

A STUDY ON MATERIAL HANDLING AND STORAGE PACKAGING AT GOOD TRANS LOGISTICS

Submitted in partial fulfillment of the requirements for the award of Degree in

MASTER OF BUSINESS ADMINISTRATION

by

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**DEPARTMENT OF BUSINESS ADMINISTRATION
SCHOOL OF MANAGEMENT STUDIES**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **ANSELA A 41410022** who carried out the project entitled "**A Study on material handling and storage packaging at Good Trans Logistics**" under my supervision from January 2023 to March 2023.

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DECLARATION

I **ANSELA A (41410022)** hereby declare that the Project Report entitled “**A study on material handling and storage packaging at Good Trans Logistics**” done by me under the guidance of **DR. R. BLESSIE PATHMU** is submitted in partial fulfillment of the requirements for the award of Master of BusinessAdministration degree.

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ABSTRACT

This project aims to investigate the material handling and storage packaging practices at Good Trans Logistics. The primary objective is to gain insights into the current processes and identify areas for improvement. Secondary objectives include understanding customer preferences for packaging, discovering desirable qualities of Good Trans Logistics, and exploring their use of technology. By examining these factors, the project aims to recommend suitable measures to enhance material handling and storage packaging, which will improve customer satisfaction. The findings of this study will benefit logistics companies by providing valuable insights into best practices for material handling and storage packaging, ultimately resulting in increased efficiency, reduced costs, and higher customer satisfaction.

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CHAPTER 1 - INTRODUCTION

1.1 OVERVIEW

Logistics is a part of supply chain management that deals with the efficient forward and reverse flow of goods, services, and related information from the point of origin to the point of consumption according to the needs of customers. Logistics management is a component that holds the supply chain together. The resources managed in logistics may include tangible goods such as materials, equipment, and supplies, as well as food and other consumable items.

Military logistics, it is concerned with maintaining army supply lines with food, armaments, ammunition, and spare parts apart from the transportation of troops themselves. Meanwhile, civil logistics deals with the acquisition, movement, and storage of raw materials, semi-finished goods, and finished goods. For organizations that provide services such as garbage collection, mail utilities, and after-sales services, logistical problems also need to be addressed.

Logistics deals with the movement of materials or products from one facility to another, it does not deal with the material flow within the production or assembly plants. Logistics occupies a significant amount of the operational cost of an organization or country.

The complexity of logistics can be modeled, analyzed, visualized, and optimized by dedicated simulation software. The minimization of the use of resources is a common motivation in all logistics fields. A professional working in the field of logistics management is called a logistician.

TYPES OF LOGISTICS

There are several types of logistics, each with its focus and set of activities. Some of the most common types of logistics include,

- ***INBOUND LOGISTICS***: This type of logistics refers to the management of the flow of goods and materials into a business or organization. This can include activities such as sourcing raw materials, managing suppliers, and transporting materials to the production facility.
- ***OUTBOUND LOGISTICS***: This type of logistics involves managing the flow of finished products from a business or organization to its customers. Activities in outbound logistics can include order processing, packaging, transportation, and delivery.
- ***REVERSE LOGISTICS***: This type of logistics refers to the management of the flow of goods and materials in the opposite direction to traditional logistics. Reverse logistics can involve activities such as product returns, recycling, and the disposal of waste materials.
- ***THIRD-PARTY LOGISTICS***: This type of logistics involves outsourcing logistics activities to a third-party provider. They offer a range of logistics services, including transportation, warehousing, and inventory management.
- ***FOURTH-PARTY LOGISTICS***: This type of logistics is like third-party logistics, but it involves outsourcing the entire logistics process, including the management of third-party logistics providers. Fourth-party logistics providers act as a single point of contact and coordination for all logistics activities.
- ***GLOBAL LOGISTICS***: This type of logistics involves managing the movement of goods across international borders. Global logistics can

involve a range of activities, including customs clearance, compliance with international regulations, and transportation across multiple modes.

- *GREEN LOGISTICS*: This type of logistics focuses on reducing the environmental impact of logistics activities. Green logistics can involve activities such as optimizing transportation routes, reducing packaging waste, and using renewable energy sources.

COMPONENTS OF LOGISTICS

Logistics involve several components, each of which plays a crucial role in managing the movement and storage of goods. Some of the most important components of logistics include:

- *TRANSPORTATION*: Transportation is a critical component of logistics, and it involves selecting the most efficient mode of transportation for moving goods from one place to another. This can include road, rail, sea, or air transportation.
- *WAREHOUSING*: Warehousing involves the storage of goods before they are distributed to their destination. This can include receiving and inspecting goods, storing them in the correct conditions, and picking and packing them for delivery.
- *INVENTORY MANAGEMENT*: Inventory management involves managing the stock of goods to ensure that there is sufficient inventory to meet customer demand without excess stock leading to overstocking. This can include tracking the flow of goods, forecasting demand, and managing the supply chain to ensure that inventory levels are optimized.
- *MATERIAL HANDLING*: Material handling involves the movement, storage, and control of goods within a warehouse or distribution center. This can

include activities such as loading and unloading, picking and packing, and palletizing.

- *INFORMATION MANAGEMENT*: Information management involves collecting, analyzing, and managing information related to the movement and storage of goods. This can include order tracking, inventory levels, transportation schedules, and other data that are critical to the efficient functioning of the logistics system.
- *PACKAGING AND LABELING*: Packaging and labeling involve preparing goods for shipment by packaging them in the appropriate materials and labeling them with the necessary information, such as product codes and shipping addresses.
- *SECURITY AND RISK MANAGEMENT*: Security and risk management involve identifying potential risks and taking steps to mitigate them. This can include implementing security measures to prevent theft or damage to goods and ensuring compliance with safety regulations and industry standards.

By effectively managing these components of logistics, businesses can improve efficiency, reduce costs, and ensure customer satisfaction.

PRINCIPLES OF LOGISTICS

There are several principles of logistics that are important to understand to effectively manage the movement and storage of goods. Some of the most important principles of logistics include:

- *CUSTOMER FOCUS*: The goal of logistics is to meet the needs of customers by delivering goods and services in a timely and efficient manner. Customer focus involves understanding customer requirements and tailoring logistics operations to meet their needs.

- *COST EFFICIENCY*: Logistics can be a major cost center of businesses, so it is important to find ways to optimize logistics operations to reduce costs. This can involve selecting the most efficient transportation modes, optimizing inventory levels, and reducing waste and inefficiencies.
- *CONTINUOUS IMPROVEMENT*: Logistics operations should be regularly evaluated and improved to ensure that they are meeting the needs of the business and its customers. Continuous improvement can involve implementing new technologies, refining processes, and adapting to changes in the business environment.
- *INTEGRATION*: Logistics operations should be integrated with other functions of the business, such as sales, marketing, and production. This can help ensure that logistics operations are aligned with overall business goals and objectives.
- *FLEXIBILITY*: Logistics operations should be flexible and adaptable to changes in customer demand, market conditions, and other factors. This can involve having backup plans and contingency strategies in place to respond to unexpected events.
- *SUSTAINABILITY*: Logistics operations should be designed with sustainability in mind, considering environmental and social factors. This can involve implementing green logistics practices, such as using renewable energy sources and reducing packaging waste.

By following these principles of logistics, businesses can optimize their logistics operations to meet the needs of their customers, reduce costs, and improve overall performance.

MATERIAL HANDLING

Material handling is the movement, protection, storage, and control of materials and products throughout manufacturing, warehousing, distribution, consumption, and disposal. As a process, material handling incorporated a wide range of manual, semi-automated, and automated equipment and systems that support logistics and make the supply chain work. Their application helps with:

- Forecasting
- Resource allocation
- Production planning
- Flow and process management
- Customer delivery
- After-sales support and service

A company's material handling system and process are put in place to improve customer service, reduce inventory, shorten delivery time, and lower overall handling costs in manufacturing, distribution, and transportation.

ROLE OF MATERIAL HANDLING

The role of material handling is to improve efficiency by making the logistics system respond effectively and quickly as per the customer's demand. It means that it helps improve customer service by making products to be found, moved, and delivered easily. Material handling is not only for the company but also for the customer's needs. It cuts costs by reducing the time and money and effort and reduces the product damage while doing product transport. It is very important in outbound logistics.

TYPES OF MATERIAL HANDLING

Material handling is a complex process that can involve both human and machine-led processes.

- ***MANUAL HANDLING***: Manual handling is driven by humans. It might involve workers pushing, pulling, lifting, lowering, and carrying goods. They may use tools, like dollies, hoppers, or bucket elevators, to help them. Unfortunately, this creates the capacity for human error. People make mistakes, for example, by dropping them. People can hurt themselves through their errors. For instance, a person can injure their back by lifting a heavy weight incorrectly.
- ***AUTOMATED HANDLING***: Increasingly, material handling professionals are prioritizing automated handling. Instead of relying on people, automated handling uses machinery to maneuver goods. Types of material handling equipment use technology like machine intelligence, motion sensors, and robotics to automate tasks fully. For example, a robotic arm can be used to move packages off a conveyor belt and onto a pallet truck, or an automatic guided vehicle can replace a human-driven vehicle. Automated equipment handling has the benefit of reducing the risk of human errors. It can also be more cost-efficient, eliminating the need to train workers.

OPTIMIZATION OF MATERIAL HANDLING

To optimize the material handling during the whole process, we can leverage the following strategies to improve material handling.

- ***DEFINE THE CURRENT STATE OF THE PROCESS***

First, we need to understand the relevant data concerning the company's operation. This includes information such as the number of processed orders, the number of lines each operator has done, the number of working forklifts, the cost

of leasing and operating forklifts, utility costs for running the distribution center, and the entire cost of running the distribution center per square foot.

Once we understood how the current material handling process works, we can make the necessary adjustments and changes based on its weaknesses. For example, if we discovered there's a lot of downtime happening, we can make plans to minimize these incidences.

We can achieve this by doing regular checkups and maintenance of all equipment involved. Machines such as carousels, conveyors, palletizers, case erectors, tapers, and stretch wrappers. Ensure that all the equipment is inspected, maintenance logs are well-stored, and any problem is corrected immediately.

Plan regular maintenance of all equipment in the distribution centers, monitor the motor temperature, and lubricate your equipment. Ensure that you have spare parts such as belts, rollers, motors, and bearings. Such measures will always keep your orders moving.

- *USE THE RIGHT TOOLS*

To have a productive and efficient material handling process, you need to use the right tools for the job. Ensure that the diverse modules and components involved in the material handling are homogenous and reorganized. Work with well-established suppliers who can be distributing your products because the lack of local support can affect the continuity of production and lower production level. Using the right tools helps you level up efficiency, responsiveness, and accuracy.

- *AUTOMATE THE PROCESS*

It is said that automation is the future of warehousing. Automating material handling is essential for the sole reason of optimizing responses and operations for both internal and external clients. It helps reduce manual work and saves a lot of time, which can be put to better use for other productive works. Automation also allows you to develop consistency and be predictable so you may reduce operational costs. You can automate the handling of materials concerning flow, desired type, and process.

All the modern material handling types of machinery comes with a control panel used for performing all the operations. This controls all the related types of machinery that facilitate the smooth functioning of the entire process. As the number of machinery increases, so does the size of the equipment and the cost.

- *CONDUCT STORAGE AND FLOW ANALYSIS*

Storage flow and analysis involve determining material flow from point A to point B. This is critical in storage design because it helps reduce the travel time of the materials throughout the business premises.

Storage and flow analysis also plays a vital role in determining the size of storage facilities. In large organizations, storage and flow analysis may involve the use of simulation models to determine optimum solutions to problems in storage, material flow, and transport and inspection processes. It involves the modeling and analyzing of the entire life cycle costing of any process and evaluating the impact on the total cost of the process.

Good design ensures efficient storage and the flow of material toward production is critical. The material in high use should be placed in areas that provide the shortest distance to the point of use.

In essence, storage design and material flow work as a unit, so you can't plan for one in the exclusion of the other. To have the correct balance of quality, cost, safety, and delivery without having to compromise on any of them, efficient tools are needed for evaluating the space and offering data-driven solutions that work.

- *IMPLEMENT INTELLIGENT STORAGE LAYOUT*

We can work with expert facilities engineers to help you create an efficient and intelligent storage layout for your materials. Facilities engineer helps design and implement new processes or improvements in different operations in a facility. They also analyze labor costs, procedures, and standards to ensure the continued efficiency of the storage facility.

USAGE OF MATERIAL HANDLING EQUIPMENT

There is a variety of manual, semi-automated, and automated material handling equipment, and technologies available to aid in the movement, protection, storage, and control of materials and products throughout manufacturing, distribution, consumption, and disposal. These include:

- Automated storage and retrieval system
- Automated guided vehicles
- Automated identification and data collection
- Casters and wheels
- Controls
- Conveyors
- Dock equipment
- Ergonomics
- Hoisting equipment
- Industrial robots
- Integrated material handling systems
- Item order fulfillment systems
- Lift trucks
- Overhead cranes
- Protective guarding
- Racks
- Software
- Sortation

INDUSTRIES WHERE MATERIAL HANDLING USED

- Aerospace
- Appliance
- Automotive
- Beverage

- Chemical
- Construction
- Consumer goods
- E-Commerce
- Food
- Hardware
- Hospital
- Manufacturing
- Materials processing
- Pharmaceutical
- Plastic
- Retail
- Warehousing and distribution

PRICIPLES OF MATERIAL HANDLING

When designing a material handling system, it is important to refer to best practices to ensure that all the equipment and processes including material, semi-automated and automated in a facility work together as a unified system. By analyzing the goals of the material handling process and aligning them to guidelines, such as the 10 principles of material handling, a properly designed system will improve customer service, reduce inventory, shorten delivery time, and lower overall handling costs in manufacturing, distribution, and transportation. These principles include:

- ***PLANNING***: Define the needs, strategic performance objectives, and functional specification of the proposed systems and supporting technologies at the outset of the design. The plan should be developed in a team approach, with input from consultants, suppliers, and end users, as well as from management, engineering, information systems, finance, and operations.

- *STANDARDIZATION*: All material handling methods, equipment, controls, and software should be standardized and able to perform a range of tasks in a variety of operating conditions.
- *WORK*: Material handling processes should be simplified by reducing, combining, shortening, or eliminating unnecessary movement that will impede productivity. Examples include using gravity to assist in material movement and employing straight-line movement as much as possible.
- *ERGONOMICS*: Work and working conditions should be adapted to support the abilities of a worker, reduce repetitive and strenuous manual labor, and emphasize safety.
- *UNIT LOAD*: Because less effort and work is required to move several individual items together as a single load, unit loads such as pallets, containers, or totes of items should be used.
- *SPACE UTILIZATION*: To maximize efficient use of space within a facility, it is important to keep work areas organized and free of clutter, maximize density in storage areas, and to utilize overhead space.
- *SYSTEM*: Material movement and storage should be coordinated throughout all processes, from receiving, inspection, storage, production, assembly, packaging, unitizing, and order selection, to shipping, transportation, and the handling of returns.
- *ENVIRONMENT*: Energy use and potential environmental impact should be considered when designing the system, with reusability and recycling processes implemented, when possible, as well as safe practices established for handling hazardous materials.
- *AUTOMATION*: To improve operational; efficiency, responsiveness, consistency, and predictability, automated material handling technologies should be deployed when possible and where they make sense to do so.

- *LIFE CYCLE COST*: For all equipment specified for the system, an analysis of life cycle costs should be conducted. Areas of consideration should include capital investment, installation, setup, programming, training, system testing, operation, maintenance and repair, reuse value, and ultimate disposal.

STORAGE PACKAGING

In logistics, storage packaging plays a crucial role in the proper handling and transportation of goods. Storage packaging refers to the process of preparing products for storage, shipment, and eventual delivery to the end customer. This involves selecting the appropriate packaging materials and methods to ensure that the goods are protected and secure during transit.

There are several types of packaging materials used in logistics, including cardboard boxes, plastic containers, wooden crates, and metal containers. The choice of packaging material depends on various factors such as the type and nature of the product, the mode of transport, and the length of the journey. For example, fragile or delicate items may require additional cushioning or protective wrapping to prevent damage during transport.

The packaging process involves several steps, including selecting the appropriate packaging material, preparing the item for packaging, and labeling the package with relevant information such as the destination address, product details, and handling instructions. In addition to this, the package must also be designed in a way that makes it easy to handle and transport, ensuring that it can be loaded and unloaded safely without causing damage to the goods.

Effective storage packaging in logistics can help to reduce the risk of product damage or loss, lower transportation costs, and increase efficiency in the supply chain. It also helps to ensure that products are delivered in good condition to the

end customer, enhancing customer satisfaction and loyalty.

Storage packaging is a critical component of logistics operations that involves selecting the appropriate packaging materials and methods to protect and secure goods during transport. Effective packaging can help to reduce the risk of damage or loss, lower transportation costs, and enhance customer satisfaction.

ROLE OF STORAGE PACKAGING

The role of storage packaging in logistics is crucial for ensuring that products are protected and transported efficiently. Here are some of the key roles that storage packaging plays in logistics:

- ***PROTECTION***: The primary role of storage packaging is to protect products from damage during transport and storage. Packaging materials should be selected based on the type of product being shipped and the mode of transport used.
- ***EFFICIENT USE OF SPACE***: Storage packaging can be used to optimize the use of space during transport and storage. By using packaging materials that are appropriately sized for the product, logistics companies can maximize the use of space in transport vehicles and warehouses.
- ***STANDARDIZATION***: Standardized packaging materials and methods can help to reduce costs and improve efficiency. Using standardized packaging materials can help to reduce the time and cost associated with packaging and shipping products.
- ***IDENTIFICATION AND TRACKING***: Storage packaging can be used to identify and track products during transport and storage. Labels and other identification methods can be used to ensure that the product is easily identifiable and tracked throughout the supply chain.

- **COMPLIANCE:** Storage packaging must comply with all relevant regulations and standards. For example, dangerous goods should be packaged in compliance with regulations governing the transport of hazardous materials.
- **SUSTAINABILITY:** The principles of sustainability should be considered when selecting packaging materials. The use of environmentally friendly materials and designs that reduce waste can help to reduce the environmental impact of logistics operations.

The role of storage packaging in logistics is to protect products during transport and storage, optimize the use of space, identify and track products, ensure compliance with regulations, and consider the principles of sustainability. By selecting the right packaging materials and following best practices in packaging and storage, logistics companies can ensure that products arrive at their destination in good condition, reduce costs, and improve efficiency.

TYPES OF STORAGE PACKAGING

There are several types of packaging used in logistics, each with its unique features and benefits. Here are some common types of packaging used in logistics:

- **INDIVIDUAL PACKAGING:** Individual packaging is packaging for individual products. For example, individual packaging is what is used to wrap each piece of candy. The purpose is to protect the product from water, humidity, light, and heat.
- **INNER PACKAGING:** Inner packaging is used to group individually packaged products in a bag. This is the bag that is filled with individually packaged candy. Inner packaging is the unit that is sold at retail stores, and it is important to design an inner package that expresses the appeal of

the product and stimulates the desire to purchase the product to promote sales.

- **OUTER PACKAGING:** Outer packaging is the unit of the largest package, such as a cardboard box or wooden crate. The main purpose is to protect the product from dirt and breakage.

OPTIMIZATION OF MATERIAL HANDLING

Optimizing storage packaging in logistics can lead to several benefits, including reduced costs, improved efficiency, and increased customer satisfaction. Here are some *ways to optimize storage packaging*:

- **RIGHT SIZING:** Right-sizing refers to selecting packaging that is the right size for the product being shipped. This can help to reduce excess material, optimize space utilization, and reduce shipping costs.
- **MATERIAL SELECTION:** The choice of packaging material can affect the weight, durability, and cost of the packaging. Selecting the right material can help to reduce the overall weight of the package, increase durability, and lower the cost of shipping.
- **STANDARDIZATION:** Standardizing packaging across products can help to streamline logistics operations, reduce waste, and improve efficiency. This can include standardizing sizes, shapes, and materials.
- **AUTOMATION:** Automating packaging processes can help to reduce labor costs, increase efficiency, and improve accuracy. This can include using automated packaging equipment, such as box-making machines and palletizers.
- **ENVIRONMENTAL SUSTAINABILITY:** Incorporating environmental

sustainability into packaging can help to reduce waste, lower costs, and improve customer satisfaction. This can include using eco-friendly materials, reducing packaging size, and implementing recycling programs.

- *PRODUCT PROTECTION*: Optimizing storage packaging for product protection can help to reduce damage, returns, and customer complaints. This can include using cushioning materials, selecting appropriate packaging materials, and incorporating tamper-evident features.
- *CUSTOMER EXPERIENCE*: Optimizing storage packaging can also enhance the customer experience by providing easy-to-open, attractive, and functional packaging. This can include using branded packaging, incorporating easy-to-follow instructions, and providing packaging that is convenient for customers.

Optimizing storage packaging in logistics can lead to several benefits, including reduced costs, improved efficiency, and increased customer satisfaction. By implementing strategies such as right-sizing, material selection, standardization, automation, environmental sustainability, product protection, and customer experience, logistics companies can optimize their storage packaging to achieve these benefits.

USAGE OF STORAGE PACKAGING EQUIPMENT

Storage packaging equipment is used to package goods for storage and shipment in a warehouse or distribution center. The usage of storage packaging equipment can help to improve efficiency, reduce costs, and increase safety. Here are some common types of storage packaging equipment and their uses:

- *STRETCH WRAP MACHINES*: Stretch wrap machines are used to wrap pallets with stretch film to secure and protect the products during shipment. They can be automated or semi-automated and can wrap pallets quickly and efficiently.

- *STRAPPING MACHINES*: Strapping machines are used to secure goods to pallets or bundles using straps. They can be automated or semi-automated and can be used to secure a variety of products for shipping.
- *SHRINK WRAP MACHINES*: Shrink wrap machines are used to wrap goods with shrink film to protect them during shipping. They can be used to wrap individual products or bundles and can be automated or semi-automated.
- *CARTON SEALERS*: Carton sealers are used to seal cardboard boxes for shipping. They can be semi-automated or automated and can seal a variety of box sizes.
- *LABEL PRINTERS*: Label printers are used to print labels for shipping and storage purposes. They can print a variety of label sizes and types and can be integrated with other equipment to streamline the packaging process.
- *BOX-MAKING MACHINES*: Box-making machines are used to create custom-sized cardboard boxes for shipping. They can be automated or semi-automated and can be used to create a variety of box sizes.
- *MATERIAL HANDLING EQUIPMENT*: Material handling equipment, such as conveyor systems and pallet jacks, can be used to move and transport packaged goods within a warehouse or distribution center.

The usage of storage packaging equipment can help to improve the efficiency of the packaging process by reducing manual labor, increasing accuracy, and improving product protection. By using the right storage packaging equipment for the specific needs of a warehouse, logistics companies can improve their operations and achieve better results.

PRINCIPLES OF STORAGE PACKAGING

The principles of storage packaging in logistics are the basic guidelines that logistics companies follow to ensure that products are packaged and stored correctly. Here are some key principles of storage packaging in logistics:

- ***PROTECTION***: The primary principle of storage packaging is to protect the product from damage during storage and shipment. Packaging materials should be strong enough to withstand the rigors of transport and provide adequate protection for the product.
- ***COMPATIBILITY***: The packaging materials used should be compatible with the product being shipped. For example, food products should be packaged in food-grade materials that do not contaminate the product.
- ***SUSTAINABILITY***: The principles of sustainability should be considered when selecting packaging materials. The use of environmentally friendly materials and designs that reduce waste should be a priority.
- ***STANDARDIZATION***: Standardization of packaging materials and methods can help to reduce costs and improve efficiency. Using standardized packaging materials can help to reduce the time and cost associated with packaging and shipping products.
- ***VISIBILITY***: The packaging should allow for easy identification and tracking of the product during transport and storage. Labels and other identification methods should be used to ensure that the product is easily identifiable.
- ***SPACE UTILIZATION***: The packaging should be designed to maximize the use of space during storage and transport. Packaging materials should be sized to fit the product and to optimize the use of space in the warehouse or transport vehicle.

- *REGULATORY COMPLIANCE*: The packaging should comply with all relevant regulations and standards. For example, dangerous goods should be packaged in compliance with regulations governing the transport of hazardous materials.

By following these principles, logistics companies can ensure that products are packaged and stored correctly, which can help to reduce costs, improve efficiency, and ensure that products arrive at their destination in good condition.

1.2. INDUSTRY PROFILE

The logistics industry is a vital sector of the global economy that plays a critical role in the movement of goods and products from one location to another. It encompasses a wide range of services, including transportation, warehousing, inventory management, and freight forwarding.

One of the key functions of the logistics industry is transportation. Goods and products need to be moved from factories, warehouses, or ports to their intended destinations, which can be either domestic or international. Different modes of transportation are used to move goods, including road, rail, sea, and air.

Warehousing is another important aspect of the logistics industry. Goods need to be stored before they are shipped to their final destinations. Warehouses can be used for storing goods temporarily, such as for consolidation, longer periods, such as for inventory management.

Inventory management is crucial for ensuring that goods are available when they are needed. This involves keeping track of inventory levels, forecasting demand, and replenishing stock as needed. Advanced inventory management systems can help automate these processes and improve efficiency.

Freight forwarding and customs brokerage are essential for facilitating international trade. Freight forwarders help ensure that goods are transported from one country to another safely and efficiently. Customs brokers help importers and exporters navigate the complex regulations involved in cross-border trade, such as customs duties and import/export documentation.

The logistics industry is highly competitive, with many companies operating in the sector, ranging from small local firms to large multinational corporations. Many logistics companies offer end-to-end supply chain solutions that integrate multiple services to provide a seamless experience for their customers.

Advancements in technology are transforming the logistics industry. New

technologies, such as the Internet of Things (IoT), artificial intelligence (AI), and blockchain, are helping logistics companies improve efficiency, reduce costs, and enhance the customer experience. For example, IoT sensors can be used to track shipments in real-time, while AI can be used to optimize transportation routes and improve warehouse operations.

Environmental sustainability is also becoming an increasingly important focus for the logistics industry. Many companies are exploring ways to reduce their carbon footprint and adopt more sustainable practices, such as using electric vehicles and optimizing transportation routes to reduce emissions.

The logistics industry is a critical part of the global economy, facilitating trade and commerce between businesses and consumers around the world. It encompasses a wide range of services, including transportation, warehousing, inventory management, and freight forwarding. With the increasing globalization of trade and the rapid growth of e-commerce, the logistics industry is expected to continue to grow in the years ahead.

1.3. COMPANY PROFILE

Good Trans Logistics is one of the fastest-logistics service providers, delivering rock-solid reliability that results in peace of mind to the clients. They offer complete and affordable shipping solutions, both in terms of facilities and manpower with the utmost standards of professionalism. The strong worldwide network of strategic associations and alliances ensures that no corner of the work is impossible for us to reach.

STRENGTH: With personnel holding decades of experience in the industry, the strength lies in providing personalized solutions and services that are tailor-made to your timeline and budget, instead of simply offering readymade options.

COMMITMENT: The history reflects our sheer commitment to quality and customer satisfaction, as no customer of ours has ever turned to someone else to obtain services.

MISSION: To attain excellence by continual improvement in service, and strategic adaptation to changes in market and customer needs, while always standing firm in honesty and reliability.

ABOUT GTL

They have wise experience in this service industry, a good reputation, and long relations with the staff and officials of the custom, warehouses, and excise departments and various other government agencies which helps the clients to expedite their work, avoid procedural delay disputes and litigation regarding compliance of custom clearance and other legal requirements. Their hard work and good nature have put the organization on a path of progress and prosperity.

They are ever ready to attend their clients and solve to their problems. These qualities made them popular amongst the clients. Such satisfied clients bring more and more business to the organizations. Apart from having three strategically located offices and warehouses in Chennai, they also have branches

in and around.

They have grown in the esteem of many major liner companies, who have offered a service cum rate contract to us, which having been accepted, they hold an edge in the forwarding market as regards pricing and connectivity. They can offer very good rates when compared to the rest of the market because of their contracts and more importantly their human rapport with everyone they came across.

By integrating sea and airfreight forwarding, international road transport, warehousing, and value-added activities in one company they can offer you a complete logistics package.

The experienced team of professionals is trained to guide you through the complexities of global shipping. They can offer a single-source solution to and from any point worldwide keeping people informed of their shipment status at every step. The Company consists of a well-experienced and trained staff, supported by fully computerized documentation and interaction, and armed with the latest communication equipment. They provide regular and reliable information on the activities, structure, financial situation, and performance of all our valuable clients. They are well versed in the procedures, rules, and regulations and possess technical knowledge about clearing all types of cargo, have good expertise & long-standing in this field.

Their personnel aim is to satisfy every customer's expectation with professionalism and to offer the best possible prices for high-quality services.

SERVICES

AIR FREIGHT

Shipping the freight by air with Good Trans Logistics will keep goods moving at optimal speed and efficiency along the supply chain.

They have contracts with the world's major international carriers that secure space on thousands of flights each month and they offer chartered flights internationally, as well for your larger consignments.

They provide real-time, global tracking as part of our standard capabilities. Their global, door-to-door services include customs clearance and forwarding to interior points, as well as coordinating with our ocean operations for forwarding cargo in the most cost-efficient manner. Select GTL and you will get fast efficient international airfreight delivery worldwide.

Service Include:

- Flexible international air options from standard to expedited service
- Door-to-door and Airport-to-airport
- Global customs clearance
- Consolidation
- Air and Sea combination
- Removal

SEA FREIGHT

Their Sea Freight Division is manned by personnel having a profound knowledge of the intricacies of sea shipments coupled with an innate desire to merit your satisfaction.

They are equipped with a computerized monitoring system, advanced communications network, and state-of-the-art cargo handling technology as well as updates on trade and port conditions. Good Trans Logistics is a single-source vendor that can handle ocean shipments from any point on the globe to another. They offer regular liner facilities and schedules, multi-modal shipping, global tracking, and worldwide logistics capabilities, all at competitive rates. Their global, door-to-door services include customs clearance and forwarding to interior points, as well as coordinating with air freight operations for shipping cargo in the most cost-efficient manner. Select Good Trans Logistics, and you will receive quality

service every time from experienced ocean professionals.

Service Include:

- LCL and FCL
- Project Cargo
- Door-to-door, Door-to-port, and Port-to-door
- Breakbulk and Consolidation
- Warehousing and Distribution
- Customs Clearance, if requested
- Owners protecting Agent
- Bunker supply
- Provision supply
- Crew change
- Cargo Claim
- Survey
- Ship Brokering

LANDSIDE SERVICES

The importance of smooth, effective, and timely landside activities is often underestimated. Getting your goods to and from the port, and getting all the paperwork done right, often involves multiple parties and processes with the potential for costly delays and errors.

Good Trans Logistics offers a unique and seamlessly integrated solution that enhances and simplifies landside activities in close coordination with your ocean or air transport.

Our Landside services include:

- Inland haulage
- Cargo insurance
- Transit documents

DANGEROUS GOODS

With the rapid changes in aspects of security worldwide, Dangerous Goods consignments require a much more delicate approach.

HANDLING OF DANGEROUS GOODS

They have more than the required staff trained in Dangerous Goods Regulations Courses as laid down by IATA. Besides, a constant check enables us to ensure that such staff undergo Refresher courses, under IATA regulations.

FORWARDING OF EXHIBITION GOODS & PROJECT HANDLING

Their staff is well-equipped to handle almost all types of Exhibition Goods and Project operations. Due emphasis is given to the special aspects related to such consignments given the additional requirements, such as cargo warrants when compared to routine, day-to-day handling of Export and Import cargo. This specialized handling adds to their providing total service packages like shipping bulk cargo, loose cargo, full container load, odd-size cargo, and break bulk as also handling shipments at Inland Container Depots. They can also help in chartering vessels, be it one-time charters or long-term contracts.

VALUE ADDED SERVICES

They pride themselves in providing comprehensive customs documentation to satisfy their clientele.

COMPREHENSIVE CUSTOMS DOCUMENTATION

This involves the grounding of documents and electronic submissions, the calculation on behalf of the client of taxes, duties, and excises, and facilitating communication between the importer/exporter and governmental authorities. Meticulous attention is paid to the correctness and completion of documents when received from our clients. This ensures the prompt passing of documents through customs channels and avoids last-minute delays when, at the passing stage, some error is located or certain documents have not been made available by the shippers/importers. Their qualified and dedicated customs staffs are alive to our

duty to monitor the minutest detail connected to Customs Documents and Examination of the cargo both, at the Docks and in the Air Cargo Complex.

PACKING AND PALLETISATION

They use only the finest packing materials for example large and small plastic bubble wrap, strong and durable Kraft cardboard boxes, high-quality tapes, etc. They make sure that the cargo is properly packed and protected. They take the time to arrange and rearrange the cargo to achieve the smallest possible combination for customizing a crate with the sole purpose of reducing dead spaces in the shipment. Wooden and custom crates are exclusively designed and built for glass and other fragile items to protect them and to better utilize container space.

WAREHOUSING, PICK UP, DELIVERY, AND INSURANCE

Safety and Security are the prime concerns in their warehousing operations. Adequate insurance is also provided. There is sufficient space for proper stacking of various forms of packing i.e., wooden cases, cartons, drums, bales, plastic containers, crates etc. Space is also available for the maneuverability of heavy cargo within the warehouses. Air cargo consignments, strictly adhere to accurate weighment, correct volumetric dimensions, thorough attention to affixing airlines labels and other handling labels required by the airline and minutely checking the packing of consignments to ensure airworthiness. When the need arises, they also undertake packaging to ensure that the cargo offered to the airline/shipping companies can withstand the flight/voyage. They have pick-up crews that are ready to pick up the order anywhere, even as soon as the day after the order is placed with our office. They have different schemes of delivery. Their schemes are always alluring. They always consider a system that is both safe as well as time competent. They have is a well-renowned name for providing services like overseas shipping, Container shipping, and different kind of Worldwide Shipping services. They have efficient tie-ups with Insurance Companies which can assist in our providing Insurance coverage. Insurance cover can also be arranged through airlines that undertake the same.

TRANSPORTATION

They have our arrangements for the transportation of Export consignments from the client's location and from the warehouses, both to the Docks area and the Airport. Good Trans Logistics has gained confidence over the years, to handle and transport packages of all sizes and dimensions about Export and Import consignments. Local and practical expertise are the elements that are foremost at all stages of transportation, thereby eliminating risks, costly errors, and most importantly, delays. Special equipment is also arranged by us for handling heavy cargo, both for Exports and Imports by Sea and by Air.

CONSULTANCY CLAIMS RECOVERY / APPEALS

They have adequate experience in the correct methodology and documentation required for lodging claims and have several instances as proof of our ability in this regard. They have many satisfied clients and have also assisted to clarify doubts of our customers for documentation and procedures when they wish to initiate claims.

SHIPMENT ALERTS, CONFIRMATIONS & VENDOR COORDINATION

They provide you with regular updates on the shipment status/location, apart from internet links where you can get them by yourselves. They interact and coordinate with various vendors like transporters, insurance companies, etc. while acting as a single point of contact for our clients, providing updated information at any given point in time.

1.4. OBJECTIVES OF THE STUDY

PRIMARY OBJECTIVES

- To study the material handling and storage packaging at Good Trans Logistics.

SECONDARY OBJECTIVES

- To understand the most preferred packages by the customers.
- To discover the most desirable qualities of Good Trans Logistics.
- To understand the technologies of Good Trans Logistics.
- To provide suitable measure to improve the material handling and storage packaging which satisfy the customer.

1.5. NEED FOR THE STUDY

- To keep away the unnecessary and deficient level of inventories in the organization.
- To increase the service to the customer through short, convenient and conveyance.
- To keep up an adequate material in the organization for the smooth creation and self-operations.
- To maintain the business operations of the organization in smooth and adequate way.

1.6. SCOPE OF THE STUDY

- To give the arrangement to the organizations like what to arrange, when to arrange and the amount to be arranged.
- To find the most desirable qualities.
- To acknowledge the most preferred package.
- To give suitable measure for material handling and storage packaging.

CHAPTER – 2 REVIEW OF LITERATURE

INTRODUCTION

Material handling and storage packaging are essential components of logistics operations. Proper material handling and storage packaging can improve efficiency, reduce costs, and minimize product damage during transportation and storage. This review of literature aims to provide an overview of recent studies on the topic of material handling and storage packaging in logistics, focusing on the period between 2020 and 2023. The literature review covers various aspects of material handling and storage packaging, including cost reduction, sustainability, challenges and trends, innovation, and the impact of smart packaging technology on supply chain management. By synthesizing and analyzing these studies, this review provides insights into the current state of research on material handling and storage packaging in logistics and highlights the potential for future research in this field.

- **Zhang Y., Liu j., & Li W. (2023)** In this study, the authors propose a new approach to optimize the material handling path in the warehouse using the improved cuckoo search algorithm. The compare their approach with other optimization algorithms and demonstrate its effectiveness in reducing the total travel distance and time.
- **Liu H., Wang J., & Yan Y. (2023)** The authors proposed an improved bat algorithm to optimize storage location allocation in the warehouse. They compare their algorithm with other optimization algorithms and demonstrate its effectiveness in minimizing the total cost of the warehouse storage systems.
- **Wang J., Yan Y., & Liu H. (2023)** In this study, the authors propose a new method for optimizing material handling in logistics using the improved particle swarm optimization algorithm. They evaluate the effectiveness of their method in minimizing the total cost of the material handling systems

and compare it with other optimization methods.

- **Li W., Chen Z., & Li Y. (2023)** The author proposes an improved ant colony algorithm to optimize the material handling path in the warehouse. They demonstrate the effectiveness of their approach in reducing the total travel distance and time of material handling in the warehouse.
- **Zhang Y., Liu J., & Li W. (2023)** In this study, the authors propose an improved genetic algorithm to optimize the storage location allocation in the warehouse. They demonstrate the effectiveness of their approach in minimizing the total cost of the warehouse storage system and compare it with other optimization algorithms.
- **Liu Y., Liu H., & Chen Z. (2023)** The authors propose a new approach to optimize material handling in logistics using the improved particle swarm optimization algorithm. They evaluate the effectiveness of their approach in reducing the total cost of material handling in logistics and compare it with other optimization methods.
- **Chen Z., Li W., & Li Y. (2022)** In this study, the authors propose an improved ant colony algorithm to optimize the material handling path in the warehouse. They evaluate the effectiveness of their approach in reducing the total travel distance and time of material handling in the warehouse and compare it with other optimization algorithms.
- **Li J., Li W., & Li Y. (2022)** This study proposes an improved bat algorithm to optimize the material handling path in the warehouse. The authors compare their approach with other optimization algorithms and demonstrate its effectiveness in reducing the total travel distance and time of material handling.
- **Xu Z., Liu Y., & Huang Z. (2022)** An improved artificial bee colony algorithm for material handling path optimization in warehouse. This study proposes an improved artificial bee colony algorithm to optimize the

material handling path in the warehouse. The authors demonstrate the effectiveness of their approach in reducing the total travel distance and time of material handling.

- **Kim J., & Choi H. (2022)** A novel material handling system for efficient e-commerce order fulfillment. The system uses a conveyor belt and a sorting machine to reduce labor costs and improve order accuracy.
- **Lin Y., & wang W. (2022)** The design of a collaborative material handling system for intelligent logistics in smart factories. The study proposes a collaborative material handling system for intelligent logistics in smart factories. The system uses Internet of things (IOT) technology and cloud computing to optimize material handling processes and improve supply chain management.
- **Huang M., Li Y., & Wang X. (2022)** A hybrid optimization algorithm for storage location allocation in a cold chain logistics center. The study proposes a hybrid optimization algorithm for storage location allocation in a cold chain logistics center. The algorithm combines a genetic algorithm and a tabu search algorithm to find the optimal solution.
- **Xu & et al. (2022)** The study demonstrated the effectiveness of the approach in reducing the total travel distance and time of material handling. The proposed algorithm considers factors such as the layout of the warehouse and the size and weight of the materials being handled to optimize the path for material handling equipment.
- **Kim & Choi (2022)** The system used a conveyor belt and s sorting machine to re3duce labor costs and improve order accuracy. The authors also proposed a dynamic scheduling algorithm that considers the order processing time and the capacity of the material handling system to optimize the order fulfillment process.

- **Wang & et al (2022)** The researcher evaluated the impact of packaging on the sustainability of logistics operations in the food industry. The authors conducted an LCA of different packaging materials and found that the use of biodegradable and compostable materials can reduce the environmental impact of logistics operations, while maintaining the product safety and quality.
- **Lin & Wang (2022)** The proposed a collaborative material handling system for intelligent logistics in smart factories. The system utilized Internet of Things (IOT) technology and cloud computing to optimize material handling processes and improve supply chain management. The proposed system, uses sensors to monitor the movement of materials and optimize the route of material handling equipment in real-time.
- **Huang et al. (2022)** The system uses a combination of autonomous mobile robots and a centralized control system to improve order picking efficiency and accuracy. The study also demonstrated the effectiveness of the proposed system in reducing the workload of human workers and improving warehouse performance.
- **Cho & et al (2022)** The study examined the impact of packaging material selection on the sustainability of logistics operations. The authors conducted a life cycle assessment (LCA) of different packaging materials and found that the use of recyclable and bio-based materials can reduce the environmental impact of logistics operations.
- **Zhao Y., Wu J., & Zhang X. (2021)** An intelligent material handling system for e-commerce order fulfillment. This study proposes an intelligent material handling system that integrates warehouse management and order fulfillment processes for e-commerce. They system uses RFID technology and an optimization algorithm to improve order accuracy and efficiency.
- **Kim D., Kim J., & Kim T. (2021)** A study on the effect of material handling

automation on logistics performance. This study investigated the effect of material handling automation on logistics performance in different industries. The authors use regression analysis to find that material handling automation positively affects logistics performance.

- **Li H., Li Q., & Li W. (2021)** This study proposes an improved ant colony algorithm to optimize the material handling system in the warehouse. The authors compare their approach with other optimization algorithms and demonstrate its effectiveness in reducing the total travel distance and time of material handling.
- **Gong X., Li Y., & Wang X., (2021)** A multi-objective optimization model for storage location allocation in a cross-docking center. This study proposes a multi-objective optimization model for storage location allocation in a cross-docking center. The model considers both cost and environmental factors and uses a genetic algorithm to find the optimal solution.
- **Liu Y., Liu H., & Chen Z. (2021)** This study proposes an improved genetic algorithm to optimize the material handling system in logistics. The authors demonstrate the effectiveness of their approach in minimizing the total cost of material handling in logistics and compare it with other optimization methods.
- **Shi Q., Zhang X., & Wu Y. (2021)** An RFID-based intelligent container for material handling in warehouse. This study proposes an RFID-based intelligent container for material handling in the warehouse. The container uses RFID technology to track the location of goods and optimize material handling processes.
- **Yang Y., Chen Y., & Xu B. (2021)** This study proposes an improved ant colony algorithm to optimize material storage and transportation in the logistics park. The authors demonstrate the effectiveness of their approach in reducing the total cost of material handling and transportation.

- **Wang X., Li Y., & Gong X. (2021)** A novel hybrid optimization algorithm for storage location allocation in the cross-docking center. This study proposes a novel hybrid optimization algorithm for storage location allocation in the cross-docking center. The algorithm combines a genetic algorithm and a simulated annealing algorithm to find the optimal solution.
- **Li H., Liu Y., & Li Q. (2021)** This study proposes a self-adaptive particle swarm optimization algorithm to optimize the material handling path in the warehouse. The author demonstrates the effectiveness of their approach in reducing the total travel distance and time of material handling.
- **Zhang Y., Guo X., & Liu Y. (2021)** The multi-objective optimization of material handling system in the warehouse based on an improved NSGA-II algorithm. The algorithm considers multiple objectives and constraints and demonstrates its effectiveness in improving warehouse efficiency and reducing cost.
- **Wu J., Zhao Y., & Zhang X. (2021)** A deep learning-based framework for material handling system optimization e-commerce warehouse. This study proposes a deep learning-based framework to optimize the material handling system in the e-commerce warehouse. The framework uses a deep neural network to learn the complex relationships between input parameters and output variables and demonstrates its effectiveness in improving warehouse efficiency and reducing costs.
- **Wu & et al. (2021)** The system integrates machine learning and image recognition technology to automated material handling processes and optimize warehouse operations. The authors also proposed a scheduling algorithm to allocate material handling tasks to different equipment based on their capacity and availability.
- **Li & et al. (2021)** The proposed method uses a genetic algorithm and fuzzy

logic system to optimize the route of material handling equipment and minimizing the total travel distance. The study demonstrates the effectiveness of the proposed method in reducing the total travel distance and improving warehouse efficiency.

- **Korkmaz & Others (2021)** The author evaluated the impact of packaging material selection on the product safety and environmental impact in logistics operations. The authors conducted a case study of a Turkish e-commerce company and found that proper material selection, including consideration of the product type and transportation conditions, can ensure the product safety and reduce the environmental impact of logistics operations.
- **He et al. (2021)** The system utilizes a combination of RFID technology and wireless sensor networks to automate material handling processes and improve warehouse performance. The authors also proposed a dynamic scheduling algorithm to optimize the allocation of material handling tasks to different equipment based on their availability and workload.
- **Zhang et al. (2021)** The system combines the advantages of traditional material handling equipment and autonomous mobile robots to improve warehouse efficiency and reduce labor costs. The authors also proposed a scheduling algorithm to allocate material handling tasks to different equipment based on their capacity and availability.
- **López-Lambas M. E., González-García V., & García-Sánchez A. (2021)** This study provides a review of the main challenges and trends in packaging logistics. The authors discuss various challenges in packaging logistics, such as transportation and storage, and highlight the trends in packaging logistics, such as the use of smart packaging and sustainable materials. The study is relevant to the topic of material handling and storage packaging in logistics, as it provides insights into the challenges and trends in packaging logistics that affect material handling and storage operations.

- **Srinivasan S., Ravi S., & Balaji R. (2021)** This study provides a review of material handling systems in supply chain management, including the importance of optimizing material handling systems for efficient supply chain operations. The authors also discuss the role of emerging technologies, such as blockchain and artificial intelligence, in improving material handling systems in supply chain management. The study is relevant to the topic of material handling and storage packaging in logistics, as it highlights the importance of material handling systems in improving supply chain efficiency.
- **Koc & Bayhan (2021)** The author studied the impact of packaging design on the customer experience and perceived value in the e-commerce industry. The authors conducted a survey of online shoppers and found that the packaging design, including the color, texture, and shape, can affect the perceived value of the products and enhance the overall customer experience.
- **Li & et al. (2021)** The author proposed a new method for optimizing material handling paths in warehouse management to minimize the total travel distance and time of material handling equipment. The study demonstrated the effectiveness of the proposed method in reducing the total travel distance and improving warehouse efficiency.
- **Van der Valk L., Van der Meer R. B., & Post J. G. (2021)** This study provides an exploratory study of logistics packaging innovation. The authors discuss the drivers of logistics packaging innovation, such as customer demands and sustainability concerns, and highlight the challenges and opportunities of logistics packaging innovation. The study is relevant to the topic of material handling and storage packaging in logistics, as it emphasizes the importance of logistics packaging innovation in improving logistics operations.
- **Du & Others (2021)** The researcher investigated the impact of packaging

on the customer experience in the online grocery industry. The authors conducted a survey of online grocery shoppers and found that packaging design and functionality can affect the perceived quality of the products and the overall customer satisfaction.

- **Chen & et al. (2021)** The author proposed a new material handling system for warehouse automation. The system uses a combination of AGVs and a centralized control system to automate material handling processes and improve warehouse efficiency. The author also proposed a scheduling algorithm to optimize the allocation of material handling tasks to different equipment based on their availability and workload.
- **Jia and others (2021)** This study focused on the optimization of packaging size and weight to improve the logistics efficiency and sustainability. The authors conducted a case study of a Chinese logistics company and found that optimizing packaging size and weight can reduce the transportation costs and environmental impact, while improving the delivery time and customer satisfaction.
- **Jung, H., & Kim, K. (2020)** This study analyzes the effects of smart packaging technology on supply chain management. The authors discuss various types of smart packaging technology, such as RFID and QR codes, and highlight the benefits of these technologies, such as improved supply chain visibility and efficiency. The study is relevant to the topic of material handling and storage packaging in logistics, as it provides insights into the potential benefits of smart packaging technology in improving logistics operations.
- **Singh A., & Sharma S. (2020)** This study provides a literature review of material handling cost reduction in supply chain management. The authors discuss various techniques for reducing material handling costs, such as automation, lean manufacturing, and optimization algorithms. The study is relevant to the topic of material handling and storage packaging in logistics, as it highlights the importance of reducing material handling costs in

logistics operations.

- **Yang & Others (2020)** The author focused on the impact of packaging design and material selection on the customer experience and environmental impact in the e-commerce industry. The authors conducted a survey of online shoppers and found that the packaging design and material selection can affect the customer experience and the environmental impact of logistics operations, with sustainable packaging practices being preferred by the customers.
- **Pervan I., & Pavlic D. (2020)** This study focuses on the role of smart packaging in driving supply chain sustainability. The authors discuss various types of smart packaging, such as active and intelligent packaging, and highlight the potential benefits of these packaging technologies, including reduced waste and improved supply chain visibility. The study is relevant to the topic of material handling and storage packaging in logistics, as it emphasizes the importance of sustainable packaging in improving logistics operations.
- **Ananda & Nagesh (2020)** The study focused on the impact of packaging design on logistics operations in the e-commerce industry. The authors conducted a case study of an Indian e-commerce company and found that a well-designed packaging system can improve the operational efficiency and customer experience, while reducing the environmental impact.
- **Chiu Y. T., Chen M. H., & Chen M. C. (2020)** This study provides a review of the influence of packaging design on logistics performance. The authors discuss various factors that influence the design of packaging, such as product protection, ease of handling, and sustainability. The study also highlights the impact of packaging design on logistics performance, including the reduction of transportation costs and the improvement of inventory management. The study is relevant to the topic of material handling and storage packaging in logistics, as it emphasizes the importance of packaging design in improving logistics performance.

- **Li & Others (2020)** The researcher investigated the impact of packaging design on the consumer behavior and purchase intention in the e-commerce industry. The authors conducted a survey of online shoppers and found that packaging design, including the aesthetics, functionality, and branding, can affect the consumer behavior and increase the purchase intention.
- **Abdel-Malek L., & El-Amine M. (2020)** This study provides a literature review of the role of packaging in logistics sustainability. The authors discuss the impact of packaging on various aspects of logistics sustainability, such as environmental sustainability and social responsibility. The study also highlights the importance of packaging design and materials in achieving sustainable logistics operations. The study is relevant to the topic of material handling and storage packaging in logistics, as it emphasizes the role of packaging in achieving sustainable logistics operations.
- **Shen & Others (2020)** The study focused on the optimization of packaging design and material selection for the food industry. The authors conducted a case study of a Chinese food company and found that optimizing packaging design and material selection can improve the product safety and quality, reduce the transportation costs, and enhance the brand image.
- **Vazquez-Bustelo D., & Seseña-López J. M. (2020)** This study provides a review of recent advances in automated material handling systems. The authors discuss various types of automated material handling systems, such as automated storage and retrieval systems and autonomous mobile robots, and highlight the benefits and challenges of these systems. The study also discusses the potential impact of these systems on logistics operations, including improved efficiency and reduced labor costs. The study is relevant to the topic of material handling and storage packaging in logistics, as it provides insights into the potential benefits of automated material handling systems in logistics operations.

CHAPTER 3 - RESEARCH METHODOLOGY

INTRODUCTION

Research methodology is mainly needed to have the research process, the designs, and the tools that are to be used for the purpose. Research methodology helps to find measures to improve material handling and storage packaging. This time research methodology is framed to find the suitable types of storage packaging and the best services provided by GTL to the customers.

3.1. RESEARCH DESIGN

CORRELATIONAL RESEARCH DESIGN

Correlational research design is a study that investigates the relationship between two variables or more.

3.2. SAMPLING TECHNIQUE

Convenience Sampling

Convenience sampling is a type of non-probability sampling method where the sample is taken from a group of people easy to contact or to reach.

3.3. SOURCES OF DATA

Data collection is the term used to describe the process of preparing and collecting data.

- Primary Data - Questionnaire
- Secondary Data – Research public articles, Journals, Books, Websites

3.4. STRUCTURE OF QUESTIONNAIRE

The questionnaire was divided into two parts. The first part was designed to know the general information about GTL customers and the second part contains respondents' opinions about GTL.

- Demographic Questions
- Likert Scaling Questions

3.5. SAMPLE SIZE

The researcher circulated the questionnaire among 270 customers and got 130 responses.

3.6. PERIOD OF STUDY

The study conducted during the period of January - March 2023.

3.7. LOCATION AND TRAGETED PEOPLE OF STUDY

The study was done in Chennai district with the customers who prefer GTL as their priority.

3.8. TOOLS FOR ANALYSIS

To analyze the problem researcher used correlation analysis, frequency table, Anova and chi-square to find the measures to improve material handling and storage packaging.

CHAPTER 4 – DATA ANALYSIS AND INTERPRETATIONS

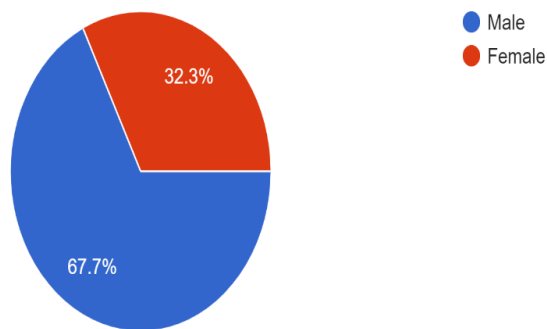
4.1. PERCENTAGE ANALYSIS:

Table 4.1.1. Gender of the respondents

OPTIONS	RESPONDENTS	PERCENTAGE
Male	88	67.7
Female	42	32.3

Chart 4.1.1. Gender of the respondents

Gender
130 responses



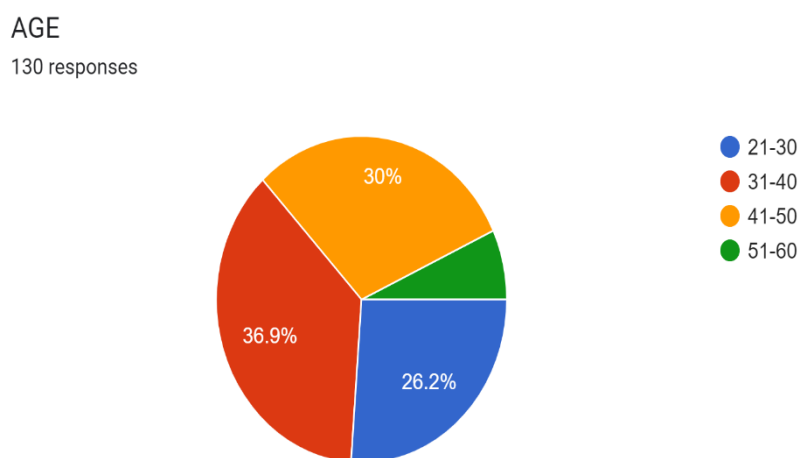
INTERPRETATIONS:

From the above table, it is interpreted that the number of male respondents is 67.7%, and the number of female respondents is 32.3%.

Table 4.1.2. Indicating the age of the respondents

OPTIONS	RESPONDENTS	PERCENTAGE
21-30	34	26.2
31-40	48	36.9
41-50	39	30
51-60	9	6.9

Chart 4.1.2. Indicating the age of the respondents



INTERPRETATIONS:

From the above table, it is interpreted that the number of respondents between the age of 21-30 is 26.2%, the number of respondents between 31-40 is 36.9%, the number of respondents between 41-50 is 30%, and the number of respondents between 51-60 is 6.9%.

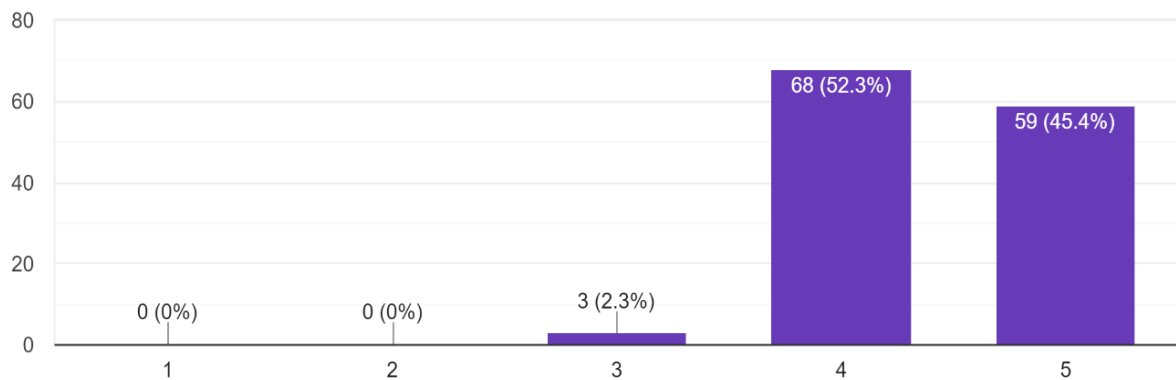
Table 4.1.3. Indicating the satisfactory level of the customer in material handling in GTL

OPTIONS	RESPONDENTS	PERCENTAGE
Strongly Disagree	0	0
Disagree	0	0
Neutral	3	2.3
Agree	68	52.3
Strongly Agree	59	45.4

Chart 4.1.3. Indicating the satisfactory level of the customer in material handling in GTL

Material handling in GTL is satisfactory

130 responses



INTERPRETATIONS:

From the above table it is interpreted that the number of respondents who strongly disagree (0%), the number of respondents who disagree with the statement is (0%), the number of respondents who stays neutral about the statement is (2.3%), the number of respondents who agree for the statement is (52.3%), and the number of the respondents who strongly agree for the statement is (45.4%).

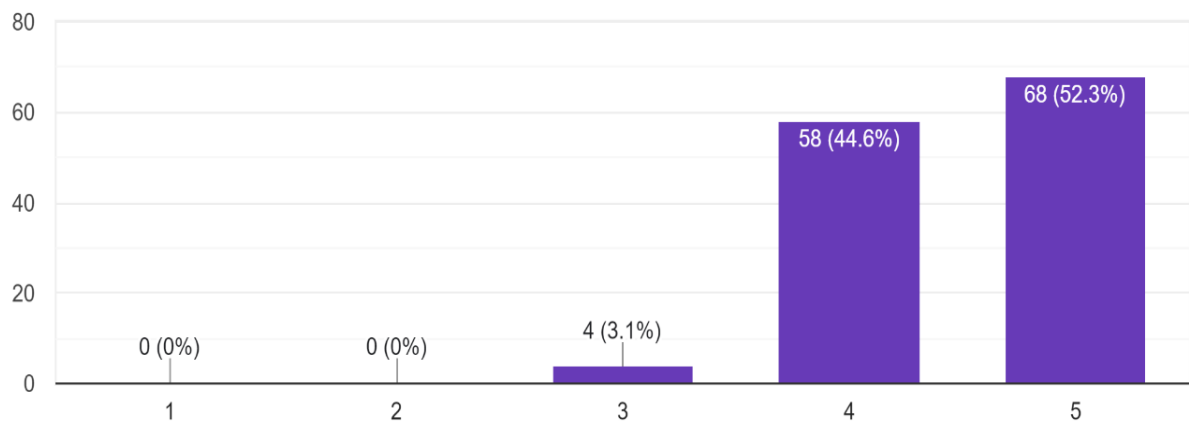
Table 4.1.4. Indicating the satisfactory level of the customer in the packaging in GTL

OPTIONS	RESPONDENTS	PERCENTAGE
Strongly Disagree	0	0
Disagree	0	0
Neutral	4	3.1
Agree	58	44.6
Strongly Agree	68	52.3

Chart 4.1.4. Indicating the satisfactory level of the customer in the packaging in GTL

Packaging in GTL is up to the standards

130 responses



INTERPRETATIONS:

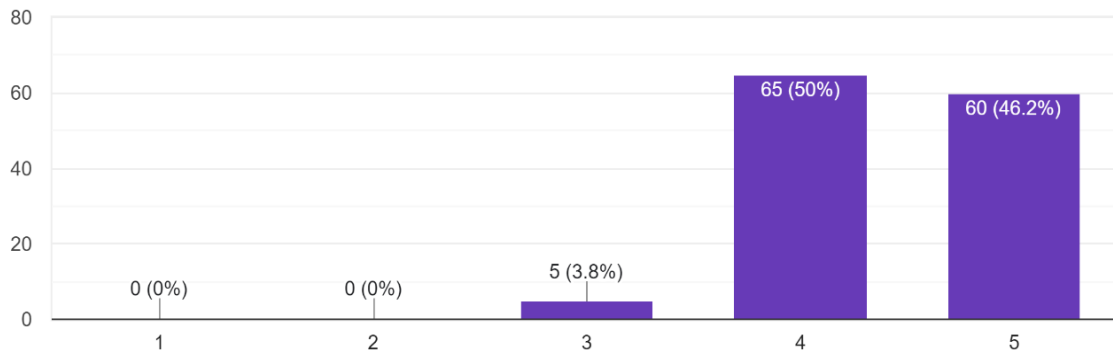
From the above table, it is interpreted that the number of respondents who stays neutral for the statement is 3.1%, the number of respondents who agree for the statement is 44.6%, and the number of respondents who strongly agree for the statement is 52.3%.

Table 4.1.5. Indicating the satisfactory level of the customer in the individual packaging of goods

OPTIONS	RESPONDENTS	PERCENTAGE
Strongly Disagree	0	0
Disagree	0	0
Neutral	5	3.8
Agree	65	50
Strongly Agree	60	46.2

Chart 4.1.5. Indicating the satisfactory level of the customer in the individual packaging of goods

Individual packaging is good
130 responses



INTERPRETATIONS:

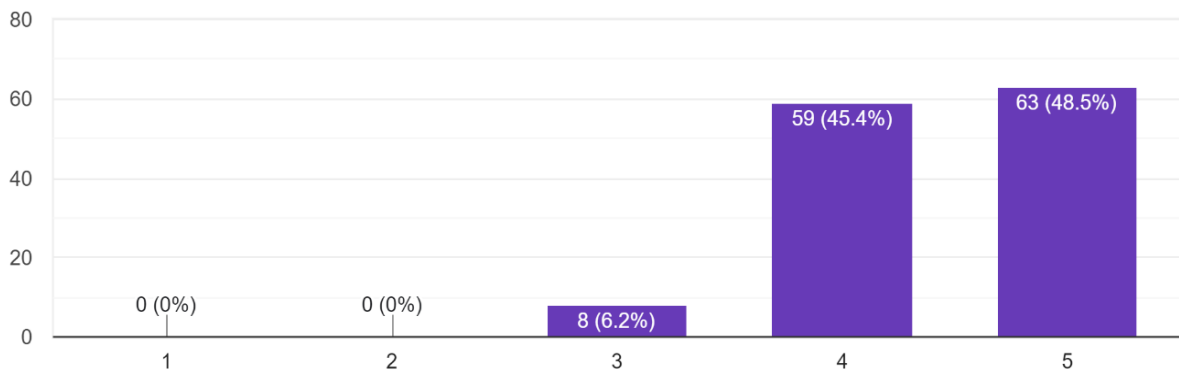
From the above table, it is interpreted that the number of respondents who stays neutral for the statement is (3.8%), the number of respondents who agree with the statement is (50%), and the number of respondents who strongly agree with the statement is (46.2%).

Table 4.1.6. Indicating the satisfactory level of the customer in the inner packaging of goods

OPTIONS	RESPONDENTS	PERCENTAGE
Strongly Disagree	0	0
Disagree	0	0
Neutral	8	6.2
Agree	59	45.4
Strongly Agree	63	48.5

Chart 4.1.6. Indicating the satisfactory level of the customer in the inner packaging of goods

Inner packaging is good
130 responses



INTERPRETATIONS:

From the above table, it is interpreted that the number of respondents who stays neutral for the statement is (6.2%), the number of respondents who agree with the statement is (45.4%), and the number of respondents who strongly agree with the statement is (48.5%).

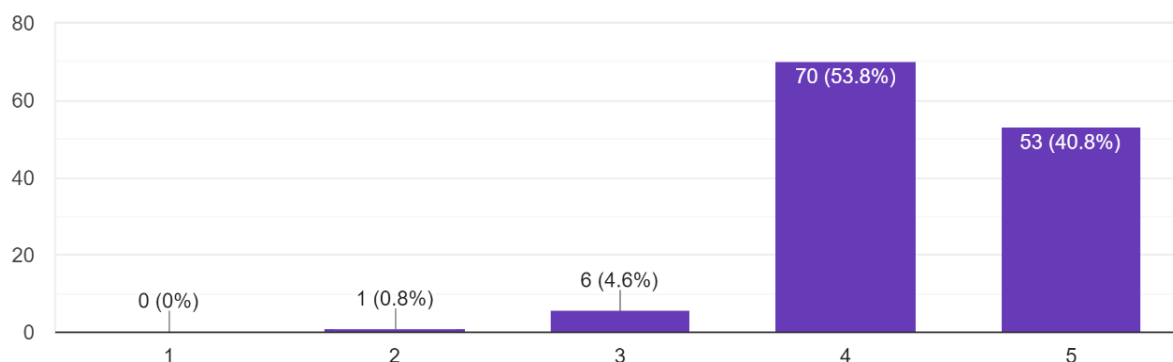
Table: 4.1.7. Indicating the satisfactory level of the customer in the outer packaging of goods

OPTIONS	RESPONDENTS	PERCENTAGE
Strongly Disagree	0	0
Disagree	1	0.8
Neutral	6	4.6
Agree	70	53.8
Strongly Agree	53	40.8

Chart 4.1.7. Indicating the satisfactory level of the customer in the outer packaging of goods

Outer packaging is decent

130 responses



INTERPRETATIONS:

From the above table, it is interpreted that the number of respondents who disagree with the statement is (0.8%), the number of respondents who stay neutral about the statement is (4.6%), the number of respondents who agrees with the statement is (53.8%), and the number of respondents who strongly agree with the statement is (40.8%).

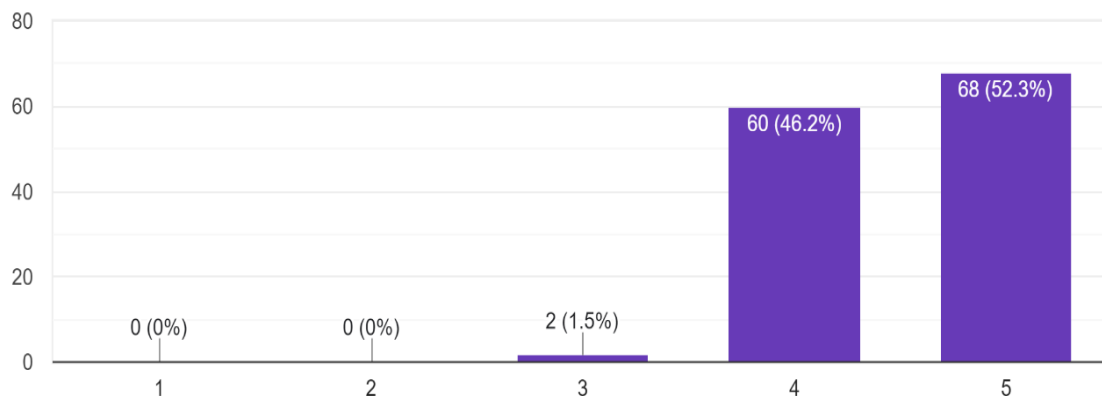
Table: 4.1.8. Indication of the customer having good experience in GTL

OPTION	RESPONDENTS	PERCENTAGE
Strongly Disagree	0	0
Disagree	0	0
Neutral	2	1.5
Agree	60	46.2
Strongly Agree	68	52.3

Chart 4.1.8. Indication of the customer having good experience in GT

GTL have good experience

130 responses



INTERPRETATIONS:

From the above table, it is interpreted that the number of respondents who stay neutral on the statement is (1.5%), the number of respondents who agree with the statement is (46.2%), and the number of respondents who strongly agree with the statement is (52.3%).

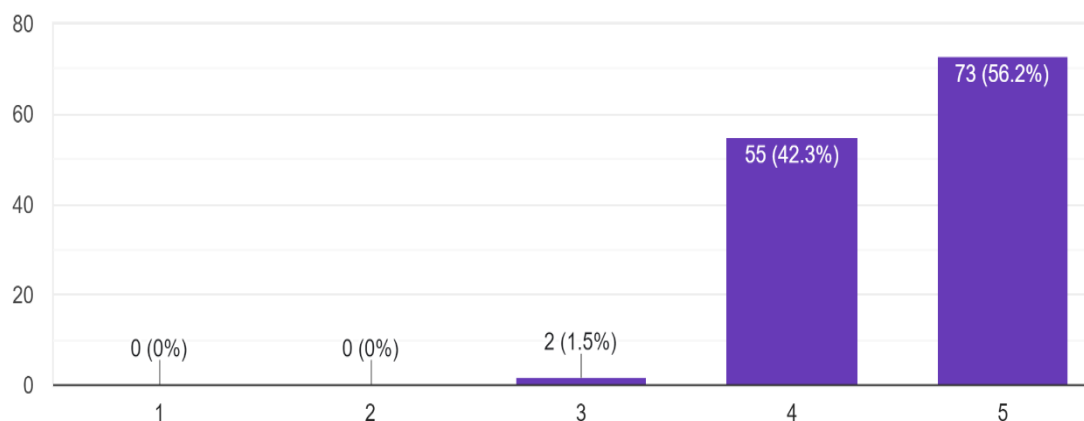
Table: 4.1.9. Indication of customers having strong customer service in GTL

OPTION	RESPONDENTS	PERCENTAGE
Strongly Disagree	0	0
Disagree	0	0
Neutral	2	1.5
Agree	55	42.3
Strongly Agree	73	56.2

Chart 4.1.9. Indication of customer having strong customer service in GTL

GTL have strong customer service

130 responses



INTERPRETATIONS:

From the above table, the number of respondents who strongly disagree with the statement is (0%), the number of respondents who disagree for the statement is (0%), the number of respondents who stays neutral with the statement is (1.5%), the number of respondents who agree with the statement is (42.3%), and the number of respondents who strongly agree with the statement is (56.2%).

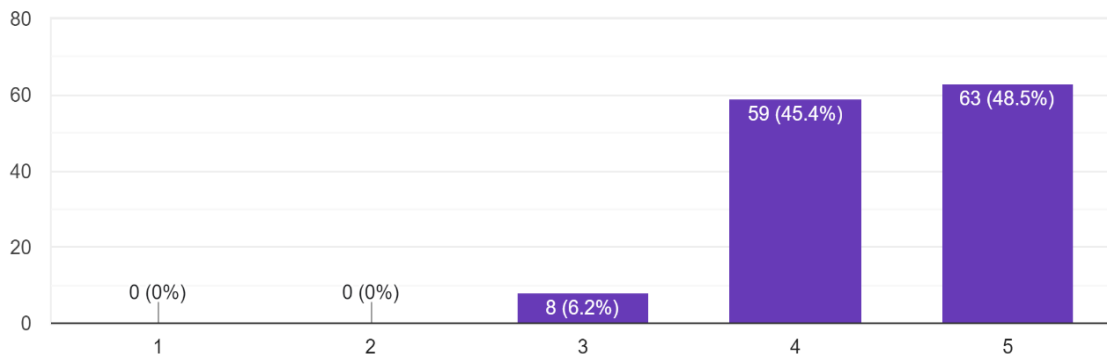
Table: 4.1.10. Indication of customers who have been experiencing many services in GTL

OPTIONS	RESPONDENTS	PERCENTAGE
Strongly Disagree	0	0
Disagree	0	0
Neutral	8	6.2
Agree	59	45.4
Strongly Agree	63	48.5

Chart 4.1.10. Indication of customer who have been experiencing many services in GTL

GTL offer many services

130 responses



INTERPRETATIONS:

From the above table, it is interpreted that the number of respondents who strongly disagree with the statement is (0%), the number of respondents who disagree with the statement is (0%), the number of respondents who stay neutral with the statement is (6.2%), the number of respondents who agree with the statement is (45.5%), and the number of respondents who strongly agree for the statement is (48.5%).

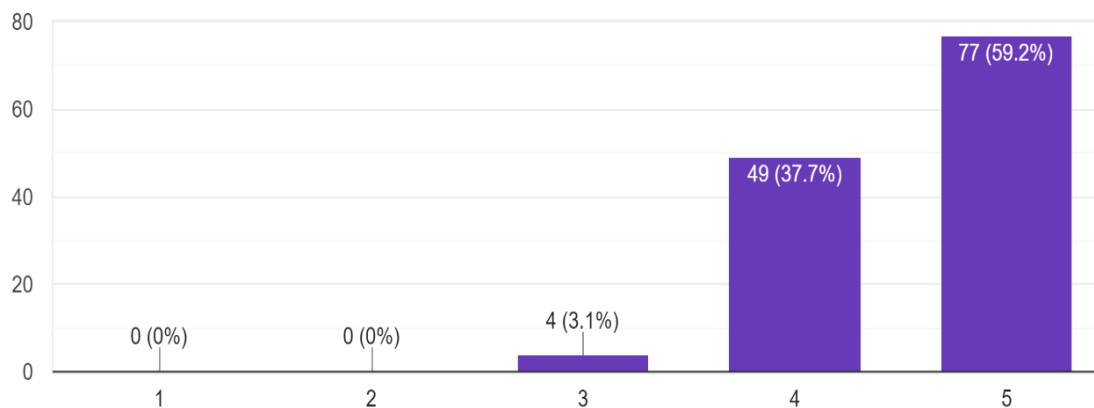
Table: 4.1.11. Indication of customers who experienced proper timing in GTL

OPTIONS	RESPONDENTS	PERCENTAGE
Strongly Disagree	0	0
Disagree	0	0
Neutral	4	3.1
Agree	49	37.7
Strongly Agree	77	59.2

Chart 4.1.11. Indication of customers who experienced proper timing in GTL

GTL is time oriented

130 responses



INTERPRETATIONS:

From the above table, it is interpreted that the number of respondents who strongly disagree with the statement is (0%), the number of respondents who disagree with the statement is (0%), the number of respondents who stays neutral with the statement is (3.1%), the number of respondents who agree with the statement is (37.7%), and the number of respondents who strongly agree with the statement is (59.2%).

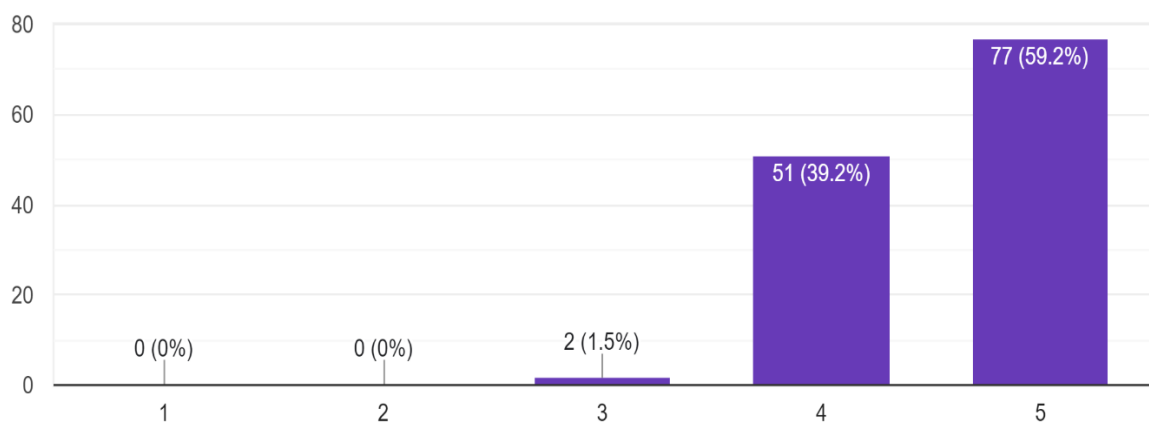
Table: 4.1.12. Indication of customer who uses tracking system

OPTIONS	RESPONDENTS	PERCENTAGE
Strongly Disagree	0	0
Disagree	0	0
Neutral	2	1.5
Agree	51	39.2
Strongly Agree	77	59.2

Chart 4.1.12. Indication of customer who uses tracking system

Tracking system is useful

130 responses



INTERPRETATIONS:

From the above table, it is interpreted that the number of respondents who strongly disagree with the statement is (0%), the number of respondents who disagree with the statement is (0%), the number of respondents who stays neutral with the statement is (1.5%), the number of respondents who agree with the statement is (39.2%), and the number of respondents who strongly agree with the statement is (59.2%).

4.2 FREQUENCY TABLE

TABLE: 4.2.1. AUTOMATED STORAGE

Measures to improve material handling [AutomatedStorage]					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	5	3.8	3.8	3.8
	4	52	40.0	40.0	43.8
	5	73	56.2	56.2	100.0
	Total	130	100.0	100.0	

INTERPRETATIONS:

From the above table, it is interpreted that the number of respondents who stays neutral with the statement is (3.8%), the number of respondents who agrees with the statement is (40%), the number of respondents who strongly agree with the statement is (56.2%).

TABLE: 4.2.2. AUTOMATED GUIDED VEHICLES

Measures to improve material handling [Automated Guided Vehicles]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 3	7	5.4	5.4	5.4
4	74	56.9	56.9	62.3
5	49	37.7	37.7	100.0
Total	130	100.0	100.0	

INTERPRETATIONS:

From the above table, it is interpreted that the number of respondents who stays neutral with the statement is (5.4%), the number of respondents who agree with the statement is (56.9), and the number of respondents who strongly agree with the statement is (37.7%).

TABLE: 4.2.3. CASTERS AND WHEELS

Measures to improve material handling [Casters and Wheels]					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	10	7.7	7.7	7.7
	4	69	53.1	53.1	60.8
	5	51	39.2	39.2	100.0
	Total	130	100.0	100.0	

INTERPRETATIONS:

The number of respondents who stay neutral with the statement is (7.7%), the number of respondents who agree with the statement is (53.1%), the number of respondents who strongly agree with the statement is (39.2%).

TABLE: 4.2.4. CONVEYORS

Measures to improve material handling [Conveyors]					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	1	.8	.8	.8
	4	64	49.2	49.2	50.0
	5	65	50.0	50.0	100.0
	Total	130	100.0	100.0	

INTERPRETATIONS:

The number of respondents who stay neutral with the statement is (0.8%), the number of respondents who agree with the statement is (49.2%), the number of respondents who strongly agree with the statement is (50.0%).

TABLE: 4.2.5. DOCK EQUIPMENT

Measures to improve material handling [Dock Equipment]					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	1	.8	.8	.8
	4	51	39.2	39.2	40.0
	5	78	60.0	60.0	100.0
	Total	130	100.0	100.0	

INTERPRETATIONS:

From the above table, it is interpreted that the number of respondents who stays neutral with the statement is (0.8%), the number of respondents who agree with the statement is (39.2%), and the number of respondents who strongly agree with the statement is (60%).

TABLE: 4.2.6. AUTOMATION

Measures to improve storage packaging [Automation]				
	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 3	5	3.8	3.8	3.8
4	52	40.0	40.0	43.8
5	73	56.2	56.2	100.0
Total	130	100.0	100.0	

INTERPRETATIONS:

From the above table, the number of respondents who stay neutral with the statement is (3.8%), the number of respondents who agree with the statement is (40.0%), and the number of respondents who strongly agree with the statement is (56.2%).

TABLE: 4.2.7. RIGHT SIZING OF CARTONS

Measures to improve storage packaging [Right Sizing of Cartons]

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 3	7	5.4	5.4	5.4
4	57	43.8	43.8	49.2
5	66	50.8	50.8	100.0
Total	130	100.0	100.0	

INTERPRETATIONS:

The number of respondents who stay neutral with the statement is (5.4%), the number of respondents who agree with the statement is (43.8%), and the number of respondents who strongly agree with the statement is (50.8%).

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TABLE: 4.2.8. PROPER PACKAGING STATION

Measures to improve storage packaging [Proper Packaging Station]					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2	1	.8	.8	.8
	3	4	3.1	3.1	3.8
	4	62	47.7	47.7	51.5
	5	63	48.5	48.5	100.0
	Total	130	100.0	100.0	

INTERPRETATIONS:

The number of respondents who disagree with the statement is (0.8%), the number of respondents who stay neutral with the statement is (3.1%), the number of respondents who agree with the statement is (47.7%), and the number of respondents who strongly agree with the statement is (48.5%).

4.3. CORRELATION ANALYSIS

Correlation analysis in research is a statistical method used to measure the strength of the linear relationship between two variables and compute their association.

HYPOTHESIS

H₀ (Null Hypothesis): There is no significant relationship between age and material handling.

H₁ (Alternative Hypothesis): There is a significant relationship between age and material handling.

		AGE	Material handling in GTL is satisfactory
AGE	Pearson Correlation	1	.017
	Sig. (2-tailed)		.845
	N	130	130
Material handling in GTL is satisfactory	Pearson Correlation	.017	1
	Sig. (2-tailed)	.845	
	N	130	130

INTERPRETATIONS:

The p-value (0.845) is greater than the alpha-value (0.005). Hence null hypothesis is accepted. Therefore, there is no relationship between age and material handling.

4.4. ANOVA

Anova is a statistical formula used to compare variances across the means of different groups.

HYPOTHESIS

H₀ (Null Hypothesis): There is no significant difference between gender and technology.

H₁ (Alternative Hypothesis): There is a significant difference between gender and technology.

Tracking system is useful

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.175	1	.175	.630	.429
Within Groups	35.556	128	.278		
Total	35.731	129			

INTERPRETATIONS:

The p-value is (0.429) which is greater than the alpha value (0.005). Hence null hypothesis is accepted. Therefore, there is no significant difference between gender and technology.

CHAPTER 5 – FINDINGS, SUGGESTIONS AND CONCLUTIONS

5.1. FINDINGS OF THE STUDY

- Most (67.7%) of the respondents are male.
- Mainstream (36.9%) of the respondents is between 31-40.
- Preponderance (52.3%) of the respondents agree with the statement “Material handling in GTL is satisfactory.”
- Dominant (52.3%) of the respondents strongly agree with the statement “Packaging in GTL is up to the standards.”
- Leading (50%) of the respondents agree with the statement “Individual packaging is good.”
- Primary (48.5%) of the respondents strongly agree with the statement “Inner packaging is good.”
- Prevailing (53.8%) of the respondents agree with the statement “Outer packaging is decent”.
- Greater part (52.3%) of the respondent strongly agrees with the statement “GTL have a good experience.”
- Bulk (56.2%) of the respondents strongly agree with the statement “GTL has strong customer service.”
- Mass (48.5%) of the respondents strongly agree for the statement “GTL offers many services.”
- Plurality (59.2%) of the respondents strongly agree with the statement “GTL is time-oriented”.
- Majority (59.2%) of the respondents strongly agree with the statement “Tracking system is useful”.
- Largest share (56.2%) of the respondents strongly agree that automated storage is a measure to improve material handling.
- Predominant (56.9%) of the respondents agree with that automated guided vehicles as a measure to improve material handling.
- Core (53.1%) of the respondents agree with the casters and wheels as the measure to improve material handling.
- Principal (50.0%) of the respondents strongly agree with conveyors as

the measure to improve material handling.

- Majoritarian (60%) of the respondents strongly agree with dock equipment as the measure to improve material handling.
- Common (56.2%) of the respondents strongly agree with automation as the measure to improve packaging.
- Popular (50.8%) of the respondents strongly agree with the Rightsizing cartoons as the measure to improve packaging.
- Standard (48.5%) of the respondents strongly agree with proper packaging stations as the measure to improve packaging.
- As per correlation null hypothesis is accepted “There is no relationship between age and material handling.”
- As per Anova null hypothesis is accepted “There is no relationship between gender and technology.”

5.2. SUGGESTIONS AND RECOMMENDATIONS

- The overall experience from the index to the study reveals that the maximum customers enjoy the services provided by GTL.
- Many respondents strongly agree that the inner packaging is good, it is worth exploring ways to improve it further. This can be achieved by investing in better materials that offer more protection to the products during transportation and storage.
- Respondents strongly agree that GTL is time-oriented, it may be worthwhile to prioritize time efficiency in all aspects of the logistics process. This can include investing in technologies that can speed up the handling and packaging of goods, as well as optimizing transportation routes to reduce delivery times.
- From the analysis the GTL company is likely to have a good reputation among the customers.
- Respondents choose dock equipment as the best measure to improve material handling, a suggestion for Good Trans Logistics would be to invest in high-quality dock equipment. Some examples of dock equipment that

can improve material handling include loading dock levelers, dock lifts, dock seals and shelters, yard ramps, and dock bumpers.

- Overall, these suggestions can help improve the material handling and storage packaging at GTL and satisfy customers.

5.3. LIMITATIONS OF THE STUDY

- The study is confined to the Chennai district only
- The study is based on the customer perception of GTL.
- The analysis in spss is made fully with the primary data given by the respondents.

5.4. CONCLUSION

The study on material handling and storage packaging in logistics has provided valuable insights into the current practices and areas for improvement at Good Trans Logistics. The study found that the company's material handling and storage packaging practices are generally satisfactory, but there are some areas for improvement to meet customer preferences and enhance overall efficiency. By understanding the most preferred packages by customers, discovering the most desirable qualities of Good Trans Logistics, and exploring the use of technology, the project identified several recommendations to improve material handling and storage packaging that will ultimately lead to higher customer satisfaction.

Based on the findings of the study, it can be concluded that Good Trans Logistics has satisfactory material handling and storage packaging practices that are up to customer standards. Many respondents agreed that the individual packaging, inner packaging, and outer packaging provided by GTL are good and among them, outer packaging has been rated high. Additionally, many respondents strongly agreed that GTL has good experience, strong customer service, and is time-oriented.

Regarding measures to improve material handling, the respondents strongly agreed that automated storage, automated guided vehicles, conveyors, and dock equipment are effective measures and among them dock equipment has been rated high. In terms of packaging, the respondents strongly agreed that automation, rightsizing cartons, and proper packaging stations are effective measures to improve packaging and among them, proper packaging stations rated high.

Furthermore, the study found that there is no significant relationship between age and material handling, as well as between gender and technology.

Overall, the study provides valuable insights into the current practices and areas for improvement in material handling and storage packaging at Good Trans Logistics. The recommended measures identified in the study can help GTL improve its efficiency, reduce costs, and ultimately increase customer satisfaction. By continuously evaluating and improving their practices, logistics companies like GTL can remain competitive in today's globalized world.

REFERENCE

- Zhang Y., Liu j., & Li W. (2023) - Optimizing Material Handling Path in Warehouse using Improved Cuckoo Search Algorithm
- Liu H., Wang J., & Yan Y. (2023) - Improved Bat Algorithm for Storage Location Allocation Optimization in Warehouse
- Wang J., Yan Y., & Liu H. (2023) - Material Handling Optimization in Logistics using Improved Particle Swarm Optimization Algorithm
- Li W., Chen Z., & Li Y. (2023) - Improved Ant Colony Algorithm for Material Handling Path Optimization in Warehouse
- Zhang Y., Liu J., & Li W. (2023) - Improved Genetic Algorithm for Storage Location Allocation Optimization in Warehouse
- Liu Y., Liu H., & Chen Z. (2023) - Optimizing Material Handling in Logistics using Improved Particle Swarm Optimization Algorithm
- Chen Z., Li W., & Li Y. (2022) - Improved Ant Colony Algorithm for Material Handling Path Optimization in Warehouse
- Li J., Li W., & Li Y. (2022) - Improved Bat Algorithm for Material Handling Path Optimization in Warehouse
- Xu Z., Liu Y., & Huang Z. (2022) - Improved Artificial Bee Colony Algorithm for Material Handling Path Optimization in Warehouse
- Kim J., & Choi H. (2022) - Novel Material Handling System for Efficient E-commerce Order Fulfillment
- Lin Y., & Wang W. (2022) - Collaborative Material Handling System for Intelligent Logistics in Smart Factories
- Huang M., Li Y., & Wang X. (2022) - Hybrid Optimization Algorithm for Storage Location Allocation in Cold Chain Logistics Center
- Xu & et al. (2022) - Optimizing Material Handling Path considering Layout and Material Characteristics using Proposed Algorithm
- Kim & Choi (2022) - Dynamic Scheduling Algorithm for Order Fulfillment in Material Handling System using Conveyor Belt and Sorting Machine
- Wang & et al (2022) - Evaluating Sustainability of Logistics Operations in Food Industry by Analyzing Packaging Materials using LCA
- Lin & Wang (2022) - Collaborative Material Handling System for Intelligent

Logistics in Smart Factories

- Huang et al. (2022) - Autonomous Mobile Robots and Centralized Control System for Improved Order Picking Efficiency
- Cho & et al. (2022) - Impact of Packaging Material Selection on Sustainability of Logistics Operations
- Zhao Y., Wu J., & Zhang X. (2021) - Intelligent Material Handling System for E-commerce Order Fulfillment
- Kim D., Kim J., & Kim T. (2021) - Effect of Material Handling Automation on Logistics Performance
- Li H., Li Q., & Li W. (2021) - Improved Ant Colony Algorithm for Material Handling System Optimization in Warehouses
- Gong X., Li Y., & Wang X. (2021) - Multi-Objective Optimization Model for Storage Location Allocation in Cross-Docking Center
- Liu Y., Liu H., & Chen Z. (2021) - Improved Genetic Algorithm for Material Handling System Optimization in Logistics
- Shi Q., Zhang X., & Wu Y. (2021) - RFID-Based Intelligent Container for Material Handling in Warehouses
- Yang Y., Chen Y., & Xu B. (2021) - Improved Ant Colony Algorithm for Material Storage and Transportation Optimization in Logistics Parks
- Wang X., Li Y., & Gong X. (2021) - Hybrid Optimization Algorithm for Storage Location Allocation in Cross-Docking Center
- Li H., Liu Y., & Li Q. (2021) - Self-Adaptive Particle Swarm Optimization Algorithm for Material Handling Path Optimization in Warehouses
- Zhang Y., Guo X., & Liu Y. (2021) - Multi-Objective Optimization of Material Handling System in Warehouses using Improved NSGA-II Algorithm
- Wu J., Zhao Y., & Zhang X. (2021) - Deep Learning-Based Framework for Material Handling System Optimization in E-commerce Warehouses
- Wu & et al. (2021) - Machine Learning and Image Recognition-Based Automated Material Handling System with Scheduling Algorithm
- Li & et al. (2021) - Genetic Algorithm and Fuzzy Logic System-Based Optimization of Material Handling Equipment Routes in Warehouses
- Korkmaz & Others (2021): Impact of Packaging Material Selection on Product Safety and Environmental Impact in Logistics Operations

- He et al. (2021): RFID and Wireless Sensor Networks for Material Handling Process Automation and Dynamic Scheduling in Warehouses
- Zhang et al. (2021): Combining Traditional Material Handling Equipment and Autonomous Mobile Robots for Warehouse Efficiency and Labor Cost Reduction
- López-Lambas M. E., González-García V., & García-Sánchez A. (2021): Challenges and Trends in Packaging Logistics for Material Handling and Storage Operations
- Srinivasan S., Ravi S., & Balaji R. (2021): Material Handling Systems in Supply Chain Management for Improved Efficiency and the Role of Emerging Technologies
- Koc & Bayhan (2021): Impact of Packaging Design on Customer Experience and Perceived Value in E-commerce
- Li & et al. (2021): Optimizing Material Handling Paths in Warehouse Management for Distance and Time Reduction
- Van der Valk L., Van der Meer R. B., & Post J. G. (2021): Logistics Packaging Innovation: Drivers, Challenges, and Opportunities for Improved Logistics Operations
- Du & Others (2021): Impact of Packaging on Customer Experience in Online Grocery Industry
- Chen & et al. (2021): Material Handling System for Warehouse Automation with AGVs and Centralized Control System
- Jia and others (2021): Optimization of Packaging Size and Weight for Logistics Efficiency and Sustainability in Chinese Logistics Industry
- Jung, H., & Kim, K. (2020): Effects of Smart Packaging Technology on Supply Chain Management for Improved Visibility and Efficiency
- Singh A., & Sharma S. (2020): Techniques for Material Handling Cost Reduction in Supply Chain Management.
- Yang & Others (2020): Impact of Packaging Design and Material Selection on Customer Experience and Environmental Impact in E-commerce
- Pervan I., & Pavlic D. (2020): Role of Smart Packaging in Driving Supply Chain Sustainability
- Ananda & Nagesh (2020): Impact of Packaging Design on Logistics

Operations in E-commerce Industry

- Chiu Y. T., Chen M. H., & Chen M. C. (2020): Influence of Packaging Design on Logistics Performance
- Li & Others (2020): Impact of Packaging Design on Consumer Behavior and Purchase Intention in E-commerce
- Abdel-Malek L., & El-Amine M. (2020): Role of Packaging in Logistics Sustainability
- Shen & Others (2020): Optimization of Packaging Design and Material Selection for Food Industry
- Vazquez-Bustelo D., & Seseña-López J. M. (2020): Recent Advances in Automated Material Handling Systems

ANNEXURE I – QUESTIONNAIRE

A STUDY ON MATERIAL HANDLING AND STORAGE PACKAGING AT GOOD TRANS LOGISTICS

1. Name
2. Gender
 - Male
 - Female
3. Age
 - 21-30
 - 31-40
 - 41-50
 - 51-60
4. Material handling in GTL is satisfactory
 - Strongly Disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly Agree
5. Packaging in GTL is up to the standards
 - Strongly Disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly Agree
6. Individual packaging is good
 - Strongly Disagree
 - Disagree
 - Neutral
 - Agree
 - Strongly Agree
7. Inner packaging is good

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

8. Outer packaging is decent

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

9. GTL have good experience

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

10. GTL have strong customer service

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

11. GTL offer many services

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

12. GTL is time oriented

- Strongly Disagree
- Disagree

- Neutral
- Agree
- Strongly Agree

13. Tracking system is useful

- Strongly Disagree
- Disagree
- Neutral
- Agree
- Strongly Agree

14. Measures to improve material handling

- Automated Storage
- Automated Guided Vehicles
- Casters and Wheels
- Conveyors
- Dock Equipment

15. Measures to improve storage packaging

- Proper Packaging Station
- Right Sizing of Cartons
- Automation

ANNEXTURE II – RESEARCH ARTICLE

A STUDY ON MATERIAL HANDLING AND STORAGE PACKAGING AT GOOD TRANS LOGISTICS

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ABSTRACT

The researcher investigates the material handling and storage packaging at Good Trans Logistics. The primary objective is to know about the material handling and storage packaging process and to identify areas of improvement. The secondary objective is to study the types of packaging, most desirable qualities, and technologies and to find the best measure to improve these. By examining these factors, the study aims to recommend a suitable measure for material handling and storage packaging that satisfies the customer. The findings of the study will help the GTL to improve the practices of material handling and storage packaging.

Key Words: Material handling, storage packaging

INTRODUCTION

Material handling and storage packaging are very much important in logistics. Material handling involves the movement, storage, and protection throughout the processing starting from the manufacturing, warehousing, consumption, and distribution. Effective material handling will improve productivity, reduce cost, minimize waste, maximize customer satisfaction, etc. Storage packaging refers to the type of packaging we use to protect, organize, and store goods during transportation and warehousing. Proper packaging will prevent the material from damage, spoilage, and contamination and helps in loading, unloading, and inventory management. In conclusion, both material handling and storage packaging are the key elements of logistics that help the company to grow more.

REVIEW OF LITERATURE

Hans-Henrik Hvolby, Fabio Sgarbassa, and Jan ola Strandhagen (2023) The researcher uses multiple case studies to map sterile instrument logistics and evaluate the transportation performance of material handling systems in terms of flexibility, productivity, quality, and costs.

Brajesh Kumar Panda, Shubham Subrot Anigrahi, et al. (2023) This study focuses on the mechanism of end effector robots in the food handling process. The food industry has been evolving continuously in implementing robots due to the varied characteristic of different food materials. Efforts have been proposed to design soft robots for flexible adaptation in material handling during various food processing operations. These operations are carried out by the robot's end effectors.

Taniya Mukherjee, Isha Sangal, et al. (02 Dec 2022) This study aims to optimize the material handling cost within a cross-dock when goods are unloaded and transferred from the dock area to the storage area. The result explains that a variation in the number of inbound trucks, product quality, and pallet handling prices influence the net material handling cost. It also verifies that applying direct transfer of product through cross-docking is economical as fewer products in storage reduce the handling cost.

Li & et al. (2021) The author proposed a new method for optimizing material handling paths in warehouse management to minimize the total travel distance and time of material handling equipment. The study demonstrates the effectiveness of the method to reduce travel distance and improve warehouse efficiency.

Pervan I., & Pavlic D. (2020) The study focuses on the role of smart packaging in driving supply chain sustainability. The author discusses various types of smart packaging, such as active and intelligent packaging, including reduced waste and improved supply chain visibility.

OBJECTIVE OF THE STUDY

Primary Objective

- To study the material handling and storage packaging at Good Trans Logistics.

Secondary Objective

- To understand the most preferred packages by the customers.
- To discover the most desirable qualities of GTL.

NEED OF THE STUDY

- To keep away the unnecessary and deficient level of inventories in the organization.
- To increase the service to the customer through short, convenient, and conveyance.

SCOPE OF THE STUDY

- To give the arrangement to the organizations like what to arrange, when to arrange and the amount to be arranged.
- To find the most desirable qualities.
- To acknowledge the most preferred packages.

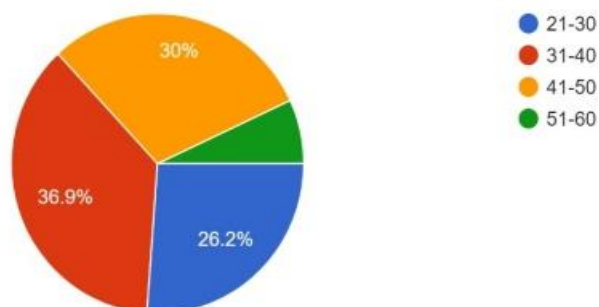
DATA ANALYSIS

- PERCENTAGE ANALYSIS

Indicating the age of the respondents

OPTIONS	RESPONDENTS	PERCENTAGE
21-30	34	26.2
31-40	48	36.9
41-50	39	30
51-60	9	6.9

AGE
130 responses



INTERPRETATIONS:

From the above table, it is interpreted that the number of respondents between the age of 21-30 is 26.2%, the number of respondents between 31-40 is 36.9%, the number of respondents between 41-50 is 30%, and number of respondents between 51-60 is 6.9%.

INFERENCE:

The majority (36.9%) of the respondents are between 31-40.

- CORRELATION ANALYSIS**

Correlation analysis in research is a statistical method used to measure the strength of the linear relationship between two variables and compute their association.

HYPOTHESIS

H₀ (Null Hypothesis): There is no significant relationship between age and material handling.

H₁ (Alternative Hypothesis): There is a significant relationship between age and material handling.

		AGE	Material handling in GTL is satisfactory
AGE	Pearson Correlation	1	.017
	Sig. (2-tailed)		.845
	N	130	130
Material handling in GTL is satisfactory	Pearson Correlation	.017	1
	Sig. (2-tailed)	.845	
	N	130	130

INTERPRETATIONS:

The p-value (0.845) is greater than the alpha value (0.005). Hence null hypothesis is accepted. Therefore, there is no relationship between age and material handling.

INFERENCE:

There is no relationship between age and material handling.

- ANOVA**

Anova is a statistical formula used to compare variances across the means of different groups.

HYPOTHESIS

H₀ (Null Hypothesis): There is no significant difference between gender and technology.

H₁ (Alternative Hypothesis): There is a significant difference between gender and technology.

The tracking system is useful

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.175	1	.175	.630	.429
Within Groups	35.556	128	.278		
Total	35.731	129			

INTERPRETATIONS:

The p-value is (0.429) which is greater than the alpha value (0.005). Hence null hypothesis is accepted. Therefore, there is no significant difference between gender and technology.

INFERENCE:

There is no significant difference between gender and technology.

SUGGESTIONS

The overall experience from the index to the study reveals that GTL has good experience and strong customer service. According to the respondents, GTL can improve their company by focusing a little more on packaging, features, technologies, etc. Dock equipment and automation are the best measures to improve material handling and storage packaging.

CONCLUSION

The study found that the material handling and storage packaging which the company is following are satisfactory, but there are some areas to be improved. By understanding the most preferred packages, qualities, and technologies' the researcher identified many suggestions to improve material handling and storage packaging that will lead to higher customer satisfaction. Furthermore, the researcher found that there is no relationship between age and material handling and there is no relationship between gender and technology. The suggested measure identified by the researcher in this study will help GTL to improve its efficiency, reduce cost, and improve customer satisfaction.

REFERENCE

- Autonomous mobile robots in sterile instrument logistics: an evaluation of the material handling system for a strategic fit.
- Robotics for general material handling machines in food plants.
- The effect of material handling automation on logistics performance.
- A multi-objective optimization model for storage location-allocation in a cross-docking center.
- Improved genetic algorithm for material handling system optimization in logistics.