



# A Study on the Effectiveness of Material Handling and Storage with Special Reference to Blue Force Logistics

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Date of Submission: 12-04-2023

Date of Acceptance: 27-04-2023

## ABSTRACT

Material handling is an integral part of every industry. It is an essential component of any successful warehouse. Material handling can improve customer service by making products easy to find, move, and ship out, cut costs by reducing the amount of time spent moving the products and reduce product damages by properly transporting your products. Storage management encompasses the principles and processes involved in running the day-to-day operations of a warehouse. At a high level, this includes receiving and organizing storage space, scheduling labor, managing inventory and fulfilling orders. Zoom in closer and you'll see that effective storage management involves optimizing and integrating each of those processes to ensure all aspects of a storage operation work together to increase productivity and keep costs low. This research shows that material handling and storage is one of the greatest attribute to any company for that matter. This study has been done to help the business to better understand the challenges faced in material handling and storage sections. This Research will help the company to understand the behavior of the employee and their attitude towards the handling of materials, it will also help them to understand the major things that the company should concentrate on the customer goodwill with their services and retain the customers with the company. The research is done through a questionnaire to obtain the required data from the respondents. The data collected through questionnaire were transferred to the table from which various table are prepared for future analyze. The present study is descriptive research design it includes survey of different kinds its major purpose is description of the state of affairs exists all present.

**Keywords:** material handling equipments, storage, handling methods, employee perception.

## I. INTRODUCTION

Material handling is an integral part of every industry. It is an essential component of any successful warehouse. Material handling can improve customer service by making products easy to find, move, and ship out, cut costs by reducing the amount of time spent moving the products and reduce product damages by properly transporting your products. It also ensures increased safety from permanent and temporary disabilities.

## MATERIAL HANDLING IN LOGISTICS CHAIN

Material handling is an activity that involves movement of material or products within an organization from one place to another place or the flow of material or products to vehicles or from vehicles. The activities are usually confined within the boundaries of an organization. The movement of material from one organization to another is categorized as transportation work, which is not part of material handling activities.

It is not only about the movement of material. It also involves storage, protection, and control of material while it moves in different departments like a warehouse, production, and manufacturing departments. It is one of the essential tasks for organizations. A poorly handled material becomes waste before it can be used for production purpose or before it is sent to retail stores.

In the old times, it was mostly done manually because of the lack of technology. Because of that, the number of accidents during handling work was quite high. In present times, with the introduction of technology, almost all of the work is done using automation or semi-automation. The introduction of technology not only reduced the cases of accidents occurred but also made the work fast.



## IMPORTANCE OF MATERIAL HANDLING AND STORAGE

The logistics chain is a complex process involving a series of stages which must run perfectly smoothly to ensure that the goods arrive at their destination fast and safely. One of those stages is storage, which plays an essential part in the distribution process. Storage isn't only about looking after goods; here are some of the aspects involved in a good warehousing service:

- **Goods reception.**
- **Safekeeping** the goods, making them easy to access and handle.
- **Maintenance:** Managing products, their safety and preservation.
- **Inventory** of the cargo and available stock.
- **Transport:** Managing preparation, packaging and shipment to the destination.

Storage plays a vital part in the supply chain given that it helps to guarantee good delivery times and reduce warehouse losses, making it possible to offer better services, to occupy a position ahead of competitors and, ultimately, to increase profits.

## TYPES OF MATERIAL HANDLING EQUIPMENT

**Drawers, bins, and shelves:** These are the most basic storage items commonly used to store smaller materials in an organized manner.

**Racks:** Racks help companies store materials in accessible locations, and they save floor space.

**Stacking Frames:** These are interlocking units that enable materials to get stacked without being crushed.

**Stackers:** Like forklifts, stackers help lift and stack heavy loads on the dock or in the warehouse.

**Reclaimers:** These are large machines used to recover bulk materials from a stockpile.

**Bucket elevators:** These elevators (also known as grain legs) assist with hauling bulk materials vertically.

**Silos:** Silos are towers that hold materials. Materials that are typically stored in silos include grain, woodchips, coal, and sawdust.

**Conveyor systems:** Automated conveyor systems carry heavy materials to specified destinations using

belts, flexible chains, or live rollers. It is highly efficient equipment to move large volumes of material quickly.

**Automated guided vehicles:** These vehicles are mobile robots that follow specific markers or wires in the floor to move large materials around a manufacturing facility or warehouse.

**Robotic delivery systems:** Robotic delivery systems transport goods and materials around a facility. These systems usually help move goods along an assembly line.

## STORAGE MANAGEMENT IN LOGISTICS CHAIN

Storage management encompasses the principles and processes involved in running the day-to-day operations of a warehouse. At a high level, this includes receiving and organizing storage space, scheduling labor, managing inventory and fulfilling orders. Zoom in closer and you'll see that effective storage management involves optimizing and integrating each of those processes to ensure all aspects of a storage operation work together to increase productivity and keep costs low.

A storage management system is a software solution that aims to simplify the complexity of managing a warehouse. Often provided as part of an integrated enterprise resource planning (ERP) suite of business applications, a storage management system can support and help to optimize every aspect of warehouse management.

## NEED OF THE STUDY

✓ This study focuses on the importance of the material handling system and storage in the company to optimize the movement of goods and materials around manufacturing and storage facilities.

✓ It also examines that a well designed material handling system can improve customer service, lower costs and reduces the risk of accidents and damage.

✓ This study also focuses on the storage space of the company and also the extent to which people value, enjoy and believe in what they do.

## SIGNIFICANCE OF THE STUDY

✓ This research shows that material handling and storage is one of the greatest attribute to any company for that matter. This study has been done to help the business to better understand the



challenges faced in material handling and storage sections.

✓ This Research will help the company to understand the behavior of the employee and their attitude towards the handling of materials, it will also help them to understand the major things that the company should concentrate on the customer goodwill with their services and retain the customers with the company.

#### STATEMENT OF PROBLEM

✓ The research in general refers to any problem that has been arisen and is difficult to solve in which the researcher experiences the context of finding a solution for the problem that has been arisen.

✓ In this sense, the organization's material handling system and storage plays an important role in any logistics business in this regard.

✓ The research is carried out so that we can study about the challenges faced in handling the materials and storage and also to create a better working environment for the employee. The priorities must be defined in accordance with certain aspects.

✓ From the research, the researcher can able to find some of the important aspects which motivate the employee to handle the materials and storage and how the suggestions will improve the material handling performance.

## II. REVIEW OF LITERATURE

**Riccardo Accorsi and Fausto Maranesi (2014)** proves that the issue of material handling involves the design and operative control of warehousing systems (i.e., distribution centres), which allow matching vendors and demands, smoothing with seasonality, consolidating products and arranging distribution activities. The warehouse design entails a wide set of decisions, which involve layout constraints and operative issues that seriously affect the performances and the overall logistics costs.

**Bhavin Shah and Vivek Khazode (2015)** unprecedented the increase in adoption of e-commerce in recent times asks for more efficient, flexible and agile warehousing due to product variants. All previous reviews broadly focus on warehouse design and operations ignoring the major function of providing effective buffering and efficient materials handling. The objective is to investigate design issues from lean perspective, and the findings reveal the interrelationship between performance measures, solution approaches and wastes affecting leanness.

**Filip Florani (2017)** discusses those cargoes in maritime transport, the way they are stored, handled and the way they can be damaged during transport. It includes: containerized cargo, refrigerated cargoes, grain cargo and crude oil. Each type of cargo has unique characteristics which dictate the design of storage spaces and cargo handling equipment to be used. It describes the process of cargo loading and unloading. There are different types of damages. It explains the characteristics of these cargoes, causes and outcome of damages.

**Ahmad Hanafie and Andi Haslindah (2018)** redesign this layout aims to provide information on improvements to the material storage space (warehouse) can be more effective and efficient both from the outside, material handling costs, and workers. The condition of placement of irregular/unregulated material makes the condition ineffective and dangerous, material handling costs become larger and difficult to measure due to searching time and longer, there is also no clear identity on the material or storage location.

**Peter Dobos, Peter Tamas and Bela Illes (2020)** shows that the production companies, the identification and elimination of logistics losses have a great importance, as it mostly determines their competitiveness. Reducing the turnaround time of logistics processes has so far been mainly in the production areas, however, in order to serve the production processes smoothly and efficiently, the proper selection of raw material warehousing strategies has become extremely important. The paper presents the currently used warehouse material handling strategies and the concept of their appropriate selection.

**Mehwish Ahmed and Youssef Maknoon (2021)** present a multi-criteria storage assignment model for the manufacturing system of the steel industry. The manufacturing system involves several plants, dozen of the production line and different products. The handling cost is related to the number of handling, product storage time, and meeting the due date. We have tested our algorithms with the data provided by a large steel company in Europe. The results indicate that considering product features in the storage assignment offers better performance on handling, storage time, and meeting the due date.

#### RESEARCH METHODOLOGY

Research methodology is a systematically solve the research problems. It includes the overall research design, the sampling procedure, data collection method and analysis procedure.



### SAMPLING DESIGN

The research is done through a questionnaire (Google form – online mode) to obtain the required data from the respondents. The data collected through questionnaire were transferred to the table from which various table are prepared for future analyze. The present study is descriptive research design it includes survey of different kinds its major purpose is description of the state of affairs exists all present.

### SAMPLING METHOD

It refers to the technique or procedure to the researcher would adopt in selecting some sampling unit from which inference about the population are drawn. The sampling method adopted for this study is well-structured Questionnaire.

### SOURCES OF DATA

Both primary and secondary data is used for the study.

#### Primary data

The firsthand information, which is being collected through online mode – Google form by the researcher, is called primary data. In this study, the primary data was collected through structured questionnaire.

#### Secondary data

Secondary were collected from the books, leading journals, newspapers and magazines, textbooks, related to study and from the internet sources have been referred for this purpose.

#### Sample size and population

The intended population of this research study is based on the employee working with Blue force logistics. Total population of employee in Blue force logistics is 180. In the study, samples of 120 respondents are selected from the Blue force logistics using convenient sampling method.

#### Period of the study

The field survey has been carried out during the period from January 2023 to April 2023 to collect primary data.

### 1.5.4 DATA ANALYSIS

The data collected from the primary source were arranged sequentially and tabulated in the systematic order in the master table.

#### Tools Used For Analysis

Data collected through questionnaire. For analysis and interpretation of the data simple statistical tools like Percentage Analysis, Weighted Average Ranking Method and Chi-Square Analysis was used.

- Percentage Analysis
- Chi-square Analysis

### ANALYSIS AND INTERPRETATION

#### 1. PERCENTAGE ANALYSIS

DEMOGRAPHIC PROFILE		NO. OF RESPONDENTS	PERCENTAGE
gender	Female	52	43.3
	male	68	56.7
age	21 to 30	29	24.2
	31 to 40	43	35.8
	41 to 50	42	35
	50 and above	6	5
Work experience	Below 3	22	18.3
	3 To 5	39	32.5
	6 to 9	30	25
	Above 9	29	24.5
Logistics improvement	Yes	46	38.3
	No	41	34.2
	Future plans	33	27.5
Logistics reviewed at a company	Daily	19	15.8
	Weekly	41	34.2
	Monthly	35	29.2
	Quarterly	17	14.2
	other	8	6.6
Quality metrics used in logistics	Cost saving	22	18.3
	Error free	34	28.4
	Reliability	27	22.5



	<b>Timely delivery</b>	<b>28</b>	<b>23.3</b>
	<b>All the above</b>	<b>9</b>	<b>7.5</b>
<b>Problem on logistics</b>	<b>Lead time</b>	<b>27</b>	<b>22.5</b>
	<b>Tracking</b>	<b>37</b>	<b>30.9</b>
	<b>Cost</b>	<b>28</b>	<b>23.3</b>
	<b>Reliability</b>	<b>20</b>	<b>16.6</b>
	<b>Loading and unloading time</b>	<b>8</b>	<b>6.7</b>
<b>Modern equipments</b>	<b>Bay crane</b>	<b>41</b>	<b>34.2</b>
	<b>Scissor lift</b>	<b>34</b>	<b>28.3</b>
	<b>Fork lift</b>	<b>33</b>	<b>27.5</b>
	<b>Order picker</b>	<b>12</b>	<b>10</b>
<b>Rack distance</b>	<b>1.0 meter</b>	<b>26</b>	<b>21.6</b>
	<b>1.2 meter</b>	<b>46</b>	<b>38.3</b>
	<b>1.5 meter</b>	<b>34</b>	<b>28.4</b>
	<b>2 meter</b>	<b>14</b>	<b>11.7</b>

### INTERPRETATION

The respondents in this survey, 56.7% were males, 35.8% were between (31 to 40) years old, 32.5% were 3 to 5 years of experience, 38.3% needs logistics improvements, 34.2% logistics weekly reviewed at a company, 28.4% error free quality metrics used in logistics, 30.9% tracking is the problem faced in logistics, 34.2% bay crane is the commonly used modern equipments and 38.3% the rack distance should be 1.2 meter.

## 2. CHI SQUARE TEST

### Gender and Satisfaction of Currently Used Equipments

**Null hypothesis (H<sub>0</sub>):** There is no significant relationship between gender and satisfaction of currently used equipments.

**Alternative Hypotheses (H<sub>1</sub>):** There is a significant relationship between gender and their level of satisfaction of currently used equipments.

	Value	df	Asymptotic Significance (2-sided)
<b>Pearson Chi-Square</b>	3.342 <sup>a</sup>	4	.502
<b>Likelihood Ratio</b>	3.353	4	.501
<b>N of Valid Cases</b>	120		

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 4.77.

### INTERPRETATION

As per the above table, it is inferred that the P value is 0.502; it is significant to 5% (0.05) significant level. The minimum expected count is 4.77. Thus null hypothesis is accepted and it is found that there is no significant relationship between gender of the respondent and satisfaction of currently used equipments.

### Age and Quality Metrics Used in Logistics

**Null hypothesis (H<sub>0</sub>):** There is no significant relationship between age of the respondents and quality metrics used in logistics.

**Alternative Hypothesis (H<sub>1</sub>):** There is a significant relationship between age of the respondents and quality metrics used in logistics.

	Value	df	Asymptotic Significance (2-sided)
<b>Pearson Chi-Square</b>	10.682 <sup>a</sup>	12	.556
<b>Likelihood Ratio</b>	12.375	12	.416





<b>N of Valid Cases</b>	120		
a. 8 cells (40.0%) have expected count less than 5. The minimum expected count is 0.45.			

### INTERPRETATION

As per the above table, it is inferred that the P value is 0.556; it is significant to 5% (0.05) significant level. The minimum expected count is 0.45. Thus null hypothesis is accepted and it is found that there is no significant relationship between age of the respondents and quality metrics used in logistics.

#### Problem in Handling the Materials and Implementations of Alternative Methods

**Null hypothesis (Ho):** There is no significant relationship between the respondents facing the problem in handling the materials and implementations of alternative methods in material handling.

**Alternative Hypothesis (H1):** There is a significant relationship between the respondents facing the problem in handling the materials and implementations of alternative methods in material handling.

	Value	df	Asymptotic Significance (2-sided)
<b>Pearson Chi-Square</b>	11.049 <sup>a</sup>	12	.525
<b>Likelihood Ratio</b>	13.175	12	.356
<b>N of Valid Cases</b>	120		
a. 9 cells (45.0%) have expected count less than 5. The minimum expected count is 0.42.			

### INTERPRETATION

As per the above table, it is inferred that the P value is 0.525; it is significant to 5% (0.05) significant level. The minimum expected count is 0.42. Thus null hypothesis is accepted and it is found that there is no significant relationship between the respondents facing the problem in handling the materials and implementations of alternative methods in material handling.

It is inferred that the P value is 0.525; it is significant to 5% (0.05) significant level. The minimum expected count is 0.42. Thus null hypothesis is accepted and it is found that there is no significant relationship between the respondents facing the problem in handling the materials and implementations of alternative methods in material handling.

### III. FINDINGS

The respondents in this survey, 56.7% were males, 35.8% were between (31 to 40) years old, 32.5% were 3 to 5 years of experience, 38.3% needs logistics improvements, 34.2% logistics weekly reviewed at a company, 28.4% error free quality metrics used in logistics, 30.9% tracking is the problem faced in logistics, 34.2% bay crane is the commonly used modern equipments and 38.3% the rack distance should be 1.2 meter.

It is inferred that the P value is 0.502; it is significant to 5% (0.05) significant level. The minimum expected count is 4.77. Thus null hypothesis is accepted and it is found that there is no significant relationship between gender of the respondent and satisfaction of currently used equipments.

It is concluded that the P value is 0.556; it is significant to 5% (0.05) significant level. The minimum expected count is 0.45. Thus null hypothesis is accepted and it is found that there is no significant relationship between age of the respondents and quality metrics used in logistics.

### IV. SUGGESTIONS

Organisation should implement different logistics plans for solving the logistics problem. Tracking is the major problem influencing on logistics and the organization should implement an alternative method to solve the problem in tracking. The employee need more transport facilities while handling the materials.

Organisation should improve the existing method of storing the materials. Organisation should upgrade the currently used equipments and also that most of the employee suggested, bay crane is the most effective equipment to handle the materials. More trained forklift drivers are required for handling the forklift in an organisation.

It is suggested that 1.2 meter is the effective rack distance for the equipment's movement in inventory. Additional changes in inventory are required for creating a better working environment in an organisation.



## V. CONCLUSION

In every logistics organisation, material handling is a vital role that involves the movement of material or products within an organization from one place to another place or the flow of material or products to vehicles or from vehicles. The project titled “a study on importance of material handling and storage” helps in studying the factors that influence the employee while storing the materials, handling the materials, handling the equipments and work place in inventory. In blue force logistics, the implemented safety measures for the employees while handling the materials and equipments are satisfied.

From the study, it is concluded that the company “blue force logistics” should follow the certain strategies based on the findings and suggestions of the study to create a better working environment for the employee and to upgrade the material handling and storage facilities.

## BIBLIOGRAPHY

### BOOKS

- [1]. Mital, Anil. A guide to manual materials handling. 2nd ed. London: Taylor & Francis, 1997.
- [2]. Sims, E. Ralph. Planning and managing industrial logistics systems. Amsterdam: Elsevier, 1991.
- [3]. Reese, Charles D. Industrial safety and health for goods and materials services. Boca Raton: CRC Press, 2009.
- [4]. Ayoub, M. M. Manual materials handling. London: Taylor & Francis, 1989.
- [5]. Mulcahy, David E. Materials handling handbook. New York: McGraw-Hill, 1999.

### JOURNALS

- [6]. Site control of materials: Handling, storage and protection; John E Johnston; Elsevier, 2016.
- [7]. The definitive guide to warehousing: managing the storage and handling of materials and products in the supply chain; Scott Keller, Brian C Keller; Pearson Education, 2014.
- [8]. Optimization of Warehouse Material Handling Parameters to Enhance the Efficiency of Automated Sorting and Storage Systems; Ayman S Abbas, Tamer A Mohamed, Mohannad Hazem; Journal of Management & Engineering Integration 11 (1), 72-84, 2018.
- [9]. New strategy for warehouse optimization–lean warehousing; USS Dharmapriya, AK Kulatunga; Proceedings of the 2011

International Conference on Industrial Engineering and Operations Management, 513-519, 2011.

- [10]. Warehouse design: A structured approach; Peter Baker, Marco Canessa; European journal of operational research 193 (2), 425-436, 2009.
- [11]. Innovative Solutions and Challenges for the Improvement of Storage Processes; Dalia Perkumienė, Kristina Ratautaitė, Rasa Pranskūnienė; Sustainability 14 (17), 10616, 2022.