

A STUDY ON WAREHOUSE MANAGEMENT AT DHL SUPPLYCHAIN INDIA.

Submitted in partial fulfilment of the requirements for the award of

MASTER OF BUSINESS ADMINISTRATION

by

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Register No.41410013



SCHOOL OF MANAGEMENT STUDIES

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with Grade "A" by NAAC | 12B Status by UGC | Approved by AICTE

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **ALBIN ROLLAND.G 41410013** who carried out the project entitled "**A STUDY ON WAREHOUSE MANAGEMENT AT DHL SUPPLYCHAIN INDIA**" under my supervision from January 2023 to March 2023.

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DECLARATION

I **ALBIN ROLLAND.G** hereby declare that the Project Report entitled “**A STUDY ON WAREHOUSE MANAGEMENT AT DHL SUPPLYCHAIN INDIA**” done by me under the guidance of **Dr.M. RAJA MBA., M.Phil., Ph.D.** is submitted in partial fulfilment of the requirements for the award of Master of Business Administration degree.

DATE: 05/05/2023

PLACE: Chennai

A handwritten signature in black ink, reading 'Albin Rolland.G', with a stylized flourish at the end.

ALBIN ROLLAND.G

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ABSTRACT

A warehouse is a commercial building for storage of goods. Warehouses are used by manufactures, importers, exporters, wholesalers, transport businesses, customs, etc. They are usually large plain buildings in industrial areas of cities and towns and villages. They usually have loading docks to load and unload goods from trucks.

The scope of the study conducted focuses on the wireless technology used in DHL Supply Chain India to enhance the supply chain operations. The effectiveness of wireless technology can be analyzed from the factors like familiarity, ease of use. Importance of workflow application, flexibility, and tenure reliability, importance of information, effectiveness of the various modules, performance, utilization rate, satisfaction and rate of success are also assessed using wireless technology for tracing goods. This study is limited to DHL Supply Chain India.

DHL Supply Chain India needed a strategic look at the development of an information management structure that exploits the availability of real – time, accurate information and amend and develop business applications that drive business improvements. That is the reason the company is adopting wireless technology in its warehouse. The employees are required to be trained, educated, and exposed to this new technology. Thus, research is required within the organization.

Primary objectives are to study the Warehouse management with special reference to DHL Supply Chain India. Secondary objectives are to identify the issues in the location of warehouse and its impact of customer service, find out the factors influencing ideal warehouse location, analyze which location is suitable for various goods like FMCG, perishable goods, machinery & electronic goods, agriculture products, garments products, Auto mobiles products, chemical products and identify which place is the convenient place of warehouse to use both distribution and storage of goods.

The warehouse location is must be near the high ways, market areas, near to the port and airport. And warehouse place is requiring availability of manpower, electricity, warehouse space, safety and security. The considerations of warehouse site selection

revolve around four major factors as location, infrastructure, access, availability, market. However, transportation cost, which is a major element in logistic, it depends on the location of the warehouse. Locations of the warehouse depend on the products and customers. So, company can consider location of because warehouse location cost is standard and other costs are variable like transportation cost.

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CHAPTER-1

INTRODUCTION

1.1 INTRODUCTION

WAREHOUSING

A warehouse is a commercial building for storage of goods. Warehouses are used by manufactures, importers, exporters, wholesalers, transport businesses, customs, etc. They are usually large plain buildings in industrial areas of cities and towns and villages. They usually have loading docks to load and unload goods from trucks. Sometimes warehouses are designed for the loading and unloading of goods directly from railways, airports or seaways. They often have cranes and forklifts for moving goods, which are usually placed on ISO standard pallets loaded into pallet racks. Stored goods can include any raw materials, packing materials, spare parts, components, or finished goods associated with agriculture, manufacturing, or commerce.

LOGISTICS

Logistics is the management of the flow of resources, not only goods, between the point of origin and the point of destination in order to meet the requirements of customers or corporation. Logistics involves the integration of information , transportation, warehouse, warehousing, material handling and packaging, and often security. Today the complexity of production logistics can be modeled, analyzed, visualized and optimized by plant simulation software, but is constantly changing. This can involve anything from consumer goods such as food, to IT materials, to aerospace and defense equipment.

Inbound logistics is one of the primary processes and it concentrates on purchasing and arranging inbound movement of materials, parts and/or finished warehouse from suppliers to manufacturing or assembly plants, warehouses or retail stores.

Outbound logistics is the process related to the storage and movement of the final product and the related information flows from the end of the production line to the end user.

1.2 INDUSTRY PROFILE

World's leading logistics company DHL Supply Chain India has been started working in Chennai FTWZ on January 08,2011. This efficient organization mainly deal with Warehousing and transportation, Domestic transportation and Asset light model with more than 160 warehouses.

DHL Supply Chain is a division of Deutsche Post DHL and is affiliated with DHL. Headquartered in Bonn, Deutsche Post has 510,000 employees. In 2016, DHL Supply Chain was primarily competing in strategic life sciences and healthcare, automotive and technology sectors of the market. The automotive sector, with its Lead Logistics Provider (LLP) service, has been shifting to China, India and Mexico as those countries become significant vehicle and parts manufacturers.

DHL Supply Chain is organized into six regions: North America, South America, APAC (Asia Pacific), Greater China, MLEMEA (Mainland Europe, Middle East, and Africa), and UK&I (United Kingdom and Ireland). The Excel brand was retained for North America (USA and Canada), with the headquarters for the region in Westerville, Ohio. In 2016, the Exel brand transitioned DHL Supply Chain for the North America region. DHL Supply Chain trades in six focus sectors: AEMCE (Automotive, Engineering, Manufacturing, Chemical and Energy) Consumer, Retail, Technology, Service Logistics, Life Sciences and Healthcare. DHL is a global company with a unique portfolio have the below vision, Vision: the logistics company for the world Mission: Excellence. Simply delivered Purpose: We connect people, improving their lives. Guiding principles: respect & results Goals: 3 Bottom Lines & Living Responsibility.

In the Supply Chain business, DHL Supply Chain provides customers in many industry sectors with logistics services along the entire supply chain – from planning, sourcing, production, storage, and delivery to returns logistics and value-added services – in order to ensure logistics flow.

DHL Supply Chain offers warehousing, distribution, managed transport and value-added services as well as business process outsourcing, supply chain management and consulting. DHL Supply Chain's goal is to ensure that their customers' products and information reach their markets quickly and efficiently, thus securing them competitive advantages.

1.3 COMPANY PROFILE

DHL provide the best service in the field of supply chain management. Their services are extremely treasured by their esteemed clients for their outstanding quality in terms of warehousing and operations management, logistics, supply chain management and customer support. Additionally, we also Value-Added Services (VAS) for the shipment as per the customer requirement including checking the defective/short/ excess, label activities. With the help of our well-established and robust infrastructure, we are able to offer the entire array as per our clients' specifications within the committed time frame. Our advanced facility is equipped with enough systems, scanners, MHE, reach trucks, power trolley, safety equipment's etc. that ensure efficient and safety working behavior. Further, our quality controllers thoroughly check the services on various well-defined parameters customer review, internal audits, training and KPI checking. Under the futuristic direction and motivating nature of our manager, "Mr. Kushal Diggy Reddy" and our cluster manager "Mr. Wilson Vargheese" we have established ourselves as the reckoned entity in the industry. Their sharp business acumen, operation management, customer management and rich industry experience also aids us attain maximum satisfaction of our clients.

Our Quality Assurance

We are providing the best services in warehousing, storing-racking, non-racking, open yard and temperature-controlled rooms, customer support, customs clearance and dispatching as per the customer requirement. These are also stringently checked by our quality inspectors by various methods. In addition, such quality measures help us in maintaining international quality in terms of services, right from the beginning of cargo arrived till the final dispatch.

Client Satisfaction

Being a client-centric organization, we focus on the exact demands of the clients and provide them the entire collection exactly according to their requirements. We also follow client-oriented approach and transparent business practices that help us create a strong bond with our respected customers. Apart from this, we are working with various MNCs. Due to our wide distribution network, we are able to deliver our wide array within the committed time frame that assists us to attain the maximum satisfaction of our clients.

Our Infrastructural Facilities

We have a spacious infrastructure which is segregated into different divisions such as warehousing, CHA, customer service, VAS area and temperature-controlled storage area. Each unit is synchronized with each other to deliver the bulk consignments of our clients on time. We are also able to offer customization facility to our respected clients in terms of timely dispatch, value added services, Bill filing, customs clearance and daily reports. The various machines we use are the following:

- Power trolley
- Hand Trolley
- Zebra Printer
- Reach Truck

Service Portfolio

We are successfully ranked amongst the top Supply chain. Keep a close eye out for any problems or bottlenecks that cause snafues, along with any unnecessary or redundant steps that elongate the process, and keep customers waiting. The longer your products take to arrive at sales, the more your profit margins will be negatively impacted. To ensure sustainable supply chain management, consider changing over to a portfolio-based approach rather than one centered on SKU (Stock Keeping Unit). This allows for a more granular, targeted approach that makes supply change management and refinement easier. Creating a visual chart of product flow volume that clearly shows information gaps and other important vulnerabilities. Closing information gaps by gaining feedback from your suppliers, employees, customers, and other third parties. You can also use real-time monitoring tools to gain sufficient information on how your business operates behind the scenes. managing your insights and adjusting your supply chain. Experts recommend using a Corrective Action Plan (CAP) to develop effective and creative solutions to any problems within your supply chain. Manage your everyday tasks like checklists, data entry, and supply chain management on your smartphone, tablet and laptop, either partially or completely.

We offer:

- building a highly skilled and knowledgeable workforce

- investing in advanced technology
- automating business processes
- standardizing your process workflows
- identifying and building on your business's competitive edge.

Customization

Working with our highly skilled crew and flexible methods, we succeed in meeting the exact requirements of our esteemed clients through our efficient customization facility. Moreover, our team members communicate with customers to understand their specific desires and craft out outstanding services. They work in close co-ordination with each other to offer the entire range within the committed time frame. Additionally, our highly demanded services are customized in terms of:

- Rethink manufacturing from centralized to distributed
- Create different supply chains for different demands
- Reduce lead time

Our Team

We are supported by our highly experienced and creative experts who have the requisite knowledge to manufacture and supply these high-quality services. Also, our professionals strive hard to understand the diverse requirements of our clients and provide the entire collection accordingly. In order to update our workforce as per the latest trends, we also conduct for them various training sessions.

1.4 NEED OF THE STUDY

Warehouse is important concept in Supply chain management. Location is helpful and most effective concept of warehousing. The location of the warehouse is one of the most important features which a customer (client) would look for while choosing the specific company. In supply chain process we have to move the goods to customers quickly but the goods produced in various place like industrial as well as agricultural goods are produced at some specific places but consumed throughout the country. So the warehouse is must place in conventional location for a quick supply to the customers. And also Continuous production of goods in factories requires

adequate supply of raw materials. So there is a need to keep sufficient quantity of stock of raw material in the warehouse to ensure continuous production. The warehouse location should be placed in the perfect place near to the supply area and also production area.

- ✓ The purpose of the study is to understand the various location factors which the customer will look in DHL Supply Chain India.
- ✓ To understand the issues which arise in location of warehouse and to analyze the overall impact in customer services
- ✓ To find the features of an ideal warehouses viz., distribution warehouse and storage warehouse
- ✓ To ensure continues production as well as dispatching the product of manufacturing industry should require the location of warehouse.

1.5 SCOPE OF THE STUDY

The scope of the study conducted focuses on the wireless technology used in DHL Supply Chain India to enhance the supply chain operations. The effectiveness of wireless technology can be analyzed from the factors like familiarity, ease of use. Importance of workflow application, flexibility, and tenure reliability, importance of information, effectiveness of the various modules, performance, utilization rate, satisfaction and rate of success are also assessed using wireless technology for tracing goods. This study is limited to DHL Supply Chain India.

1.6 OBJECTIVES

1.6.1 PRIMARY OBJECTIVES:

To study the Warehouse management with special reference to DHL Supply Chain India.

1.6.2 SECONDARY OBJECTIVES:

- To identify the issues in the location of warehouse and its impact of customer service
- To find out the factors influencing ideal warehouse location.
- To analyses which location is suitable for various goods like FMCG, perishable goods, machinery & electronic goods, agriculture products, garments products, Auto mobiles products, chemical products
- To identify which place is the convenient place of warehouse to use both distribution and storage of goods.
- To provide valuable suggestions to the organization based on the study.

REVIEW OF LITERATURE

Ashutosh Verma (2023) Warehouse management is the key aspect for an uninterrupted flow of products within a supply chain. This paper deals with the critical factors that are responsible for creating an impactful influence on the working of warehouse management. The analysis involves the selection of critical factors then applying Interpretive Structural Modelling (ISM) methodology to them in order to get the level partition and final ISM model. This research also involves the MICMAC analysis on the factors which classifies all the selected factors into four groups namely, autonomous variables, dependent variables, linkage variables and driver variables. This research will help the supply chain architects to establish a better and reliable warehouse system. As this research involves analysis of multiple domains that is why a variety of users can refer to this work for their businesses, also the ISM approach gives a good accuracy of the hierarchy of the factors which helps in deciding the most effective chronology of the implementation of various warehousing operations. Researchers can also refer to this work to get insights of the significance of warehouse management in the supply chain and also the complete working of the ISM methodology.

Pablo Becerra (2021) This paper provides a systematic and up-to-date review and classification of 91 studies on quantitative methods of green supply chains for sustainable warehouse management. It particularly identifies the main study areas, findings and quantitative models by setting a point for future research opportunities in sustainable warehouse management. It seeks to review the quantitative methods that can better contribute to deal with the environmental impact challenge.

Natalia Burganova, Patrik Grznar (2021) Warehouse management and internal logistics planning and control are growing in importance. Nowadays, many methods have been developed in the areas of warehouse management and internal logistics planning and control. Internal logistics is essential in creating value and maximizing profits by streamlining internal logistics tasks. As a key indicator of logistic processes, efficiently is set transport time. The article deals with the possibilities of improving logistics and warehousing using available methods with the smallest possible input capital and decreasing transport time. In the first part, the warehouse is reorganised, and lean methods such as Kanban and Milk run are set. The presented design is

applied to the newly created hall. The result is improved processes and shorter transport times for material at the workplace and, ultimately, faster delivery of the finished product to the market and customer satisfaction. Scientific and more important for this study professional benefits consist in the application of mentioned methods.

Deepesh Singh, Ajay Verma (2018) in their research, The Purpose of this paper is to overview the warehouse management in supply chain and their current warehouse related issue in a present-day business and present a conceptual methodology for related issue. The methodology based on the warehouse, which are inputs for the methodology and benefits which are output of methodology.

Syafrial Fachri Pane (2018) Logistic sector actors need innovation to improve competitiveness in providing their best services to consumers, one of them on Warehouse Management System (WMS) because the system is used to control the movement of the supply chain. There is a problem in one of Indonesia logistics companies on the process of selecting goods, so the warehouseman still difficulties in this process. Thus, RFID implementation on WMS becomes one of the solutions to handle the goods selection process. This research uses Design Science Research Methodology (DSRM) which focuses on developing and improving the model performance of a system and using waterfall model for system development. Then the authors will analyze the test results with the validity test and reliability test of the questionnaire, and the results of the data analysis will determine the feasibility of this research to be applied.

Jia Mao, Huihui Xing & Xiuzhi Zhang (2018) With the continuous development and application of information technology in the logistics industry, mobile applications, bar code, wireless communication, system integration and other technologies are widely used in warehouse management. Focusing on warehousing process management has become a new trend of informatization and lean management of material warehouse management. In this paper, the management of distributed storage cloud model is discussed, and a variety of automation, intelligence and information technology are utilized to effectively integrate the resources effectively. The author studies the resource scheduling optimization problem in the system, proposes an effective scheduling method, and initially realizes the intelligent warehouse management system based on cloud model, which provides users with a good package management service.

C.K.M. Lee, Yaqiong Lv (2018) Warehouse operations need to change due to the increasing complexity and variety of customer orders. The demand for real-time data and contextual information is required because of the highly customized orders, which tend to be of small batch size but with high variety. Since the orders frequently change according to customer requirements, the synchronization of purchase orders to support production to ensure on-time order fulfilment is of high importance. However, the inefficient and inaccurate order picking process has adverse effects on the order fulfilment. The objective of this paper is to propose an Internet of things (IoT)-based warehouse management system with an advanced data analytical approach using computational intelligence techniques to enable smart logistics for Industry 4.0. Based on the data collected from a case company, the proposed IoT-based WMS shows that the warehouse productivity, picking accuracy and efficiency can be improved and it is robust to order variability.

Mourad Makaci (2017) Today, pooled warehouse presents a major issue for supply chain actors. Managing such structures establishes a more complex and little-known actions system. In this paper, we provide the main specificities of a pooled warehouse examined from the perspectives of both a literature review and an exploratory qualitative study built on seven cases in France. This study is based on semi-structured interviews with 22 companies managing projects in the field of pooled warehouses. From this qualitative analysis, we distinguish the main characteristics of pooled warehouses, such as compatibility and partner maturity, shared Vendor Managed Warehouse, and collaborative management. In addition, we identify new key performance indicators, uncertainty sources and risks of pooled warehouses. This work helps define pooled warehouse concept and brings practitioners a better understanding of how it can be managed. Furthermore, it allows researchers to develop new models of optimization considering the pooling context.

Burcu Balcik, Cem Deniz Caglar Bozkir, O. Erhun Kundakcioglu (2016) In this paper, we present a review and analysis of studies that focus on humanitarian warehouse planning and management. Specifically, we focus on papers which develop policies and models to determine how much to stock, where to stock, and when to stock throughout the humanitarian supply chain. We categorize papers according to the disaster management cycle addressed; specifically, we focus on pre-disaster and post-disaster warehouse management. We evaluate existing literature in

terms of problem aspects addressed such as decision makers, stakeholders, disaster types, commodities, facility types, performance measures as well as methodological aspects (i.e., types of policies, models, and solution approaches). We identify current gaps in the literature and propose directions for future research.

Johannes Fichtinger, Peter Baker (2015) There has been considerable research on the environmental impact of supply chains but most of this has concentrated on the transport elements. The environmental impact of warehousing has received relatively little attention except within the context of distribution networks. A high proportion of total warehouse emissions emanate from heating, cooling, air conditioning and lighting and these aspects are largely related to warehouse size. This in turn is greatly influenced by warehouse management, affecting stockholding levels, and warehouse design, affecting the footprint required for holding a given amount of stock. Other emissions, such as those caused by material handling equipment, are closely related to warehouse throughput and equipment choice. There is a substantial gap in the literature regarding this interaction between warehouse and warehouse management and its environmental impact. The purpose of this paper is to contribute to filling this gap. Therefore, an integrated simulation model has been built to examine this interaction and the results highlight the key effects of warehouse management on warehouse-related greenhouse gas emissions.

Wen Ding (2013) With the development of enterprises and the constant demands of the product diversity, traditional warehouse management model cannot meet that, due to its heavy workload and low efficiency. This paper presents a new type of intelligent warehouse management system - Smart Warehouse Management System based on the IOT, and expounded the principles and structure of it. This system has great advantages compared with the traditional mode, and we expect good prospects for its development.

A.Smidts(2013) The purpose of this paper is to investigate how warehouse management, understood as a cluster of planning and control decisions and procedures, is organized and driven by task complexity (TC) and market dynamics (MD).

Ramaa.A, K.N.Subramanya, T.M.Rangaswamy (2012) In a supply chain, warehousing function is very critical as it acts as a node in linking the material flows

between the supplier and customer. In today's competitive market environment companies are continuously forced to improve their warehousing operations. Many companies have also customized their value proposition to increase their customer service levels, which has led to changes in the role of warehouses. This paper highlights the findings of the study carried out to evaluate performance levels and enhance productivity of the manual warehouses by developing a WMS framework and cost benefit analysis.

S Hong-Ying (2009) Applying barcode technology to logistics and warehouse management becomes an inevitable trend for logistics modernization. In this paper, we introduce the bar code technology using in logistics and warehouse, then we pay more attention to how to apply barcode technology in the course of goods entering warehouse, storage and outing warehouse. At last, we put forward that applying barcode technology to logistics and warehouse will bring logistics enterprises huge profit.

Michael Hompel, Thorsten Schmidt (2008) The book gives an overview on background, potentials, risks and strategies for efficient warehouse-management in modern production and supply chains.

Jay D. Schwartz, Wenlin Wang, Daniel E. Rivera (2006) A simulation-based optimization framework involving simultaneous perturbation stochastic approximation (SPSA) is presented as a means for optimally specifying parameters of internal model control (IMC) and model predictive control (MPC)-based decision policies for warehouse management in supply chains under conditions involving supply and demand uncertainty. The effective use of the SPSA technique serves to enhance the performance and functionality of this class of decision algorithms and is illustrated with case studies involving the simultaneous optimization of controller tuning parameters and safety stock levels for supply chain networks inspired from semiconductor manufacturing. The results of the case studies demonstrate that safety stock levels can be significantly reduced and financial benefits achieved while maintaining satisfactory operating performance in the supply chain.

H.Min (2006) With the increasing demand for impeccable customer service, today's warehouses are pressured to raise their goals for warehouse accuracy, timely delivery service, individualized order fulfilment, flexible value-added service and

responsiveness to special customer requests. To meet these high-performance goals, a way needs to be found to eliminate any waste from the warehouse, to streamline its operations, and improve efficiency in every aspect of warehousing activities. One of the most proactive ways of doing so is the use of a warehouse management system (WMS) that is designed to speed up order turnaround time, improve warehouse accuracy, provide instant order status information, manage warehouse space and enhance labor productivity. This paper aims to help firms assess the extent of the WMS benefits for warehouse operations and their impact on competitiveness, while developing practical guidelines for successful WMS implementation based on the findings of our exploratory study of selected US firms. The findings suggest that WMS has become an integral part of warehouse operations and the subsequent supply chain processes.

E Krauth (2005) With the ever-increasing focus on cost reduction, product leadership and customer intimacy, the need for Supply Chain Management practices rises across many industries. Over the last two decades Logistics Service Providers have become important players in many chains and industries. New challenges arise due to the emergence of technologies. Data and information can be found anywhere, however, to make the proper decisions we need to have an insight in how decisions should be made, and what is important for the company and what not. In order to do so we solicited the Key Performance Indicator (KPI) literature -focusing on the areas of general management, supply chain management, logistics service provision and warehousing. In our earlier work we proposed a KPI framework that we here revisit and validate in the Warehousing domain – through the means of expert interviews.

Chad W. Autry Ph.D., Stanley E. Griffis Ph.D., (2005) Modern warehousing firms and distribution centers are overwhelmed with information related to the flows and storage of goods and services. The efficient and effective utilization of logistics-related information can enhance firms' ability to reduce costs while simultaneously improving customer satisfaction. Warehouse management systems (WMS) are frequently implemented and used with these goals in mind. The current research examines resource-based empirical justification for the pursuit and implementation of WMS. In addition, a research agenda is offered to guide future research efforts related to WMS and the broader area of logistics information systems (LIS).

Smith, Robert L. (2005) Uncertainties inherent in customer demands make it difficult for supply chains to achieve just-in-time warehouse replenishment, resulting in losing sales opportunities or keeping excessive chain-wide inventories. In this paper, we propose two adaptive warehouse-control models for a supply chain consisting of one supplier and multiple retailers. The one is a centralized model and the other is a decentralized model. The objective of the two models is to satisfy a target service level predefined for each retailer. The warehouse-control parameters of the supplier and retailers are safety lead time and safety stocks, respectively. Unlike most extant warehouse-control approaches, modelling the uncertainty of customer demand as a statistical distribution is not a prerequisite in the two models. Instead, using a reinforcement learning technique called action-value method, the control parameters are designed to adaptively change as customer-demand patterns change. A simulation-based experiment was performed to compare the performance of the two warehouse-control models.

M.Braglia & L. Zavanella (2003) Stock control in Supply Chain management is of concern here, particularly an industrial practice observed in the automotive manufacturing context and defined as 'Consignment Stock' (CS). To understand the potentiality of CS policy, an analytical modelling is offered that refers to the problem of a single-vendor and single-buyer productive situation. A comparison with the optimal solution available in the literature is also shown. The conclusion proposes a method that is useful in identifying those productive situations where CS might be implemented successfully. Results show how CS policy might be a strategic and profitable approach to stock management in uncertain environments, i.e., where delivery lead times or market demand vary over time.

Gerard P. Cachon, Marshall Fisher (2000) In traditional supply chain warehouse management, orders are the only information firms exchange, but information technology now allows firms to share demand and warehouse data quickly and inexpensively. We study the value of sharing these data in a model with one supplier, N identical retailers, and stationary stochastic consumer demand. There are warehouse holding costs and back-order penalty costs. We compare a traditional information policy that does not use shared information with a full information policy that does exploit shared information. In a numerical study we find that supply chain costs are 2.2% lower on average with the full information policy than with the traditional

information policy, and the maximum difference is 12.1%. We also develop a simulation-based lower bound over all feasible policies. The cost difference between the traditional information policy and the lower bound is an upper bound on the value of information sharing: In the same study, that difference is 3.4% on average, and no more than 13.8%. We contrast the value of information sharing with two other benefits of information technology, faster and cheaper order processing, which lead to shorter lead times and smaller batch sizes, respectively. In our sample, cutting lead times nearly in half reduces costs by 21% on average, and cutting batches in half reduces costs by 22% on average. For the settings we study, we conclude that implementing information technology to accelerate and smooth the physical flow of goods through a supply chain is significantly more valuable than using information technology to expand the flow of information.

3.1. METHODOLOGY:

The methodology is the general research strategy that outlines the way in which research is to be undertaken and, among other things, identifies the methods to be used in it. These methods, described in the methodology, define the means or modes of data collection or, sometimes, how a specific result is to be calculated. Methodology does not define specific methods, even though much attention is given to the nature and kinds of processes to be followed in a particular procedure or to attain an objective.

3.2. RESEARCH DESIGN:

Research design refers to the overall strategy utilized to carry out research that defines a succinct and logical plan to tackle established research question(s) through the collection, interpretation, analysis, and discussion of data. The type of design chosen for this study is descriptive research.

3.3. SAMPLING TECHNIQUE:

This research has adopted simple random sampling techniques for collecting the data from the respondents. Sufficient time was given to the respondents for filling up the questionnaire. The target population was employees in give a hand foundation, the researcher will choose a sample of 130 employees in DHL SUPPLYCHAIN INDIA.

3.4. SOURCES OF DATA:

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

- Primary Data – Questionnaire given to 130 respondents.
- Secondary Data - Websites and online journals, Published reports & Review of literature from published articles.

3.5. STRUCTURE OF QUESTIONNAIRE:

Questionnaire is the tool used for the data collection under Primary Method. It was divided into two sections. First part was designed to know the general information about customers and the second part contained the respondent's opinions about warehouse management.

3.6. SAMPLE SIZE:

The sample size of this study is 130 which is collected from the Employees of DHL SUPPLYCHAIN INDIA.

3.7. PERIOD OF STUDY:

The period of study is from January 2023 to March 2023 which is three months of study.

3.8 ANALYTICAL TOOLS

KARL PEARSON'S CORRELATION

Correlation analysis is the statistical tool used to measure the degree to which two variables are linearly related to each other. Correlation measures the degree of association between two variables. The Pearson product-moment correlation coefficient is a measure of the strength and direction of association that exists between two variables measured on at least an interval scale. It is denoted by the symbol r .

$$r = \frac{N\sum XY - \sum X \sum Y}{\sqrt{N\sum X^2 - (\sum X)^2} \sqrt{N\sum Y^2 - (\sum Y)^2}}$$

CHI- SQUARE TEST I – (χ^2)

A chi-squared test, also referred to as chi-square test or χ^2 test, is any statistical

hypothesis test in which the sampling distribution of the test statistic is a chi-squared distribution when the null hypothesis is true, or any in which this is asymptotically true, meaning that the sampling distribution (if the null hypothesis is true) can be made to approximate a chi-squared distribution as closely as desired by making the sample size large enough.

The χ^2 test was first used by Karl Pearson in the year 1980. The quantity χ^2 describes the magnitude of the discrepancy between theory and observation.

It is calculated using:

$$\chi^2 = \sum [(O_i - E_i)^2 / E_i] \text{ with } (n - 1) \text{ degrees of freedom.}$$
Where, O_i refers to the observed frequency & E_i to the expected frequencies. χ^2 was used as a test of independence and goodness of fit.

ONE WAY ANOVA

The ANOVA tests the null hypothesis that samples in two or more groups are drawn from populations with the same mean values. To do this, two estimates are made of the population variance. The ANOVA produces an F-statistic, the ratio of the variance calculated among the means to the variance within the samples. If the group means are drawn from populations with the same mean values, the variance between the group means should be lower than the variance of the samples, following the central limit theorem. A higher ratio therefore implies that the samples were drawn from populations with different mean values.

PERCENTAGES

Percentages refer to a special kind of ratio. Percentages are used in making comparison between two or more series of data. Percentages are used to describe relationships; it is expressed as.

Percentage = (no of employees/total no of employees) *100

CHARTS:

Charts are graphic displays of data for easy understanding of relative positions that is not always possible with descriptive words or numbers. Types of charts commonly used in business data presentation are: Bar and pie.

BAR CHARTS:

The bar chart is commonly used for presentation of qualitative data. The data can be continuous or discrete data, which are plotted against discrete data intervals. The vertical bar diagram, also called bar chart where the length or height of bars represent the numerical value of the event or measurement. Width or gap between the bars is of no significance to the bar chart data, but they are uniform in a diagram.

4.1. PERCENTAGE ANALYSIS

Table 4.1.1: Experience

Experience	No of Respondents	Percentage
Less Than 1 Year	21	16.00%
1 To 3 Years	21	16.00%
3 To 5 Years	47	36.00%
5-10 Years	31	24.00%
Above 10 Years	10	8.00%
Total	130	100%

Interpretation

The above table shows the experience of the person who gave the answer to the questionnaire. Most of the person having 3 to 5 year experience, 36 percent of the members having experience out of 130. 16 percent of the members having Less than one year experience out of 130 responses. Also at the same 16 percent of the members having 1 to 3 year experience out of 130 responses, 24 percent of the members have 5 to 10 year experience in warehousing field out of 130 responses. Above 10 year experience had only 8 percent of the members 8 experts gave clear knowledge to studies.

INFERENCE

Majority of (36%) respondents are 3 to 5 years.

CHART 4.1.1:

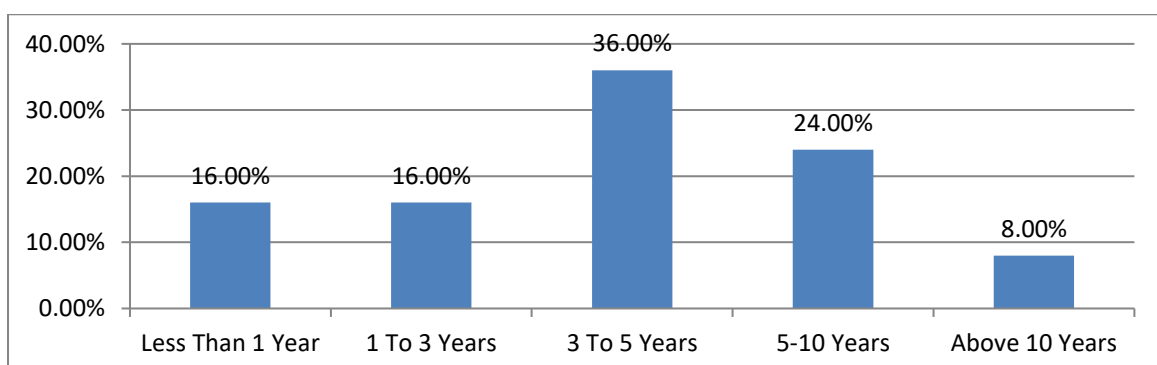


Table 4.1.2: Type of Warehouse

Type of Warehouse	No of Respondents	Percentage
Private Warehouse	88	68.00%
Public Warehouse	18	14.00%
GOVT Warehouse	8	6.00%
Bonded Warehouse	16	12.00%
Total	130	100%

Interpretation

The above table shows the clear detail about warehousing types. 68 percent of the clients are using private warehouse out of 130 respondents. 14 percent of the members are using public warehouse, 6 percent of the members are using GOVT warehouse and 12 percent of the members are using Bonded warehouse out of 130 respondents. Most of the persons are using Private warehouse the percentage is 68 percent of the.

Inference

Majority of (68%) respondents are private warehouse.

CHART 4.1.2:

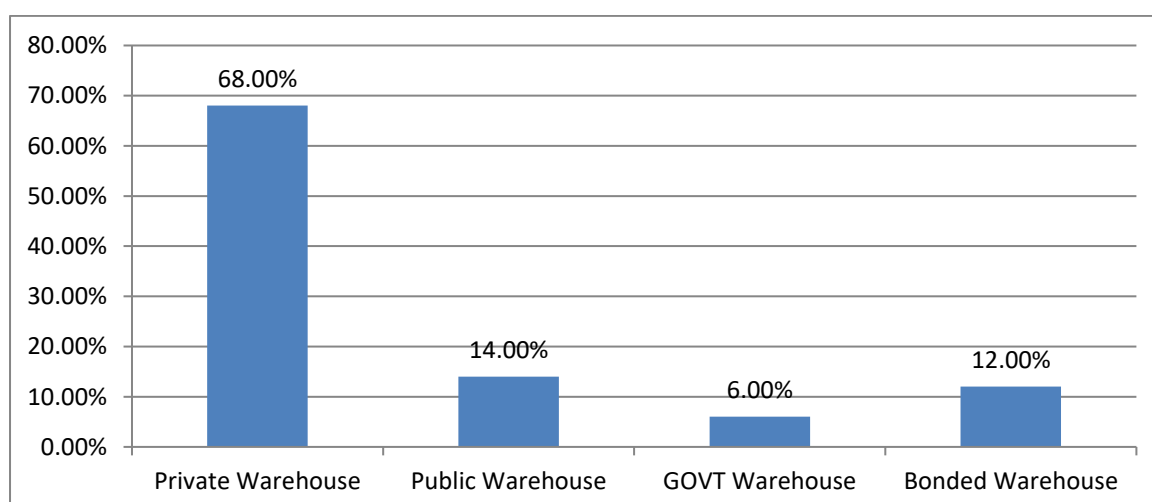


Table 4.1.3: Type of Goods

Type Of Goods	No of Respondents	Percentage
FMCG	21	16.00%
Perishable	21	16.00%
Machinery & Electronic	21	16.00%
Agriculture	15	12.00%
Garments	8	6.00%
Automobiles	26	20.00%
Chemical	10	8.00%
Others	8	6.00%
Total	130	100%

Interpretation

The above table shows various goods stored by customers in warehouse. The most of clients storing Automobiles, FMCG, Perishable, Electronic goods, 20 percent of the members are storing automobile in warehouse out of my 130 samples. And averagely 16 percent of the members are storing FMCG, Perishable, Electronic goods in warehouse. 8 percent of the members are using Chemical goods in warehouse and averagely 6 percent of the members are stored Garments and Others goods.

Inference

Majority of (20%) respondents are automobiles.

CHART 4.1.3:

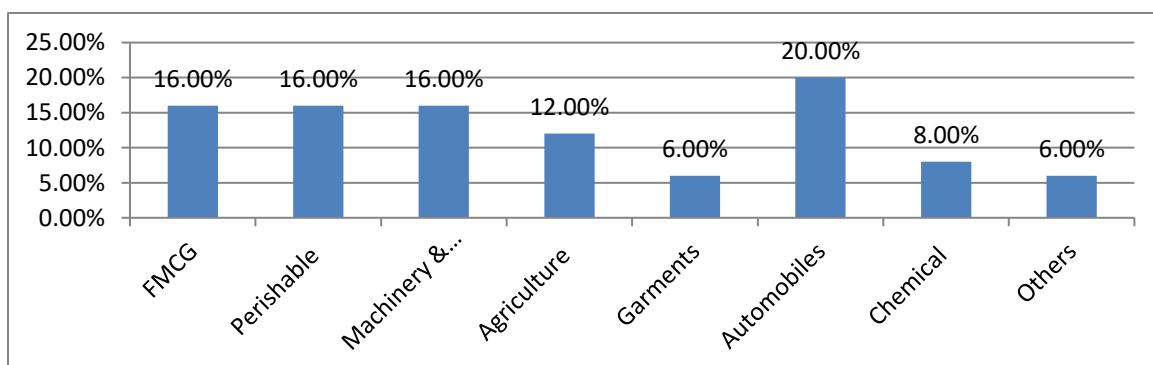


Table 4.1.4: Important Feature

Important Feature	No of Respondents	Percentage
Location	59	46.00%
Infrastructure	36	28.00%
Transport	26	20.00%
Offers	3	2.00%
Cost	6	4.00%
Others	0	0.00%
Total	130	100%

Interpretation

The above table clearly shows the important feature customer expect while approaching the warehousing. Location is mostly expected from customers. 46 percent of the members are expecting warehousing location. 28 percent of the members are expecting warehouse infrastructure. Only one expect offers and 4 percent of the customers expect warehouse cost.

Inference:

Majority of (48%) respondents are location.

CHART 4.1.4:

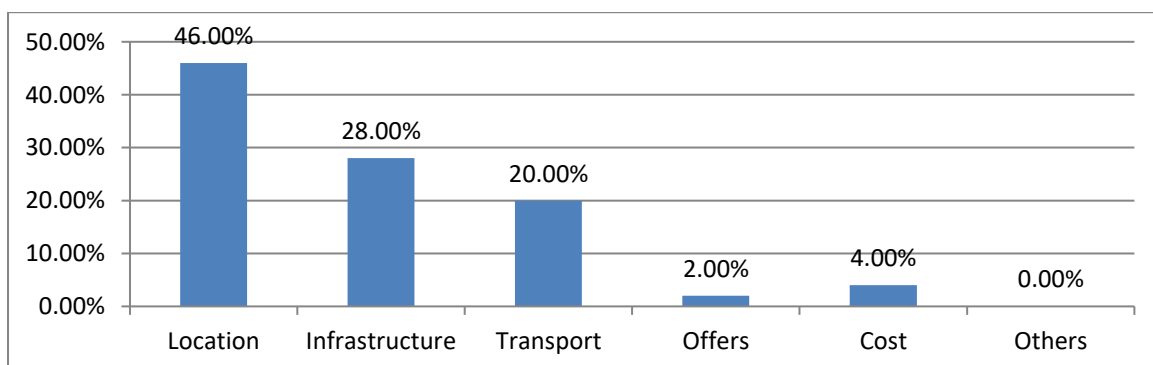


Table 4.1.5: What is the time taken by the goods to reach the customers from warehouse?

Time	No of Respondents	Percentage
0-15 Minutes	5	4.00%
15-30 Minutes	65	50.00%
30minutes-1 Hour	39	30.00%
Above 1 Hour	21	16.00%
Total	130	100%

Interpretation

The above table shows maximum 15-30 minutes time duration from warehouse to reach the city 50 percent of the respondent out of 130. 30 percent of the respondents answered 30minutes-1hour to reach their customer from the warehouse and 16 percent of the respondents told its take above one hour. 4 percent of the members told 0-15minutes to reach the customer from warehouse.

Inference

Majority of respondents (50%) are 15 -20 minutes.

CHART 4.1.5:

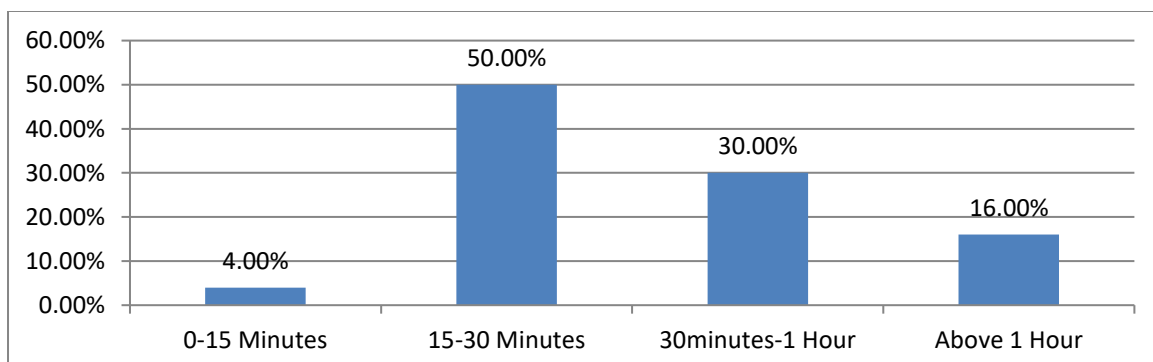


Table 4.1.6: Basic Facility of Warehouse

Basic Facility	No of Respondents	Percentage
Excellent	5	4.00%
Very Good	73	56.00%
Good	31	24.00%
Average	16	12.00%
Poor	5	4.00%
Total	130	100%

Interpretation

The above table shows the detail maximum 56 percent of the persons told Very good out of 130. 24 percent of the persons told good about the warehouse facility. 4 percent of the persons told excellent and poor and 12 percent of the persons told the warehouse facility is average.

Inference

Majority of respondents (56%) are very good.

CHART 4.1.6:

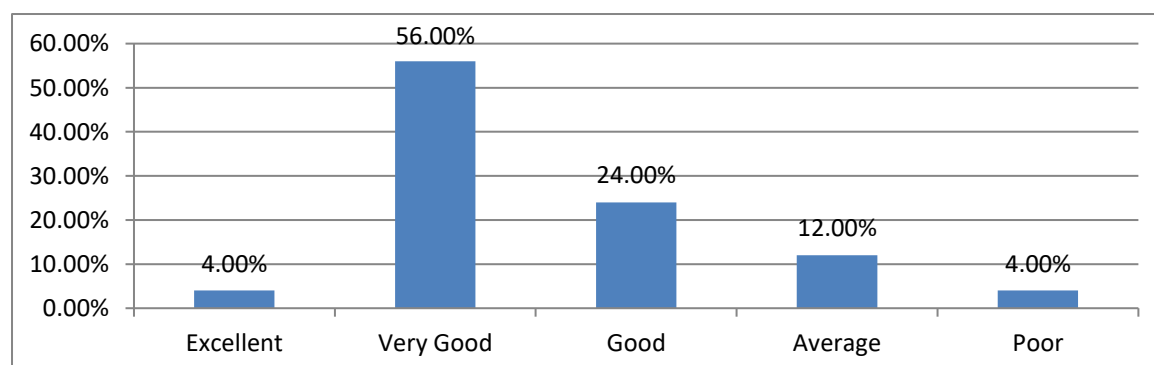


Table 4.1.7: Do you think location is the most important factor of Warehouse?

Location	No of Respondents	Percentage
Yes	96	74.00%
No	34	26.00%
Total	130	100%

Interpretation

The above table shows most of the respondent told warehouse location is most important 74 percent of the persons answers location is important in Warehouse management. And 26 percent of the persons told locations only not important another facility is also important.

Inference

Majority of respondents (74%) are yes.

CHART 4.1.7:

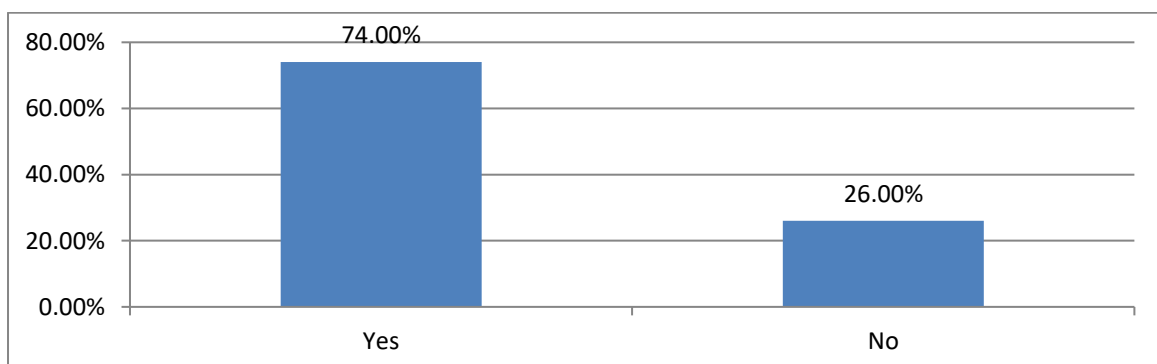


Table 4.1.8: Choice of Location According to the Customer

Choice of Location	No of Respondents	Percentage
Near to Industrial Area	18	14.00%
Near to Market Area	36	28.00%
Near to Port	23	18.00%
Near to The City	11	8.00%
Near to Agriculture Area	0	0.00%
Out of The City	42	32.00%
Total	130	100%

Interpretation

The above table shows the detail of location choice according to the customer responds, maximum 32 persons told out of the city is best place for warehouse, 28 persons told near to the market area is the best location for warehousing, 18 persons told near to port is perfect place for warehouse, 14 persons told near to industrial area is the perfect place for warehouse and 8 persons told near to city is conventional place for warehouse.

Inference

Majority of respondents (32%) are out of the city.

CHART 4.1.8:

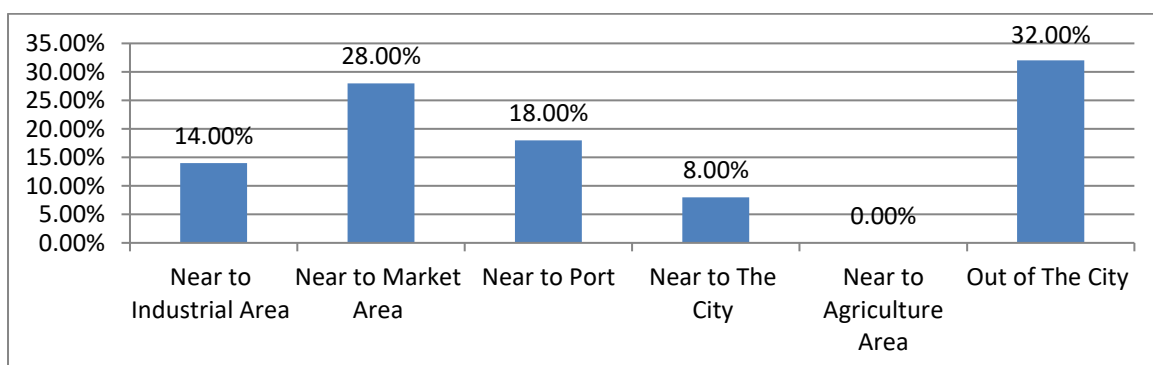


Table 4.1.9: Is the climate provided in the warehouse is suitable for your product?

Climate	No of Respondents	Percentage
Yes	91	70.00%
No	39	30.00%
Total	130	100%

Interpretation

The above table shows 70 percent of people answered out of 130 respondents told the warehousing climate is suitable to our product and 30 percent of the persons told warehouse climate is not suitable for our product.

Inference

Majority of respondents (70%) are yes.

CHART 4.1.9:

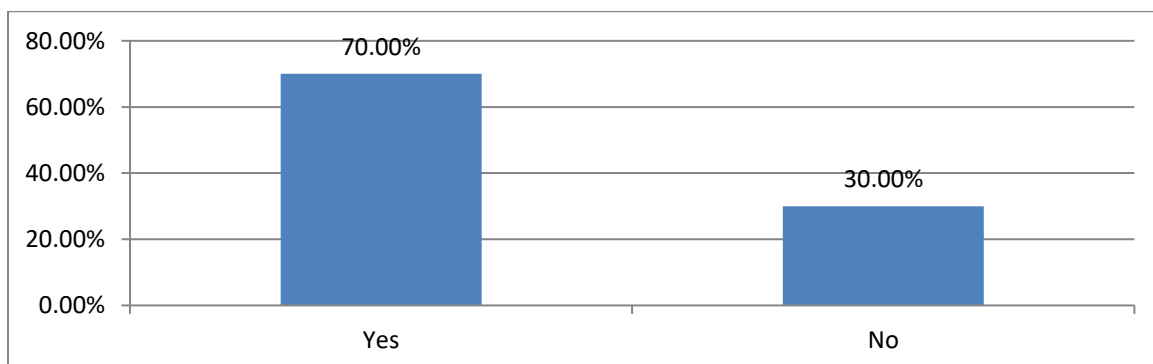


Table 4.1.10: Transportation Infrastructure Rate

Transportation	No of Respondents	Percentage
Excellent	8	6.00%
Very Good	57	44.00%
Good	44	34.00%
Average	16	12.00%
Poor	5	4.00%
Total	130	100%

Interpretation

The above table shows the transportation infrastructure rating of warehouse 44 percent told Very Good, 34 percent of the persons told Good the transportation infrastructure of warehouse, 12 percent of the person told Average, 6 percent of the persons told Excellent and 4 percent of the person told Poor the transportation facility of warehouse.

Inference

Majority of respondents (44%) are very good.

CHART 4.1.10:

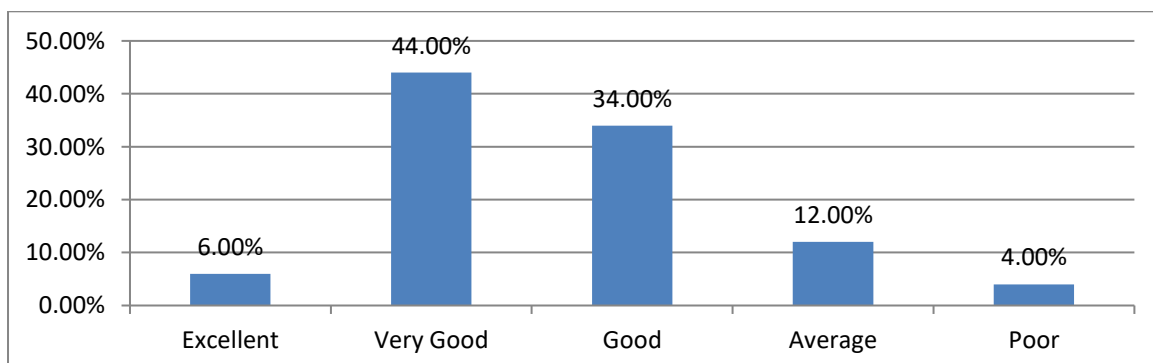


Table 4.1.11: Does the warehouse provide advance IT facilities like a RFID, GPS?

IT Facility	No of Respondents	Percentage
Yes	55	42.00%
No	75	58.00%
Total	130	100%

Interpretation

The above table shows the detail of warehouse provides advance IT facility 58 percent people told the warehouse does not provide the IT facility and 42 percent people told yes the warehouse provide advance IT facility to my product.

Inference

Majority of respondents (58%) are No.

CHART 4.1.11:

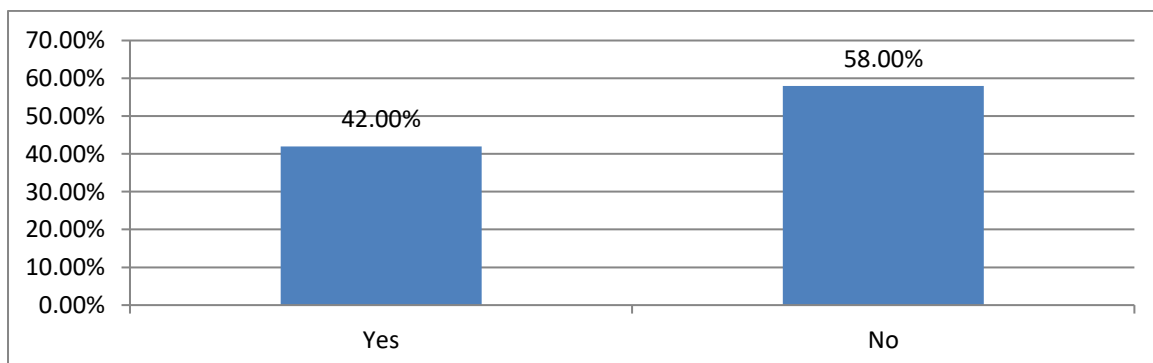


Table 4.1.12: Which type of warehouse is suitable for storing the FMCG products?

FMCG	No of Respondents	Percentage
Near to Industrial Area	11	8.00%
Near to Market Area	93	72.00%
Near to Port	13	10.00%
Near to The City	8	6.00%
Near to Agriculture Area	0	0.00%
Out of The City	5	4.00%
Total	130	100%

Interpretation

The above table shows the detail which place is suitable for FMCG products for warehousing most of the person told Near to Market area is the perfect place for FMCG Storage 36 percent of the persons answered for it. 10 percent of the persons told near to port is suitable place for FMCG product storage, 8 percent of the persons told near to Industrial area is best place, 6 percent of the persons told near to the City is best place, and 4persons told Out of the City is best place.

Inference

Majority of (72%) respondents are near to market.

CHART 4.1.12:

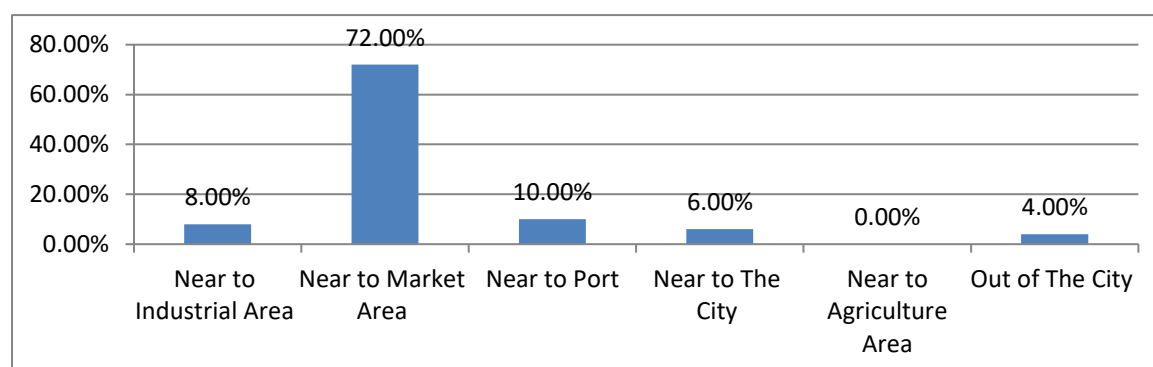


Table 4.1.13: Which type of warehouse is suitable for storing the perishable products?

Perishable	No of Respondents	Percentage
Near to Industrial Area	0	0.00%
Near to Market Area	62	48.00%
Near to Port	44	34.00%
Near to The City	16	12.00%
Near to Agriculture Area	2	2.00%
Out of The City	6	4.00%
Total	130	100%

Interpretation

The above table shows the detail which place is suitable for perishable products for store in warehouse most of the person told Near to Market area is the perfect place for perishable Storage 48 percent of the persons answered for it. 34 percent of the persons told near to port is suitable place for perishable product storage, 12 percent of the persons told near to the City is best place, 2 percent of the person told near to the agriculture area and 4 percent of the persons told Out of the City is best place for perishable goods storage.

Inference

Majority of (48%) respondents are near to market.

CHART 4.1.13:

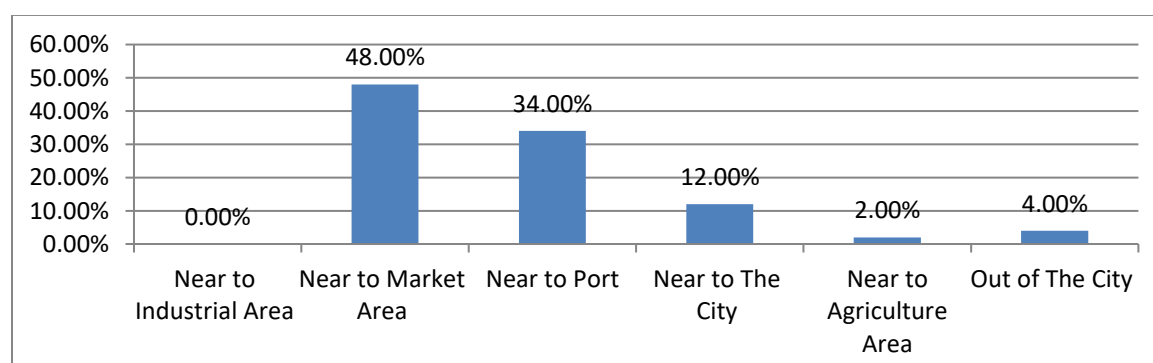


Table 4.1.14: Which type of warehouse is suitable for storing the Machinery products?

Machinery & Electronics	No of Respondents	Percentage
Near to Industrial Area	62	48.00%
Near to Market Area	0	0.00%
Near to Port	21	16.00%
Near to The City	8	6.00%
Near to Agriculture Area	0	0.00%
Out of The City	39	30.00%
Total	130	100%

Interpretation

The above table shows the detail which place is suitable for Machinery & Electronics products for warehousing most of the person told Near to the Industrial area is the perfect place for Machinery & Electronics Storage 48persons answered for it. 30 percent of the persons told Out of the City is suitable place for Machinery & Electronics Storage, 6 percent of the persons told near to the City is best place, and 16 percent of the persons told Near to the Port is best place for Machinery & Electronics goods storage.

Inference

Majority of (48%) respondents are near to market area.

CHART 4.1.14:

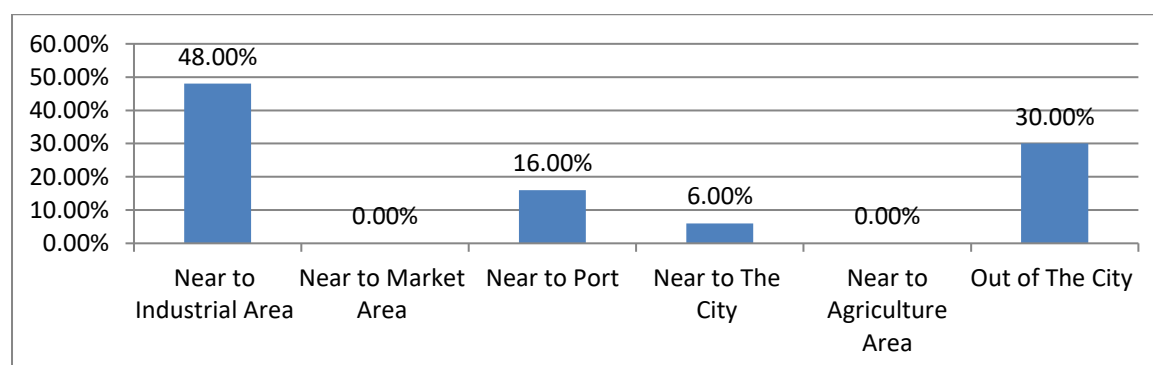


Table 4.1.15: Which type of warehouse is suitable for storing the agriculture products?

Agriculture	No of Respondents	Percentage
Near to Industrial Area	0	0.00%
Near to Market Area	5	4.00%
Near to Port	5	4.00%
Near to The City	31	22.00%
Near to Agriculture Area	84	64.00%
Out of The City	5	4.00%
Total	130	100%

Interpretation

The above table shows the clear detail which is best warehousing location for agriculture product storage the most of the persons told Near to the agriculture area is perfect location 64 percent of the persons answer for it. 24 percent of the persons told Near to the City is best location for agriculture product storage warehouse, equal respondent 4 percent of the persons answers near to market area, near to port, Out of the City is best place for locating warehouse for agriculture product.

Inference

Majority of (84%) respondents are near to agriculture area.

CHART 4.1.15:

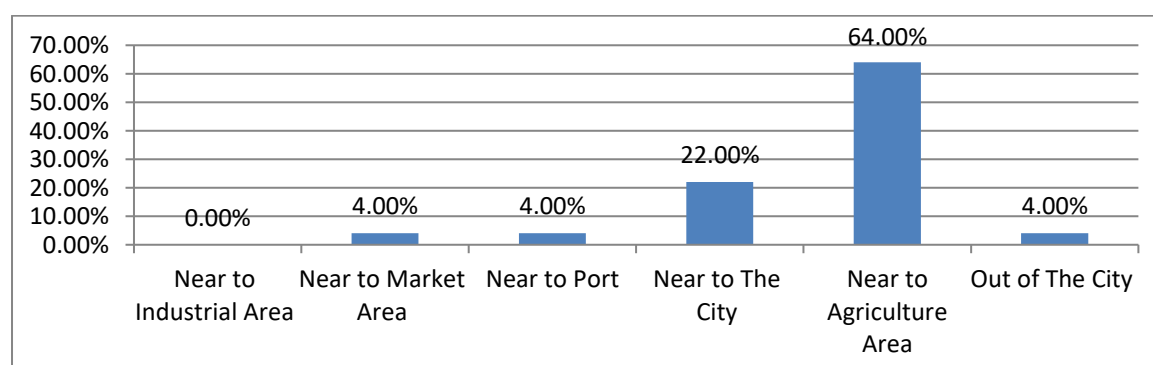


Table 4.1.16: Which type of warehouse is suitable for storing the Garments products?

Garments	No of Respondents	Percentage
Near to Industrial Area	0	00%
Near to Market Area	16	12.00%
Near to Port	49	38.00%
Near to The City	49	38.00%
Near to Agriculture Area	0	0.00%
Out of The City	16	12.00%
Total	130	100%

Interpretation

The above table shows the detail of which is best warehousing location for garments product, Equal responds for both place Near to the Port and Near to the City is best location for garments warehouse 38 percent of the persons told it and 12 percent of the persons also told equal responds for locate garment warehouse Out of the City and Near to market area.

Inference

Majority of (38%) respondents are near to port and city.

CHART 4.1.16:

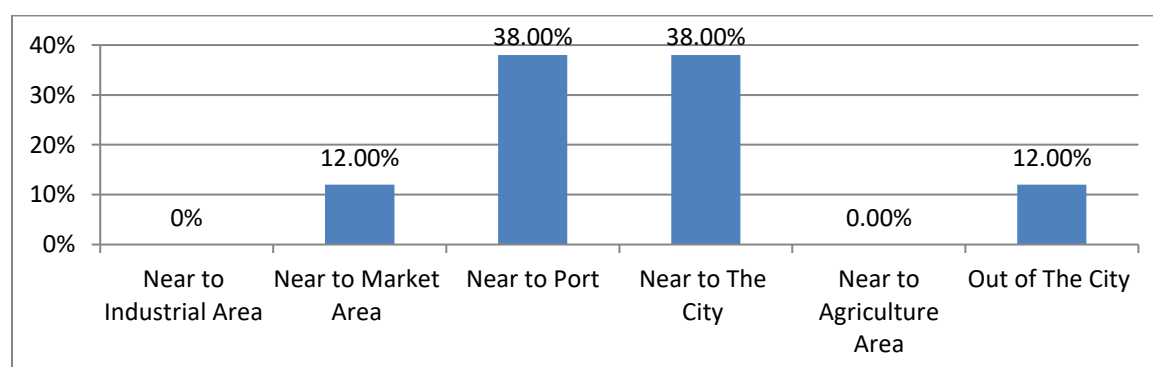


Table 4.1.17: Which type of warehouse is suitable for storing the Automobiles products?

Automobiles	No of Respondents	Percentage
Near to Industrial Area	62	48.00%
Near to Market Area	10	8.00%
Near to Port	13	10.00%
Near to The City	19	14.00%
Near to Agriculture Area	0	0.00%
Out of The City	26	20.00%
Total	130	100%

Interpretation

The above table shows Near to Industrial area is best place for locate a warehouse 48persons told it out of 130 respondents. 20 percent of the persons told out of the city is best location for automobiles, 14 percent of the persons told Near to the city is best place, 10 percent of the persons told Near to Port is good place and 8 percent of the persons told Near to market area is best place for locate a automobile warehouse.

Inference

Majority of (48%) respondents are near to industrial area.

CHART 4.1.17:

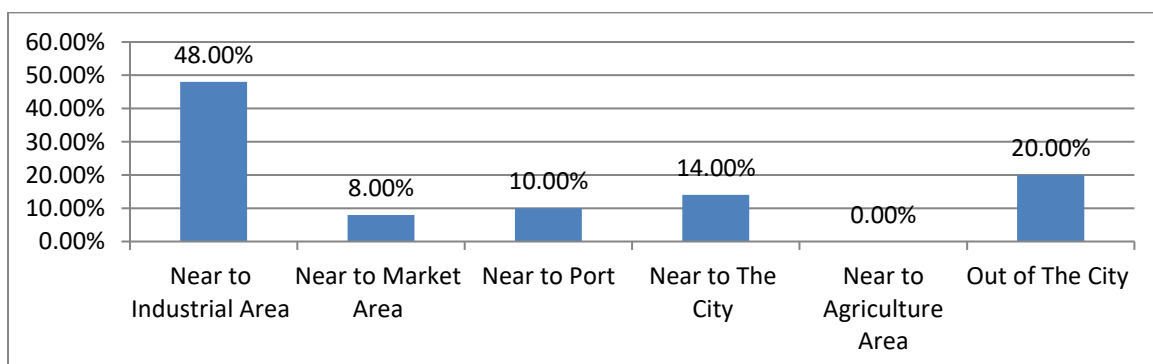


Table 4.1.18: Which type of warehouse is suitable for storing the Chemicals products?

Chemicals	No of Respondents	Percentage
Near to Industrial Area	10	8.00%
Near to Market Area	0	0.00%
Near to Port	5	4.00%
Near to The City	8	6.00%
Near to Agriculture Area	8	6.00%
Out of The City	99	76.00%
Total	130	100%

Interpretation

The above table shows the clear detail about chemical warehousing place. 76 percent of the persons told Out of the city is perfect location for Chemical warehouse, 8 percent of the persons told near to industrial area means its gives more useful, 4 percent of the persons told Near to Port is good one, 6 percent of the persons equal responds as Near to the city and near to agriculture area is good place for Chemical warehouse location.

Inference

Majority of (76%) respondents are out of city.

CHART 4.1.18:

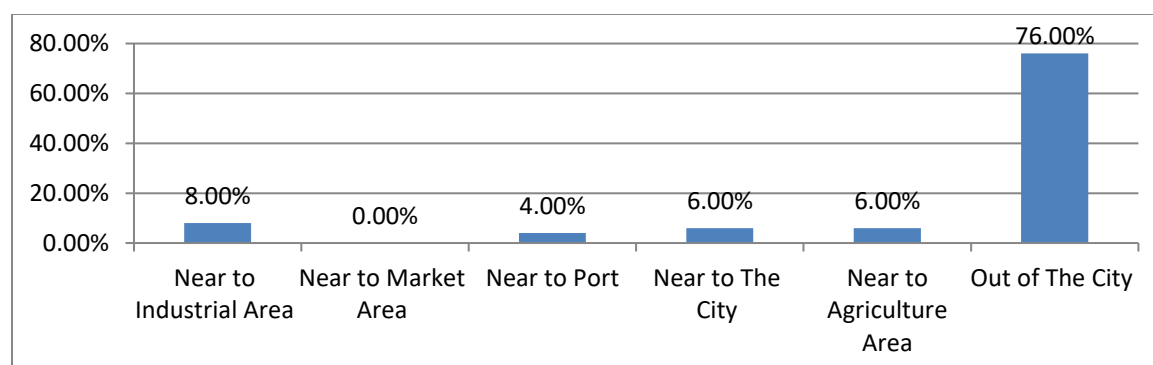


Table 4.1.19: Which type of warehouse is suitable for storing the other products?

Other Products	No of Respondents	Percentage
Near to Industrial Area	31	24.00%
Near to Market Area	8	6.00%
Near to Port	8	6.00%
Near to The City	8	6.00%
Near to Agriculture Area	13	10.00%
Out of The City	62	48.00%
Total	130	100%

Interpretation

The above table shows the clear detail about other product warehousing place rather than automobiles, electronics, FMCG, chemicals, agriculture products. 48 percent of the persons told Out of the city is perfect location for Other products warehouse, 24 percent of the persons told near to industrial area means its gives more useful, 10 percent of the persons told Near to agriculture area is good place for storing other products, 6 percent of the persons equal responds for Near to the city, near to market area and near to Port is good place for Other product storage.

Inference

Majority of (48%) respondents are out of city.

CHART 4.1.19:

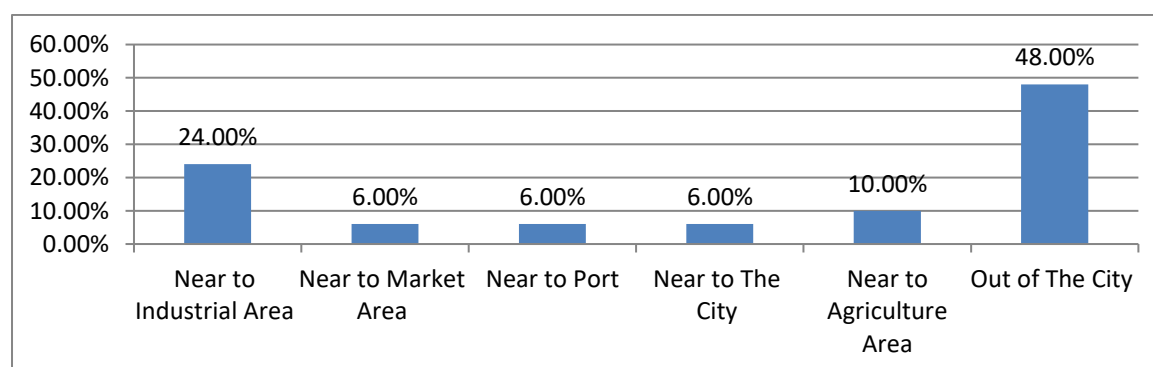


Table 4.1.20: Bottleneck of the Warehouse

Bottleneck	No of Respondents	Percentage
Transport	34	26.00%
Location	73	56.00%
Cost	23	18.00%
Total	130	100%

Interpretation

The above table shows the bottleneck of the warehouse, most of the respondents told location is the big problem of warehouse 56 percent of the persons agrees it. 26 percent of the persons told transportation and distribution is one of the problems of warehouse, 18 percent of the persons told Cost of the warehouse is only problem in warehouse they are told it.

Inference

Majority of (56%) respondents are location.

CHART 4.1.20:

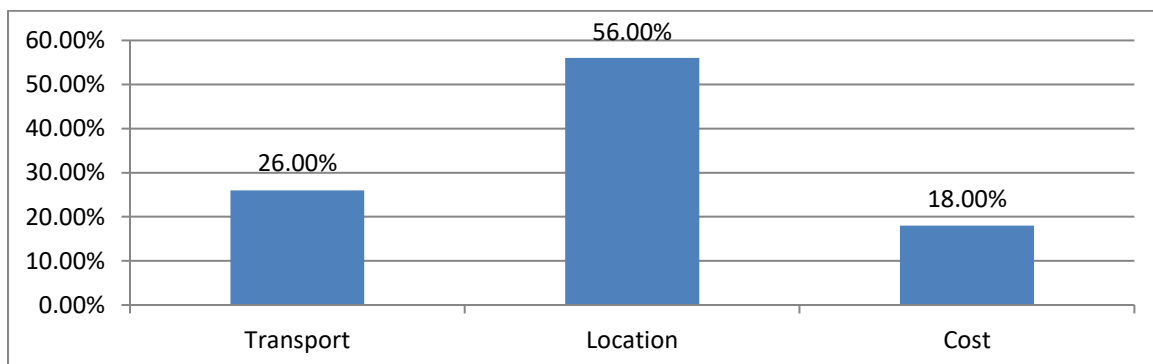


Table 4.1.21: Are you using cold storage warehouse?

Cold Storage	No of Respondents	Percentage
Yes	24	18.00%
No	106	82.00%
Total	130	100%

Interpretation

The above table shows the Cold storage warehouse client detail 82 percent of the persons told they are not using cold storage warehouse out of 130 respondents. 18 percent of the persons only told they are having cold storage warehouse.

Inference

Majority of (82%) respondents are near to agriculture area.

CHART 4.1.21:

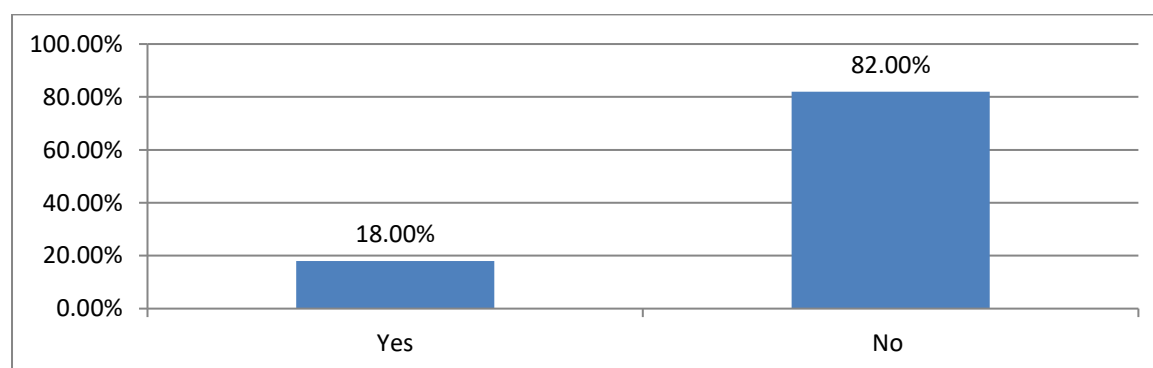


Table 4.1.22: Current Warehouse Location of Customers

Current Location	No of Respondents	Percentage
Near to Industrial Area	5	4.00%
Near to Market Area	23	18.00%
Near to Port	16	12.00%
Near to The City	8	6.00%
Near to Agriculture Area	5	4.00%
Out of The City	73	56.00%
Total	130	100%

Interpretation

The above table shows the customers current warehousing location detail. Most of the persons having warehouse out of the city 56 percent of the persons responds for it, 18 percent of the persons told Near to market area they are using their warehouse, 12 percent of the persons having their warehouse near to the port area, 6 percent of the persons told they are having warehouse Near to the city, 4 percent of the persons having warehouse near to industrial area as well as near to the agriculture area.

Inference

Majority of (18%) respondents are near to market area.

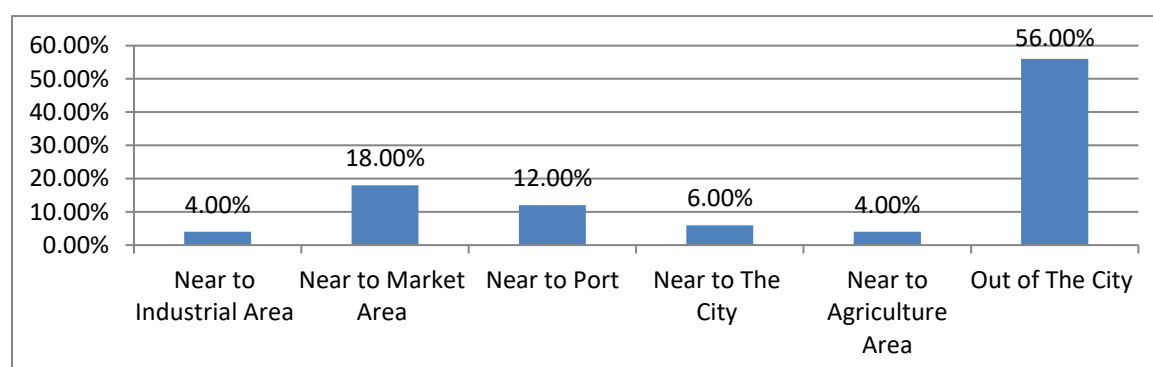
CHART 4.1.22:

Table 4.1.23: Which location is mostly preferred by you for warehousing?

Customer preferred	No of Respondents	Percentage
Urban	28	22.00%
Sub-Urban	94	72.00%
Rural	8	6.00%
Total	130	100%

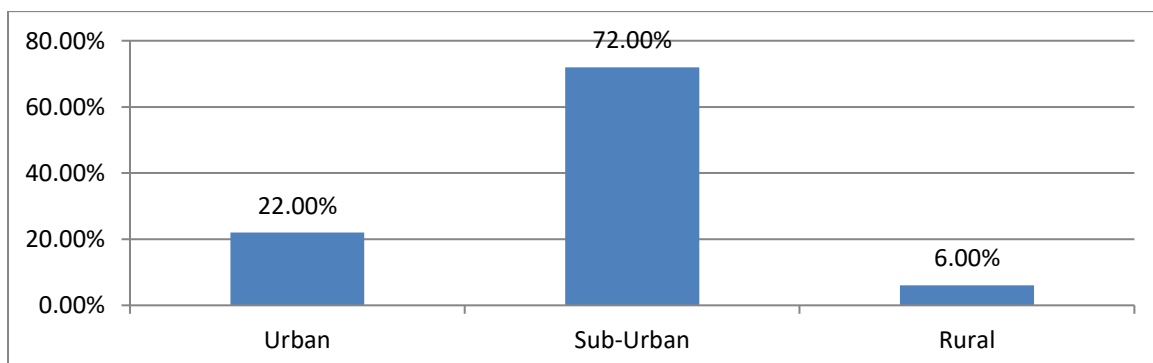
Interpretation

The above table shows the customers preferred warehouse location, most of the persons answered Sub-Urban is the best place for warehousing 72 percent of the persons told out of 130 respondents. 22 percent of the persons told urban area is better for warehouse and also 6 percent of the persons answered rural area is best place for warehousing.

Inference

Majority of (72%) respondents are sub-urban.

CHART 4.1.23:



4.2.CHI- SQUARE TEST

Chi-square is the sum of the squared difference observed (o) and the expected (e) data (or the deviation, d), divided by the expected data in all possible categories.

Null hypothesis (Ho):

There is a relationship between the Type of Warehouse and Type of Goods.

Alternate hypothesis (H1):

There is no relationship between the Type of Warehouse and Type of Goods.

Case Processing Summary

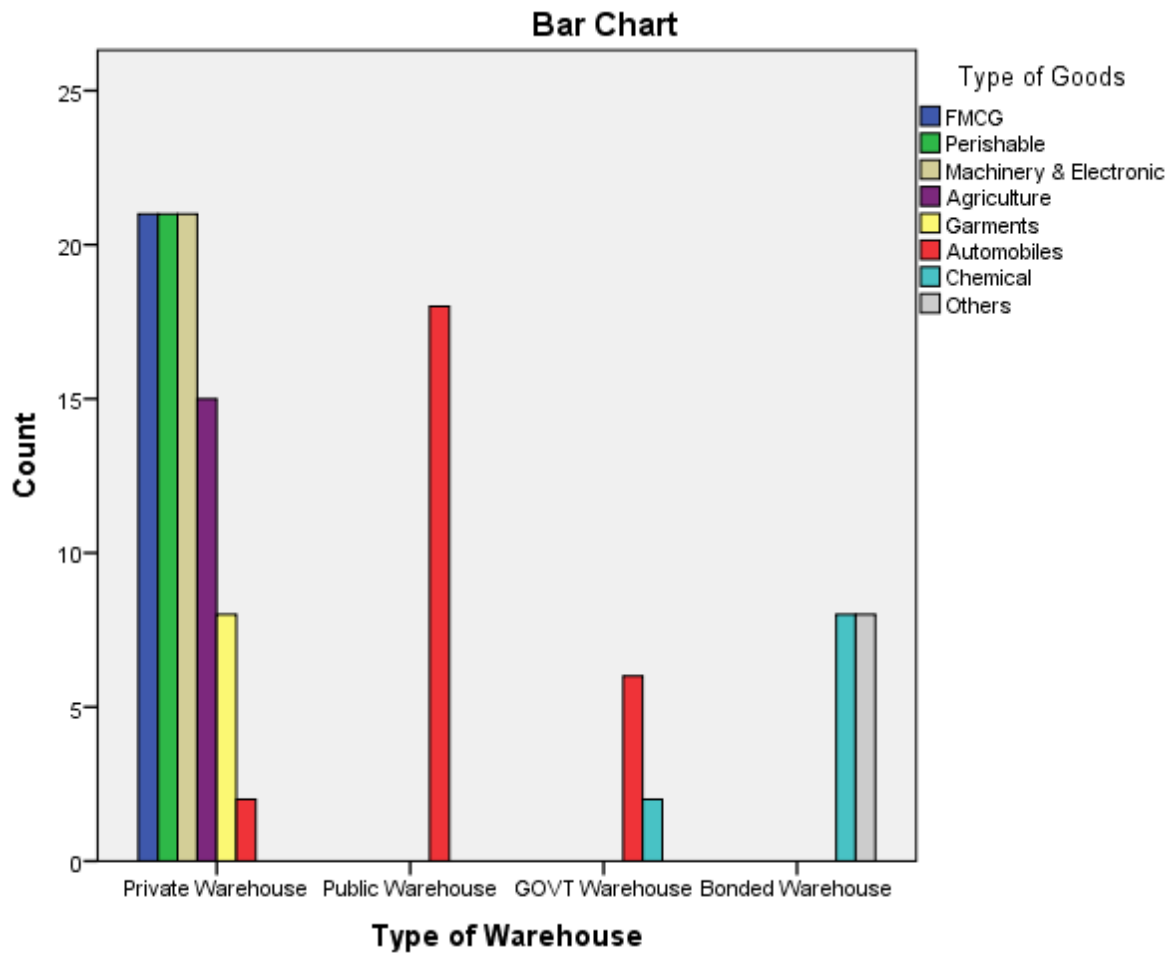
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Type of Warehouse * Type of Goods	130	100.0%	0	0.0%	130	100.0%

Type of Warehouse * Type of Goods Crosstabulation											
			Type of Goods								Total
			FMCG	Perishable	Machine ry & Electronic	Agriculture	Garments	Automobiles	Chemical	Others	
Type of Warehouse	Private Warehouse	Count	21	21	21	15	8	2	0	0	88
		% within Type of Warehouse	23.9%	23.9%	23.9%	17.0%	9.1%	2.3%	0.0%	0.0%	100.0%
		% within Type of Goods	100.0%	100.0%	100.0%	100.0%	100.0%	7.7%	0.0%	0.0%	67.7%
		% of Total	16.2%	16.2%	16.2%	11.5%	6.2%	1.5%	0.0%	0.0%	67.7%
	Public Warehouse	Count	0	0	0	0	0	18	0	0	18
		% within Type of Warehouse	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	100.0%
		% within Type of Goods	0.0%	0.0%	0.0%	0.0%	0.0%	69.2%	0.0%	0.0%	13.8%
		% of Total	0.0%	0.0%	0.0%	0.0%	0.0%	13.8%	0.0%	0.0%	13.8%
	GOVT Warehouse	Count	0	0	0	0	0	6	2	0	8
		% within Type of Warehouse	0.0%	0.0%	0.0%	0.0%	0.0%	75.0%	25.0%	0.0%	100.0%
		% within Type of Goods	0.0%	0.0%	0.0%	0.0%	0.0%	23.1%	20.0%	0.0%	6.2%
		% of Total	0.0%	0.0%	0.0%	0.0%	0.0%	4.6%	1.5%	0.0%	6.2%
	Bonded Warehouse	Count	0	0	0	0	0	0	8	8	16
		% within Type of Warehouse	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	50.0%	50.0%	100.0%
		% within Type of Goods	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	80.0%	100.0%	12.3%
		% of Total	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	6.2%	6.2%	12.3%
Total		Count	21	21	21	15	8	26	10	8	130
		% within Type of Warehouse	16.2%	16.2%	16.2%	11.5%	6.2%	20.0%	7.7%	6.2%	100.0%
		% within Type of Goods	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	16.2%	16.2%	16.2%	11.5%	6.2%	20.0%	7.7%	6.2%	100.0%

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	233.273 ^a	21	.000
Likelihood Ratio	200.398	21	.000
Linear-by-Linear Association	85.480	1	.000
N of Valid Cases	130		

- a. 24 cells (75.0%) have expected count less than 5. The minimum expected count is .49.



Degree of Freedom= $(r-1) * (c-1)$

$$= 3 * 7 = 21$$

Calculated value = 233.273

Tabulated value = 32.671

$Z = Z_{cal} > Z_{tab}$

$$Z = 233.273 > 32.671$$

Hence, the Alternate hypothesis $[H_1]$ is accepted

INFERENCE:

Since the calculated value is greater than the tabulated value, we accept the alternate hypothesis and hence there is a relationship between the Type of Warehouse and Type of Goods.

4.3.ONE-WAY ANOVA CLASSIFICATION

Null hypothesis (Ho):

There is a significance difference between the location is the most important factor of Warehouse and Choice of Location according To the Customer.

Alternate hypothesis (H1):

There is no significance difference between the location is the most important factor of Warehouse and Choice of Location according To the Customer.

Descriptives

location is the most important factor of Warehouse

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Near to Industrial Area	18	1.00	.000	.000	1.00	1.00	1	1
Near to Market Area	36	1.00	.000	.000	1.00	1.00	1	1
Near to Port	23	1.00	.000	.000	1.00	1.00	1	1
Near to The City	11	1.00	.000	.000	1.00	1.00	1	1
Out of The City	42	1.81	.397	.061	1.69	1.93	1	2
Total	130	1.26	.441	.039	1.18	1.34	1	2

Test of Homogeneity of Variances

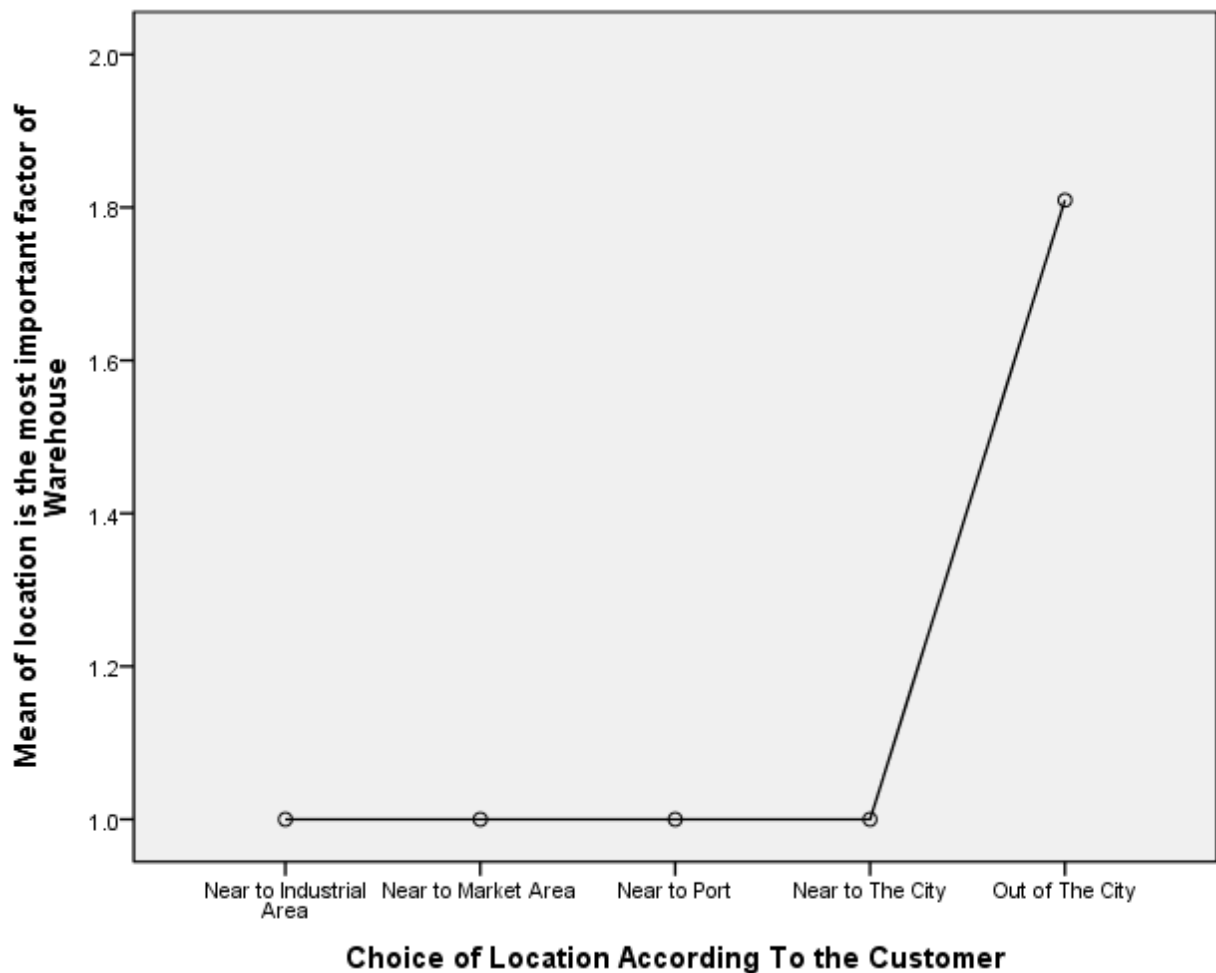
location is the most important factor of Warehouse

Levene Statistic	df1	df2	Sig.
34.046	4	125	.000

ANOVA

location is the most important factor of Warehouse

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	18.632	4	4.658	89.904	.000
Within Groups	6.476	125	.052		
Total	25.108	129			



Calculated value = 89.904

Tabulated value = 2.46

F = F cal > F tab F=89.904 > 2.46

Hence, the Alternate hypothesis [H1] is accepted.

INFERENCE:

The calculated value of F is greater than the tabulated value. Hence, we reject the null hypothesis and conclude that there is no significance difference between the location is the most important factor of Warehouse and Choice of Location according To the Customer.

4.4. KARL PEARSON'S CORRELATION

Correlation analysis is the statistical tool used to measure the degree to which two variables are linearly related to each other. Correlation measures the degree of association between two variables.

Null hypothesis (H0):

There is positive relationship between the Important Feature and Transportation Infrastructure Rate.

Alternate hypothesis (H1):

There is negative relationship between the Important Feature and Transportation Infrastructure Rate.

Correlations		Important Feature	Transportation Infrastructure Rate
Important Feature	Pearson Correlation	1	.900**
	Sig. (2-tailed)		.000
	N	130	130
Transportation Infrastructure Rate	Pearson Correlation	.900**	1
	Sig. (2-tailed)	.000	
	N	130	130

**. Correlation is significant at the 0.01 level (2-tailed).

$$r = \frac{N\sum XY - \sum X \sum Y}{\sqrt{N\sum X^2 - (\sum X)^2} \sqrt{N\sum Y^2 - (\sum Y)^2}}$$

r= .900

INFERENCE:

Since r is positive, there is positive relationship between the Important Feature and Transportation Infrastructure Rate.

4.5. WEIGHTED AVERAGE METHOD

Which type of warehouse is suitable for storing the perishable products?

PERISHABLE	NO.OF RESPONDENTS(X)	WEIGHT (W)	WEIGHTED MEAN (WX)
Near to Industrial Area	10	6	60
Near to Market Area	94	5	470
Near to Port	13	4	52
Near to the City	8	3	24
Near to Agriculture Area	0	2	0
Out of the City	5	1	5
TOTAL	130		611

Weighted average method

$$\text{WEIGHTED MEAN} = \frac{\sum (WX)}{\sum W}$$

$$= \frac{611}{130}$$

$$= 4.7 \text{ (Average =5)}$$

Inference:

Most of the respondent opinion on the perishable goods warehouse location is near to market area

Which type of warehouse is suitable for storing the agriculture products?

ARGRICULTURE	NO.OF RESPONDENTS	WEIGHT (W)	WEIGHTED MEAN (WX)
Near to Industrial Area	0	6	0
Near to Market Area	5	5	25
Near to Port	5	4	20
Near to the City	31	3	93
Near to Agriculture Area	84	2	168
Out of the City	5	1	5
TOTAL	130		311

Weighted average method

$$\text{WEIGHTED MEAN} = \frac{\sum (WX)}{\sum W}$$

$$= \frac{311}{130}$$

$$= 2.4 \text{ (Average =2)}$$

Inference:

Most of the respondent opinion on the perishable goods warehouse location is near to the city area.

Which type of warehouse is suitable for storing the Garments products?

GARMENTS	NO.OF RESPONDENTS	WEIGHT (W)	WEIGHTED MEAN (WX)
Near to Industrial Area	3	6	18
Near to Market Area	16	5	80
Near to Port	42	4	168
Near to the City	49	3	147
Near to Agriculture Area	5	2	10
Out of the City	15	1	15
TOTAL	130		438

Weighted average method

$$\text{WEIGHTED MEAN} = \frac{\sum (WX)}{\sum W}$$

$$= \frac{438}{130}$$

$$= 3.4 \text{ (Average =3)}$$

Inference:

Most of the respondent opinion on the perishable goods warehouse location is near to the city area.

5.1 FINDINGS OF THE STUDY

- Most of the customers having experience 3 to 5 years and 36 percent of customer having excellent knowledge 3 to 5 years in the warehousing field
- Many type of warehouse are giving excellent service to the customer but many of the clients using private warehouse.
- Automobile products are mostly handling by customers and also FMCG, perishable goods, machinery and electronic goods handling by some of the clients. Those goods are always used in market frequently.
- Around 130 percent of people said location is the important factor of the warehousing and thereafter some customers said warehousing infrastructure and transportation is also important
- 15-30 minutes is the best transportation duration from the warehouse to the customer place most of respondents said it and also 130 percent of respondent expect this. The second thing is 30minutes to 1hour is also best time to reach the customer place from warehouse said by some of the respondents.
- Most of the customer said their current warehouse facility is very good and some of the respondent told Good.
- 75 percent of customer accepted warehousing location is important in warehousing industry they are directly said.
- According to customer mention warehouse will place Out of the City is give more efficient and profitable most of the customers said it and some of the respondents told Near to market area is give more profitable.
- Most of the respondents accept the climate that provided by the warehouse is suitable their products
- Transportation infrastructure of the current warehouse service rate is very good said by many of respondents and some of them told good.
- 60 percent of warehouse does not have IT facility and 40 percent of customer told we are using the basic IT facility only.
- Most of the respondents said Near to Market area is the best conventional place for locate the FMCG product storage warehouse.
- 50 percent of the customer said Near to Market area is best place for locate the Perishable product storage warehouse.

- Near to Industrial area is the conventional place for locate the automobile product storage warehouse location 130 percent of customer expect it.
- Out of the City is the best place for the Chemical products storage warehousing location said by many of the respondents.
- The warehousing location will change about the product and customer said by many of respondents. They told if agriculture product means near to the agriculture area is the best place for this goods storage likewise the warehousing location will change.
- The most of the customers said location is the biggest problem of warehousing industry thereafter customer told transportation and cost is one of the problem in warehouse.
- 82 percent of people dose not using cold storage warehouse and 18 percent of the customer only using this type of warehouse.
- The customer's current warehousing location is located Out of the City only. 60percent of people accept it and they said Out of the city is the best place for warehousing
- Most of the customers preferred location is Sub-Urban area, it mean out of the city they are agree to this is place for locate the warehouse 72 percent of people said it.

5.2 SUGGESTIONS

- Private warehouse is mostly used by customers therefore the private warehouse will increase their service which will enhance their services and can achieve more profitability.
- All the customers expect the warehouse is placed near to the reachable location to reach the customer place within 30minutes to 1 hour. So company can locate around the industry, market and customer's place.
- Advance IT facility helps to warehouse to simplify the works and minimize the damage. If the warehouse can develop the IT facility its will help to get a more gain and get a customer satisfaction. The company can improve the fleet management and set the GPS to the transports and use the WMS, RFID to save the manpower and minimize the work of warehouse.
- The warehousing location will change about the products and customers. So while locate the warehouse the company consider the products and customers expectation.
- Out of the City is the best place to locate an ideal warehouse. While chose a new warehouse the company will focus those problem locations of the warehouse, transportation facility, warehouse infrastructure, labor availability, cost of the warehouse rent. Sub-urban is the best place most of customers preferred to locate an ideal warehouse.

5.3 LIMITATIONS OF THE STUDY

- ✓ This study is about overall warehousing location issues but the data is collected within Chennai and sub urban areas only.
- ✓ The time period of the study was not enough (3 months).
- ✓ This warehouse location study faced two problem one warehousing cost and transportation cost. If we are reducing warehouse location cost transportation cost will increase else, we are reducing transportation cost warehouse location cost will increase. Transportation cost is variable but warehouse location cost is standard. So, it's only based on warehousing location.

5.4 CONCLUSION

Warehousing is the part of supply chain and its requirement is must need for each and every day, warehouse is used instead of manufacturing. A warehouse is an important linkage in the supply chain flow. The warehouse location is must be near the high ways, market areas, near to the port and airport. And warehouse place is requiring availability of manpower, electricity, warehouse space, safety and security. The considerations of warehouse site selection revolve around four major factors as location, infrastructure, access, availability, market. However transportation cost, which is a major element in logistic, it depends on the location of the warehouse. Locations of the warehouse depend on the products and customers. So company can consider location of because warehouse location cost is standard and other costs are variable like transportation cost.

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BIBLIOGRAPHY:

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WEB SITES:

www.supplychainbrain.com

www.siteselection.com

www.warehousein.in

www.scribd.com

QUESTIONNAIRE

1) Name of the person.....

2) Name of the warehouse with place.....

3) Experience in this field

☐ <1yrs ☐ 1-3yrs ☐ 3-5yrs ☐ 5-10yrs ☐ 10<

4) Which type of warehouse are you using now

☐ Private warehouse ☐ Public warehouse ☐ GOVT warehouse ☐ Bonded warehouse

5) Which type of goods are you storing in the warehouse?

☐ FMCG ☐ Perishable goods ☐ Machinery & electronic goods ☐ Agriculture product ☐ Garments product ☐ Auto mobiles ☐ Chemical products ☐ others

6) What is the most important feature which you look while approaching Warehouse?

☐ Location ☐ Infrastructure ☐ Transport Facility ☐ Offers ☐ Cost ☐ Others

7) What is the time taken by the goods to reach the customers from warehouse?

☐ 0-15minutes ☐ 15-30minutes ☐ 30minutes- 1hour ☐ Above 1 Hour

8) How do you rate basic facility provided by the warehouse like a transport, man power, electricity, safety, etc.?

☐ Excellent ☐ Very good ☐ Good ☐ Average ☐ Poor

9) Do you think location is the most important factor of Warehouse?

☐ Yes ☐ No

10) According to you mention the choice of location of the warehouse so that is efficient and profitable

☐ Near to Industrial Area ☐ Near to Market Area ☐ Near to Port ☐ Near to the City ☐ Near to Agriculture Area ☐ Out of the City

11) Is the climate provided in the warehouse is suitable for your product?

☐ Yes ☐ No

12) How do you rate the transportation infrastructure which is provided by the warehouse?

☐ Excellent ☐ Very good ☐ Good ☐ Average ☐ Poor

13) Does the warehouse provide advance IT facilities like a RFID, GPS?

☐ Yes ☐ No

14) Which type of warehouse is suitable for storing the following products?

Location / Product	Near to Industrial Area	Near to Market Area	Near to Port	Near to the City	Near to Agriculture Area	Out of the City
FMCG						
Perishable goods						
Machinery & electronic goods						
Agriculture product						
Garments product						
Auto mobiles						
Chemical products						
Others						

15) What type of bottleneck do you face in the Warehouse?

☐ Transport ☐ Location ☐ Cost

16) Are you using cold storage warehouse?

☐ Yes ☐ No

17) Where is your product stored and the location of your current warehouse?

☐ Near to Industrial Area ☐ Near to Market Area ☐ Near to Port ☐ Near to the City ☐ Near to Agriculture Area ☐ Out of the City

18) Which location is mostly preferred by you for warehousing?

☐ Urban ☐ Sub urban ☐ Rural

RESEACH ARTICLE

A STUDY ON WAREHOUSE MANAGEMENT AT LOGISTICS COMPANY.

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ABSTRACT

One of the most important areas in supply chain is the warehouse management. The main objectives are to study the Warehouse management. Secondary objectives are to identify the issues in the location of warehouse and its impact of customer service, find out the factors influencing ideal warehouse location, analyze which location is suitable for various goods like FMCG, perishable goods, machinery & electronic goods, agriculture products, garments products, Auto mobiles products, chemical products and identify which place is the convenient place of warehouse to use both distribution and storage of goods.

INTRODUCTION

A Warehouses are used by manufactures, importers, exporters, wholesalers, transport businesses, customs, etc. They are usually large plain buildings in industrial areas of cities and towns and villages. They usually have loading docks to load and unload goods from trucks. Sometimes warehouses are designed for the loading and unloading of goods directly from railways, airports or seaways. They often have cranes and forklifts for moving goods, which are usually placed on ISO standard pallets loaded into pallet racks. Stored goods can include any raw materials, packing materials, spare parts, components, or finished goods associated with agriculture, manufacturing, or commerce.

REVIEW OF LITERATURE

Ashutosh Verma (2023) Warehouse management is the key aspect for an uninterrupted flow of products within a supply chain. This paper deals with the critical factors that are responsible for creating an impactful influence on the working of warehouse management. The analysis involves the selection of critical factors then applying Interpretive Structural Modelling (ISM) methodology to them in order to get the level partition and final ISM model. This research also involves the MICMAC analysis on the factors which classifies all the selected factors into four groups namely, autonomous variables, dependent variables, linkage variables and driver variables. This research will help the supply chain architects to establish a better and reliable warehouse system. As this research involves analysis of multiple domains that is why a variety of users can refer to this work for their businesses, also the ISM approach gives a good accuracy of the hierarchy of the factors which helps in deciding the most effective chronology of the implementation of various warehousing operations. Researchers can also refer to this work to get insights of the significance of warehouse management in the supply chain and also the complete working of the ISM methodology.

Pablo Becerra (2021) This paper provides a systematic and up-to-date review and classification of 91 studies on quantitative methods of green supply chains for sustainable warehouse management. It particularly identifies the main study areas, findings and quantitative models by setting a point for future research opportunities in sustainable warehouse management. It seeks to review the quantitative methods that can better contribute to deal with the environmental impact challenge.

Natalia Burganova, Patrik Grznar (2021) Warehouse management and internal logistics planning and control are growing in importance. Nowadays, many methods have been developed in the areas of warehouse management and internal logistics planning and control. Internal logistics is essential in creating value and maximizing profits by streamlining internal logistics tasks. As a key indicator of logistic processes, efficiently is set transport time. The article deals with the possibilities of improving logistics and warehousing using available methods with the smallest possible input capital and decreasing transport time. In the first part, the warehouse is reorganized, and

lean methods such as Kanban and Milk run are set. The presented design is applied to the newly created hall. The result is improved processes and shorter transport times for material at the workplace and, ultimately, faster delivery of the finished product to the market and customer satisfaction. Scientific and more important for this study professional benefits consist in the application of mentioned methods.

Deepesh Singh, Ajay Verma (2018) in their research, The Purpose of this paper is to overview the warehouse management in supply chain and their current warehouse related issue in a present-day business and present a conceptual methodology for related issue. The methodology based on the warehouse, which are inputs for the methodology and benefits which are output of methodology.

Syafrial Fachri Pane (2018) Logistic sector actors need innovation to improve competitiveness in providing their best services to consumers, one of them on Warehouse Management System (WMS) because the system is used to control the movement of the supply chain. There is a problem in one of Indonesia logistics companies on the process of selecting goods, so the warehouseman still difficulties in this process. Thus, RFID implementation on WMS becomes one of the solutions to handle the goods selection process. This research uses Design Science Research Methodology (DSRM) which focuses on developing and improving the model performance of a system and using waterfall model for system development. Then the authors will analyze the test results with the validity test and reliability test of the questionnaire, and the results of the data analysis will determine the feasibility of this research to be applied.

NEED FOR THE STUDY

- ✓ The purpose of the study is to understand the various location factors which the customer will look in DHL Supply Chain India.
- ✓ To understand the issues which arise in location of warehouse and to analyze the overall impact in customer services
- ✓ To find the features of an ideal warehouses viz., distribution warehouse and storage warehouse
- ✓ To ensure continues production as well as dispatching the product of manufacturing industry should require the location of warehouse.

OBJECTIVES OF THE STUDY

Primary Objectives

- To study the Warehouse management with special reference to DHL Supply Chain India.

Secondary Objectives

- To identify the issues in the location of warehouse and its impact of customer service
- To find out the factors influencing ideal warehouse location.
- To analyses which location is suitable for various goods like FMCG, perishable goods, machinery & electronic goods, agriculture products, garments products, Auto mobiles products, chemical products
- To identify which place is the convenient place of warehouse to use both distribution and storage of goods.
- To provide valuable suggestions to the organization based on the study.

METHODOLOGY

The methodology is the general research strategy that outlines the way in which research is to be undertaken and, among other things, identifies the methods to be used in it. These methods, described in the methodology, define the means or modes of data collection or, sometimes, how a specific result is to be calculated. Methodology does not define specific methods, even though much attention is given to the nature and kinds of processes to be followed in a particular procedure or to attain an objective.

RESEARCH DESIGN

Research design refers to the overall strategy utilized to carry out research that defines a succinct and logical plan to tackle established research question(s) through the collection, interpretation, analysis, and discussion of data. The type of design chosen for this study is descriptive research.

CHI- SQUARE TEST I – (ψ^2)

Chi-square is the sum of the squared difference observed (o) and the expected (e) data (or the deviation, d), divided by the expected data in all possible categories.

Null hypothesis (H₀):

There is a relationship between the Type of Warehouse and Type of Goods.

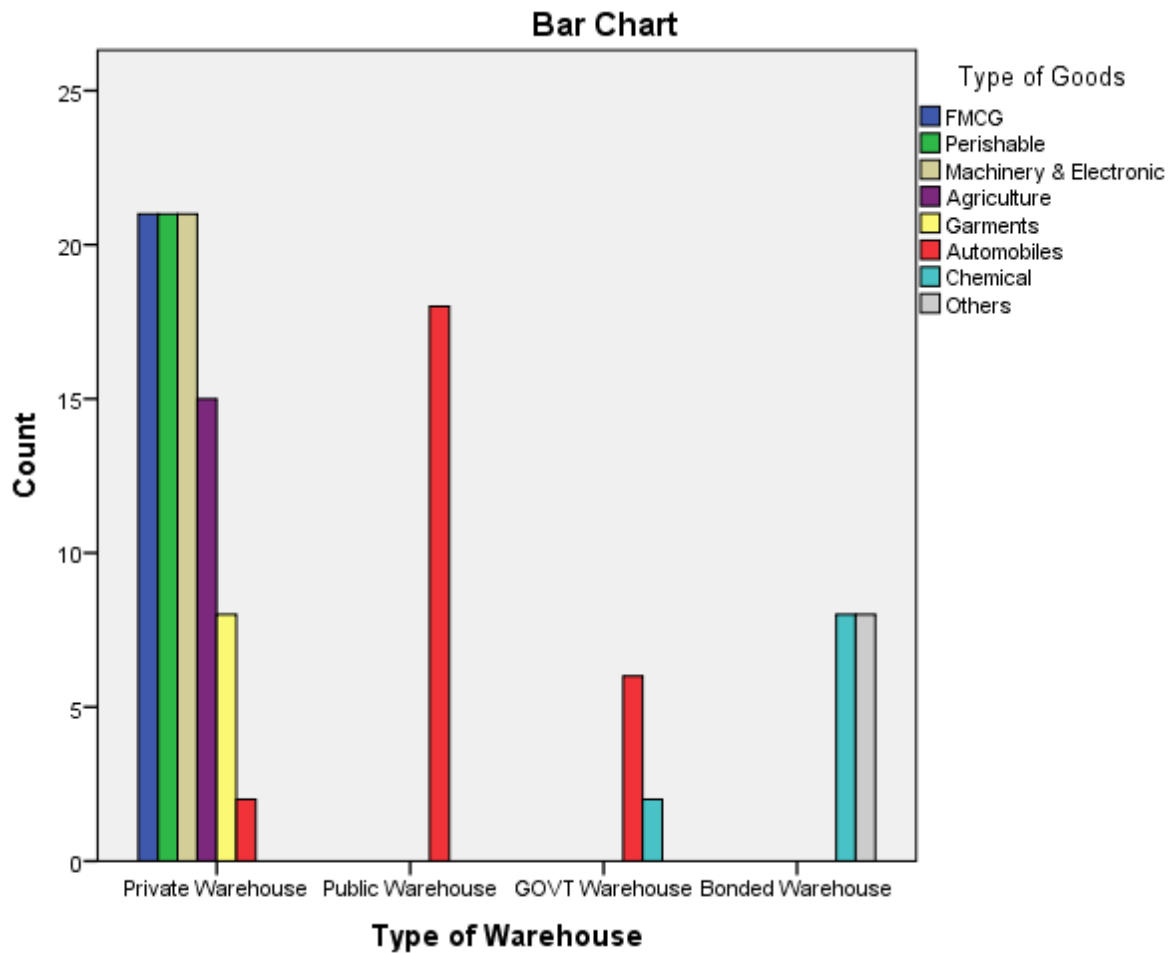
Alternate hypothesis (H₁):

There is no relationship between the Type of Warehouse and Type of Goods.

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	233.273 ^a	21	.000
Likelihood Ratio	200.398	21	.000
Linear-by-Linear Association	85.480	1	.000
N of Valid Cases	130		

- b. 24 cells (75.0%) have expected count less than 5. The minimum expected count is .49.



$$\text{Degree of Freedom} = (r-1) * (c-1)$$

$$= 3 * 7 = 21$$

Calculated value = 233.273

Tabulated value = 32.671

$Z = Z_{cal} > Z_{tab}$

$Z = 233.273 > 32.671$

Hence, the Alternate hypothesis [H1] is accepted

INFERENCE:

Since the calculated value is greater than the tabulated value, we accept the alternate hypothesis and hence there is a relationship between the Type of Warehouse and Type of Goods.

FINDINGS OF THE STUDY

- Most of the customers having experience 3 to 5 years and 36 percent of customer having excellent knowledge 3 to 5 years in the warehousing field
- Many types of warehouses are giving excellent service to the customer but many of the clients using private warehouse.
- Automobile products are mostly handling by customers and also FMCG, perishable goods, machinery and electronic goods handling by some of the clients. Those goods are always used in market frequently.

- Around 130 percent of people said location is the important factor of the warehousing and thereafter some customers said warehousing infrastructure and transportation is also important
- 15-30 minutes is the best transportation duration from the warehouse to the customer place most of respondents said it and also 130 percent of respondent expect this. The second thing is 30minutes to 1hour is also best time to reach the customer place from warehouse said by some of the respondents.
- Most of the customer said their current warehouse facility is very good and some of the respondent told Good.
- 75 percent of customer accepted warehousing location is important in warehousing industry they are directly said.
- According to customer mention warehouse will place Out of the City is give more efficient and profitable most of the customers said it and some of the respondents told Near to market area is give more profitable.
- Most of the respondents accept the climate that provided by the warehouse is suitable their products
- Transportation infrastructure of the current warehouse service rate is very good said by many of respondents and some of them told good.
- 60 percent of warehouse does not have IT facility and 40 percent of customer told we are using the basic IT facility only.
- Most of the respondents said Near to Market area is the best conventional place for locate the FMCG product storage warehouse.
- 50 percent of the customer said Near to Market area is best place for locate the Perishable product storage warehouse.
- Near to Industrial area is the conventional place for locate the automobile product storage warehouse location 130 percent of customer expect it.
- Out of the City is the best place for the Chemical products storage warehousing location said by many of the respondents.
- The warehousing location will change about the product and customer said by many of respondents. They told if agriculture product means near to the agriculture area is the best place for this goods storage likewise the warehousing location will change.
- The most of the customer's said location is the biggest problem of warehousing industry thereafter customer told transportation and cost is one of the problems in warehouse.
- 82 percent of people dose not using cold storage warehouse and 18 percent of the customer only using this type of warehouse.
- The customer's current warehousing location is located Out of the City only. 60percent of people accept it and they said Out of the city is the best place for warehousing
- Most of the customer's preferred location is Sub-Urban area, it means out of the city they are agree to this is place for locate the warehouse 72 percent of people said it.

CONCLUSION

Warehousing is the part of supply chain and its requirement is must need for each and every day, warehouse is used instead of manufacturing. A warehouse is an important linkage in the supply chain flow. The warehouse location is must be near the high ways, market areas, near to the port and airport. And warehouse place is requiring availability of manpower, electricity, warehouse space, safety and security. The considerations of warehouse site selection revolve around four major factors as location, infrastructure, access, availability, market. However, transportation cost, which is a major element in logistic, it depends on the location of the warehouse. Locations of the warehouse depend on the products and customers. So, company can consider location of because warehouse location cost is standard and other costs are variable like transportation cost.

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