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MATERIAL HANDLING  
MANAGEMENT IN THE LOGISTICS  
INDUSTRY WITH SPECIAL  
REFERENCE TO CHENNAI

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**A STUDY ON CHALLENGES FACED IN MATERIAL HANDLING  
MANAGEMENT IN THE LOGISTICS INDUSTRY WITH SPECIAL REFERENCE  
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**ABSTRACT:** Every step of the supply chain needs to be done carefully with materials to make sure they get to their final targets in one piece. To make moving goods and materials around storage and manufacturing buildings as easy as possible, a material handling system should be set up. A well-thought-out method for moving things can make customer service better, cut costs, and lower the risk of damage and accidents. The objective of the study is to analyze on challenges faced in material handling management in the logistics industry with special reference to Chennai. The data was collected from 110 employees from logistics service-providing companies in Chennai. Descriptive research design and convenience sampling techniques have been applied in the study. Primary data and secondary data have been used to collect the data. It is found that the majority 54.5% of the respondents strongly agree with the training needed to effectively implement the operation as the problems faced in material handling. It is suggested that the company must offer training for the employees to effectively handle the equipment. There must be safety for the employees to handle the materials in the workplace. It's concluded that material handling is an important part of every industry today, and no private or public sector group or industry could work without it. Therefore, moving materials around makes manufacturing companies more efficient and effective because it makes a lot of important efforts that lead to lower production costs.

**Keywords:** *Material handling management, Plant Layout, Cost constraint, Work condition*

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## **1. INTRODUCTION**

Material handling has been described as the process that is done to move, controlling, protect as well, and storing material [1]. The process of material handling is very important as the material has to be handled very well to keep it from damage and deliver it safely to the destination with the desired quality and conditions. When proper material handling is put in place, accidents are reduced and/or eliminated as a result of proper and careful handling of material is done. Johnson (1997), stated that material handling improves the profitability of an organization when accidents are eliminated and/or reduced in that, the organization does not need to spend on the costs of accidents and the same time attains optimum output. On the other hand, proper material handling reduces stress and effort. This is to say that, when a properly functioning material handling system is in place, negative factors that affect material handling are eliminated [2].

Materials handling enables production flow possible as it provides dynamism to static components such as materials, equipment, products, layout, and human resources. Production Function Mechanism was developed by Shingo (1996) and focused on explaining the production phenomenon. That demonstrates the significance of material handling. A substantial percentage of manufacturing expenses can be attributed to material handling decisions and material flow patterns [4]. Around 25% of the manufacturing costs are related to material handling. Handling and storage of goods are deemed to be important activities in logistics [5]. Logistics has become imperative for an organization to achieve competitive advantages.

The Material Handling System (MHS) aims at storing, controlling, and moving products, they play a key role in the performance of manufacturing systems [6]. An efficient MHS leads to effective production management, improvement of on-time delivery, and enhancement of production quality [7]. The cost of Material Handling Activities is far from

being negligible, it ranges from 15–70% of the total manufacturing cost depending on the production type [8]. In the literature, MHS design is still not defined properly. The main approaches are focused on the definition of design principles (defining lots, optimizing flow, ...) without supplying a comprehensive methodological approach to form a design process. Many aspects exist in the MHS design. Most of the research works mainly focus on some MHS sub-problems, such as the optimization of material flow, the definition of the appropriate Level of Automation (LoA) [9], or the Material Handling Equipment (MHE) Selection Problem [10]. However, the design of the MHS has to be done through solving all these interdependent sub-problems. It is thus lacking a global approach to the MHS design problem.

### **1.1 Statement of the Problem**

Materials need to be handled carefully at every step of the supply chain to make sure they arrive at their destinations intact. A material handling system should be put in place to optimize the movement of goods and materials around manufacturing and storage facilities. A well-designed material handling system can improve customer service, lower costs and reduce the risk of accidents and damage. With a material handling system in place, products will be easier to find, orders will be filled more accurately, and there will be fewer worker accidents and injuries. For such an effective material handling system, the company has been facing challenges in many ways. These challenges and difficulties must be evaluated and to identify ways to reduce such overcome for effective material handling management. Hence the study is carried out to analyse the challenges faced in material handling management in the logistics industry.

### **1.2 Objectives of the Study**

- To identify the problems faced in Material handling

- To measure the perception towards the issues in plant layout for effective material handling
- To evaluate the cost constraints for effective material handling
- To reveal the measures to improve the flow of material handling for effective work conditions.

## 2. LITERATURE REVIEW

**Partha Protim Saikia, Shubham Rajput (2018)** Manual Material Handling (MMH) has largely been a burning case in various types of industries including process and various other manufacturing industries. As men used to depend on machines even for small work i.e., increasing the men-machine interaction as a result the challenge of classifying material manual handling arises. This paper will focus on the major hazards that are generally faced by a worker in his day-to-day life in an organization and also the mitigating measures to decrease the risk evolved from the hazards. The main context of the study is based on a steel manufacturing plant. The various statistics regarding the workers' working hours and injuries as per the age group have been cited in the tabulated form below. In the latter part of the discussion, the inspection and maintenance of various work equipment have been discussed. Finally, this qualitative report will help to eliminate the various challenges that are been faced by the employee in their daily workplace. It concluded that back injuries occur to over 900,000 workers each year. Many of the injuries are disabling, which costs the industry billions of dollars each year. Using cranes, hoists, conveyors, or forklifts to move products does help to prevent wear and tear on workers, but these devices pose hazards that can maim or kill if proper safeguards are not followed [11].

**Surinder Kumar, Rajesh Attri (2020).** In today's competitive technology environment implementation of advanced manufacturing technologies and systems like flexible manufacturing systems (FMS) has become the necessity of manufacturing organizations. The selection of appropriate material handling equipment based on the variables that affect the effectiveness of the material handling system has become a necessity requirement of FMS. Keeping this fact in view, the current paper focuses on the identification of different variables like speed of delivery, available space, cost throughput rate, etc. TOPSIS approach has been used for the prioritization of variables affecting the material handling system effectiveness. The survey method used in the research work is limited to the northern regions of India. The results of the present research will aid in selecting an effective material handling system for enhancing the required productivity of organizations in an effective manner [12].

**Zakarya Soufi, Pierre David, Zakaria Yahouni (2021)** Mastering the Material Handling System in manufacturing is a crucial issue. The costs of Material Handling activities range from 15% to 70% of total manufacturing costs depending on the kind of production. This paper discusses the selection of Material Handling Equipment for manufacturing plants. The selection of such equipment and their level of automation plays a significant role in the success of a material handling system definition, which influences manufacturing performances. Through an analysis of the literature and field studies conducted with industrial companies, a selection methodology and a consistent list of criteria are proposed. A multi-criteria decision technique based on AHP (Analytic Hierarchy Process) is proposed to realize the selection. The proposition is implemented in a demonstrator software tool and illustrated in a simple example [13].

## 2.1 Research Gap

The previous studies have concentrated on analyzing the challenges in material handling in various manufacturing industries. There was not much analysis of the logistics industry. They have focused on understanding the Effectiveness of the Material Handling System. They have ignored to measure the perception towards the issues in plant layout for effective material handling. They have made efforts to evaluate the selection of Material Handling Equipment in manufacturing systems. They have not focused on evaluating the cost constraints for effective material handling systems. Thus, there were research gaps in the previous studies. The present study aims to fill the gaps.

## 2.2 Research Questions

- What are the main problems that come up when moving things in the transportation industry?
- How do different people think the layout of a plant affects problems with moving things?
- What are the costs that come with putting good material handling methods into place in the logistics industry?
- What changes can be made to improve working conditions and speed up the movement of goods in transportation operations?

## 2.3. Hypothesis

**H01:** There is no significant relationship between the gender of the respondents and problems faced in material handling.

**H02:** There is no relationship between the age of the respondents and measures to improve the flow of material handling for effective work conditions.

### **3. METHODOLOGY**

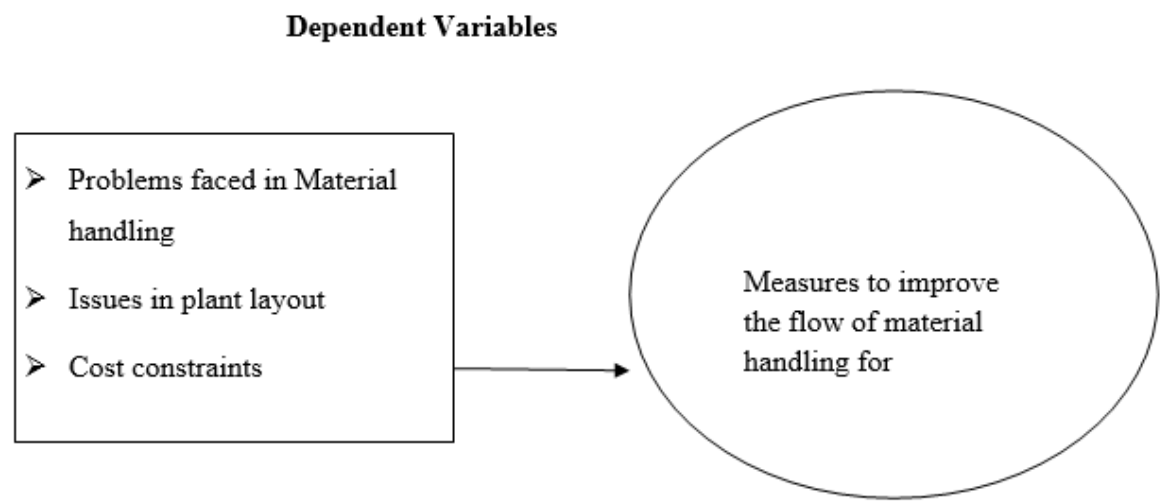
The data was collected from 110 employees from logistics service-providing companies in Chennai to fulfill the purpose of the study. The samples were chosen randomly. The completion of the survey was made possible via a carefully constructed questionnaire. The data are analyzed using statistical procedures such as correlation, chi-square analysis, and simple percentage analysis. For the study, both first-hand and second-hand information are used. Primary data were gathered using a standardized questionnaire, and both quantitative and qualitative research questionnaires were used. Although the investigator created and analyzed the survey's questions, there was little control over who was selected to receive it. The survey was carried out using a random sample technique. Secondary data was gathered from a range of public sources, including websites, case studies, and journals.

#### **3.1 Limitations of the Study**

The study might be limited by the size and diversity of the sample population, potentially affecting the generalizability of the findings to the broader logistics industry. Due to the vast nature of material handling management in logistics, the study may not be able to comprehensively cover all aspects and challenges, leading to potential oversights or omissions. The study's duration might restrict the depth of data collection and analysis, possibly limiting the depth of insights into the challenges and solutions in material handling management. The study might be affected by external factors such as changes in industry regulations, economic conditions, or technological advancements, which could influence the relevance and applicability of the findings over time.

3.2     Research Framework

Independent variables



4.       RESULTS

4.1     Data analysis and interpretation

**Table 1:** Demographic Characteristics of Respondents

|                           | Categories | Frequency | Percentage |
|---------------------------|------------|-----------|------------|
| Gender of the respondents | Male       | 60        | 54.5       |
|                           | Female     | 50        | 45.5       |
| Age of the respondents    | Below 20   | 12        | 10.9       |
|                           | 21-30      | 50        | 45.5       |
|                           | 31-40      | 27        | 24.5       |
|                           | 41-50      | 14        | 12.7       |

|  |                                       |    |      |
|--|---------------------------------------|----|------|
|  | Above 50                              | 7  | 6.4  |
| Educational<br>qualification of the<br>respondents | Higher Secondary                      | 7  | 6.4  |
|  | Graduate                              | 57 | 51.8 |
|  | Post Graduate                         | 29 | 26.4 |
|  | Diploma                               | 8  | 7.3  |
|  | Others                                | 9  | 8.2  |
| No. of working<br>years in the<br>company          | Below 1 year                          | 47 | 42.7 |
|  | 1 to 3 years                          | 53 | 48.2 |
|  | Above 3 years                         | 10 | 9.1  |
| Satisfaction in<br>material handling<br>operation  | Highly satisfied                      | 60 | 54.5 |
|  | Satisfied                             | 20 | 18.2 |
|  | Neither satisfied<br>nor dissatisfied | 15 | 13.6 |
|  | Dissatisfied                          | 7  | 6.4  |
|  | Highly dissatisfied                   | 8  | 7.3  |

Table 1 demonstrates that 54.5% of the respondents said that male, 45.5% of the respondents said that 21-30 years, 51.8% of the respondents have completed graduate, 48.2% of the respondents said that 1 to 3 years as the working years in the company and 54.5% of the respondents are highly satisfied towards material handling operation.

**Table 2:** Problems faced in Material handling

|  | Strongly agree | Agree     | Neither agree nor disagree | Disagree  | Strongly disagree |
|--|----------------|-----------|----------------------------|-----------|-------------------|
| Shortage in supply of equipment in material handling   | 60 (54.5%)     | 19 (19%)  | 15 (13.6%)                 | 8 (7.3%)  | 8(7.3%)           |
| Lack of maintenance in the concern                     | 28 (25.5%)     | 58(52.7%) | 10 (9.1%)                  | 9 (8.2%)  | 5 (4.5%)          |
| Training needed to effectively implement the operation | 60 (54.5%)     | 29(26.4%) | 10 (9.1%)                  | 7 (6.4%)  | 4 (3.6%)          |
| Unsafe in the workplace                                | 5 (4.5%)       | 8 (7.3%)  | 14 (12.7%)                 | 27(24.5%) | 56 (50.9%)        |
| High rate of damages                                   | 13 (11.8%)     | 16(14.5%) | 36 (32.7%)                 | 27(24.5%) | 18 (16.4%)        |

Table 2 demonstrates that 54.5% of the respondents strongly agree with the shortage in supply of equipment in material handling, 52.7% of the respondents agree with the lack of maintenance in the concern, 54.5% of the respondents strongly agree with the training needed to effectively implement the operation, 50.9% of the respondents are strongly disagree towards the unsafe in the

workplace and 32.7% of the respondents are neither agree nor disagree towards the high rate of damages as the problems faced in material handling.

**Table 3:** Perception towards the issues in plant layout for effective material handling

|  | Strongly<br>agree | Agree         | Neither agree<br>nor disagree | Disagree      | Strongly<br>disagree |
|--|-------------------|---------------|-------------------------------|---------------|----------------------|
| Lack of enough space in plant layout for efficient material handling     | 62<br>(56.4%)     | 30<br>(27.3%) | 6 (5.5%)                      | 6 (5.5%)      | 6 (5.5%)             |
| Frequent repairs and maintenance of plant and machinery                  | 22<br>(20.0%)     | 62<br>(56.4%) | 10 (9.1%)                     | 7 (6.4%)      | 9(8.26.4%)           |
| Inconvenient plant location for effective material handling              | 56<br>(50.9%)     | 26<br>(23.6%) | 15<br>(13.6%)                 | 7 (6.4%)      | 6 (5.5%)             |
| Situation to not utilize proper modern equipment within the plant layout | 20<br>(18.2%)     | 57<br>(51.8%) | 11<br>(10.0%)                 | 12<br>(10.9%) | 10 (9.1%)            |
| Lack of knowledge to utilize appropriate modern equipment in the plant   | 61<br>(55.5%)     | 23<br>(20.9%) | 8 (7.3%)                      | 10 (9.1%)     | 8 (7.3%)             |

Table 3 demonstrates that 56.4% of the respondents are strongly agreeing with the lack of enough space in the plant layout for efficient material handling, 56.4% of the respondents are agreeing towards the frequent repairs and maintenance of plant and machinery, 50.9% of the respondents are strongly agreeing towards the inconvenient of plant location for effective material handling, 51.8% of the respondents are agreeing towards the situation to not utilize proper modern equipment within the plant layout and 55.5% of the respondents are strongly agreeing towards the lack of knowledge to utilize appropriate modern equipment in the located plant as the perception towards the issues in plant layout for effective material handling.

**Table 4:** Cost constraints for effective material handling

|   | Strongly<br>agree | Agree     | Neither<br>agree<br>nor | Disagree  | Strongly<br>disagree |
|---|-------------------|-----------|-------------------------|-----------|----------------------|
| Contains huge training costs for employees                              | 11<br>(10.0%)     | 17(15.5%) | 61(55.5%)               | 10 (9.1%) | 11(10.0%)            |
| Recruitment costs for talented personnel for operating modern equipment | 56<br>(50.9%)     | 24(21.8%) | 14(12.7%)               | 8 (7.3%)  | 8 (7.3%)             |
| Frequent Investments in the purchase of material equipment              | 23<br>(20.9%)     | 59(53.6%) | 9 (8.2%)                | 11(10.0%) | 8 (7.3%)             |
| Constraints in determining the right                                    | 54<br>(49.1%)     | 23(20.9%) | 13(11.8%)               | 11(10.0%) | 9 (8.2%)             |

|  |               |           |           |          |          |
|--|---------------|-----------|-----------|----------|----------|
| costs for the right equipment                            |               |           |           |          |          |
| Cost constraints for maintaining a safe work environment | 23<br>(20.9%) | 61(55.5%) | 10 (9.1%) | 9 (8.2%) | 7 (6.4%) |

Table 4 demonstrates that 55.5% of the respondents neither agree nor disagree with the huge training costs for employees, 50.9% of the respondents strongly agree with the recruitment costs for talented personnel for operating modern equipment, 53.6% of the respondents agree with the Frequent Investments in the purchase of material equipment, 49.1% of the respondents are strongly agree towards the constraints in determining the right costs for right equipment and 55.5% of the respondents are agree towards the cost constraints for maintaining safe work environment as the Cost constraints for effective material handling.

**Table 5:** Measures to improve the flow of material handling for effective work condition

|   | Strongly agree | Agree      | Neither agree nor | Disagree  | Strongly disagree |
|---|----------------|------------|-------------------|-----------|-------------------|
| Modern mechanical equipment to be available for material handling | 60 (54.5%)     | 23 (20.9%) | 11 (10.0%)        | 8 (7.3%)  | 8(7.3%)           |
| Ensuring the system for minimizing the time to                    | 23 (20.9%)     | 59(53.6%)  | 11(10.0%)         | 10 (9.1%) | 7 (6.4%)          |

|   |            |           |           |           |          |
|---|------------|-----------|-----------|-----------|----------|
| loading and unloading the materials   |            |           |           |           |          |
| Establishing the systems and practices to minimize the time to handle the inventories | 57 (51.8%) | 22(20.0%) | 11(10.0%) | 10 (9.1%) | 10(9.1%) |
| Training for the staff to easily operate materials                                    | 24 (21.8%) | 59(53.6%) | 10 (9.1%) | 8 (7.3%)  | 9 (8.2%) |
| Controlling material damage to improve the quality                                    | 64 (58.2%) | 22(20.0%) | 9 (8.2%)  | 9 (8.2%)  | 6 (5.5%) |

Table 5 demonstrates that 54.5% of the respondents strongly agree with modern mechanical equipment being available for material handling, 53.6% of the respondents agree with ensuring the system for minimizing the time to loading and unloading the materials, 51.8% of the respondents are strongly agreeing towards the Establishing the systems and practices to minimizing the time handle the inventories, 53.6% of the respondents are agree towards the training for the staff to easy operation of materials and 58.2% of the respondents are agree towards the controlling the material damage as to improve quality as the measures to improve the flow of material handling for effective work condition.

4.2 Chi-Square Analysis- Relationship Between the Gender of the Respondents and Problems Faced in Material Handling

Null hypothesis (Ho):

There is no significant relationship between the gender of the respondents and problems faced in material handling.

**Alternative hypothesis (H1):**

There is some significant relationship between the gender of the respondents and problems faced in material handling.

**Table 6:** Chi-Square Tests

|                              | Value               | df | Asymp. Sig. (2-sided) |
|------------------------------|---------------------|----|-----------------------|
| Pearson Chi-Square           | 95.883 <sup>a</sup> | 16 | .000                  |
| Likelihood Ratio             | 127.469             | 16 | .000                  |
| Linear-by-Linear Association | 69.671              | 1  | .000                  |
| N of Valid Cases             | 110                 |    |                       |

a. 30 cells (88.2%) have an expected count of less than 5. The minimum expected count is .45.

It may be deduced from the preceding table that 0.000 is the P value and that at the 5% (0.05) level of significance, it is noteworthy. The anticipated count is at least 0. 45. Consequently, the alternative theory is acknowledged and it is found that there is some significant relationship between the gender of the respondents and problems faced in material handling.

**4.3 Correlation Analysis- Relationship Between Age of the Respondents and Measures to Improve the Flow of Material Handling for Effective Work Condition**

Table 7: Correlations

|  |                     | AGE OF THE RESPONDENTS | MEASURES |
|--|---------------------|------------------------|----------|
| Age of the respondents   | Pearson Correlation | 1                      | .931**   |
|  | Sig. (2-tailed)     |                        | .000     |
|  | N                   | 110                    | 110      |
| Measures to improve the flow of material handling for effective work condition | Pearson Correlation | .931**                 | 1        |
|  | Sig. (2-tailed)     | .000                   |          |
|  | N                   | 110                    | 110      |
| **. Correlation is significant at the 0.01 level (2-tailed).                   |                     |                        |          |

According to the table above, of the 120 responses, the coefficient of correlation between the age of the respondents and measures to improve the flow of material handling for effective work conditions is 0. 931. It is below 1. So, there is a positive relationship between the age of the respondents and measures to improve the flow of material handling for effective work conditions.

5. FINDINGS AND DISCUSSION

5.1 Findings

It is found that the tables above demonstrate that 54.5% of the respondents said that male, 45.5% of the respondents said that 21-30 years, 51.8% of the respondents have completed

graduate, 48.2% of the respondents said that 1 to 3 years as the working years in the company and 54.5% of the respondents are highly satisfied towards material handling operation. The majority 54.5% of the respondents strongly agree with the training needed to effectively implement the operation as the problems faced in material handling. The majority (56.4%) of the respondents strongly agree with the lack of enough space in the plant layout for efficient material handling as the perception towards the issues in plant layout for effective material handling. 55.5% of the respondents agree that the cost constraints for maintaining a safe work environment as the Cost constraints for effective material handling. 58.2% of the respondents agree that controlling the material damage to improve quality is the measure to improve the flow of material handling for effective work conditions. It is found that there is some significant relationship between the gender of the respondents and problems faced in material handling. There is a positive relationship between the age of the respondents and measures to improve the flow of material handling for effective work conditions.

## **5.2 DISCUSSION**

- There must be a sufficient number of materials available in the concern for the employees.
- The company must offer training for the employees to effectively handle the equipment.
- There must be safety for the employees to handle the materials in the workplace.
- The company must ensure that enough spaces in the plant and layout for efficient material handling.
- The plant and machinery must be maintained properly to avoid losses for the concern.
- The plant location must be a convenient one for the employees to successfully handle the materials.

- The cost of the training must be reduced in the concern by recruiting skilled employees to handle the materials.
- The company must allocate resources to purchase the equipment to smoothen the material handling operation in the workplace.

## **6. CONCLUSION**

It is concluded that material handling today are lifeblood of any industry and no government industry organization or private organization operates without it. So, material handling increases the efficiency and effectiveness of manufacturing organizations since it has many significant contributions which finally result in the reduction of production costs. By using material handling the organization can save time, reduce the number of laborers, save space, improve working conditions, etc., It is obvious that to achieve those objectives and to increase the organization's performance the organization should set up the proper principles of and guidelines to be followed that will make the organization to increase the production as well as to reduce the cost of production. Not only does material handling increase the efficiency and effectiveness that result in the reduction of costs in the production process but also has a great impact on the improvement of the company's performance which leads the company to increase its net income.

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