFO (first in, first out) principle.
 - Always keep wrapping in place. If a laboratory test is made on a roll, the wrapper must be repaired.
- Use handling equipment correctly
 - Always use the same equipment to place and take out rolls.
 - Keep the mast in the correct position.
 - Carry out only one movement at a time.
- Normally rolls should be stacked vertically using a parallel 'soldier' pattern with adequate between rolls for roll clamp truck access. A nested roll pattern eliminates rows, reducing the floor area required to store a larger quantity of rolls of a single type — these must be staggered to

allow each roll to be lifted. However, nested patterns have a higher risk of roll damage; in many countries fire regulations do not permit nesting because space required to hose down rolls.

- Part rolls should be used at the earliest opportunity to maximize warehouse space and avoid deterioration.
- Paper Rolls should be:
 - Stacked on their ends, evenly in straight lines, with the same unwind direction.
 - Place additional roll end shields on bottom roll (wrapping material).
 - No overlapping — leave a safety gap between the roll columns.
 - Space between rolls for clamp access.
 - Space in gangways for lifter turns.
 - Outer and corner rolls protected with roll guards.
 - Use paper on FIFO (first in, first out) principle.
- Always keep wrapping in place. If a laboratory test is made on a roll, the wrapper must be repaired.

LIMITATIONS OF THE STORAGE METHODS:

- Manual material handling can be employed for only one process at a time. If business scales up and operation needs to handle multiple operations simultaneously, then manual handling cannot match the demand.
- Human intervention makes manual material-handling prone to errors and inaccuracies. For example, there could be errors in inventory management and order fulfillment.
- Employees need safety training to handle equipment and operations without the risk of injuries or death. Such training needs to be undertaken regularly to keep employees up-to-date with new and updated safety practices.
- They are using traditional methods & Machinery for storage the raw material, for storing the paper etc. This will lead to increase the delay in supply.

Summary

Material handling facilitates a shorter operating cycle and reduces the handling costs. It also eliminates unproductive handling of materials and reduces idle time for labor, eliminates factory hazards and maintains the quality of materials. The study also revealed that material handling enables optimum usage of space, it facilitates better customer care, facilitates better quality of products and facilitates timely production.

AREA OF FURTHER STUDIES

This study examined the effect of material handling of an organization, however further research should be conducted in areas which are directly related to material handling on organizational profitability-

- Training and development on the efficiency of materials handling Materials handling on the customer service delivery of an organization