

A STUDY ON ANALYSIS OF COST FACTORS TOWARDS LOGISTICS IN Q2Q SOLUTIONS

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)**

**Accredited with Grade "A" by NAAC | 12B Status by UGC | Approved by AICTE
JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119**

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **KARAN VENKATESH.S 41410161** who carried out the project entitled "**A Study on Analysis of Cost Factors towards Logistics in Q2Q Solutions**" under my supervision from January 2023 to April 2023.

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DECLARATION

I **KARAN VENKATESH.S (41410161)** hereby declare that the Project Report entitled “**A Study on Analysis of Cost Factors towards Logistics in Q2Q Solutions**” done by me under the guidance of **Dr.A.S.PRINCY** is submitted in partial fulfillment of the requirements for the award of Master of Business Administration degree.

DATE:06/05/2023

PLACE:Chennai

A handwritten signature in black ink, appearing to read 'Karan Venkatesh.S', with a stylized flourish at the end.

KARAN VENKATESH.S

ACKNOWLEDGEMENT

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ABSTRACT

A vital component of warehouse management is logistics cost analysis, which helps companies to streamline their logistics processes and cut expenses related to warehousing. An introduction of logistics cost analysis for warehouse management is given in this abstract, along with information on the various expenses involved, cost analysis techniques, and the advantages of cost analysis for enterprises. Rent, utilities, labor, maintenance and repairs, insurance, as well as technology and equipment, can all be included in warehouse expenses. Businesses can find chances to save costs by optimizing warehouse structure and design, automating operations, managing inventory, and other tactics by performing a complete cost analysis. Businesses may gain a competitive edge in the market, better profitability, and more customer satisfaction by using logistics cost analysis. The study focuses on logistics warehouse maintenance, which is an important part of effective supply chain management. The goal of this research is to look at existing warehouse maintenance practises and identify the issues that logistics businesses face when it comes to warehouse maintenance. The study uses a mixed-method research strategy that combines quantitative and qualitative methodologies. An online poll and in-depth interviews with industry experts were used to obtain data from logistics businesses. The descriptive statistics were used to analyse the survey findings, while thematic analysis was used to analyse the interview data. According to the study's findings, logistics businesses confront a variety of issues in managing their warehouses, including high maintenance expenses, equipment malfunctions, and personnel turnover.

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CHAPTER 1

INTRODUCTION

1.1. INTRODUCTION:

The success of an organisation depends heavily on its ability to maximise profit in a highly competitive marketplace. Any expense made by a company to manage its logistics is referred to as a logistical cost. Logistics cost analysis is a critical process for businesses that need to optimize their supply chain operations and control expenses.

The logistics sector is a vital part of the world economy because it makes it easier for commodities to be transported from producers to retailers and consumers. Warehouse management, which comprises the storage and movement of items inside a warehouse facility, is a crucial component of logistics management. In order to fulfil client demand while keeping expenses to a minimum, warehouse management is crucial for businesses to guarantee that items are kept and moved in a safe and effective manner. Logistics costs, which might include costs for rent, labour, utilities, and equipment, are one of the major expenses linked to warehouse management. Businesses need to regularly perform logistics cost analysis to make sure that warehouse operations are both affordable and effective.

Costs associated with planning, carrying out, and managing the transportation of commodities from the place of origin to the site of consumption are referred to as logistics costs. These expenses relate to the movement and storage of products, and include transportation costs, warehousing and storage costs, packing costs, handling and order processing costs, customs fees, insurance costs, and other related costs.

Businesses usually include transportation costs, inventory holding costs, warehousing and storage costs, packaging costs, handling and order processing costs, customs taxes, insurance costs, and other expenditures while doing this study. Then, in order to find potential overspending areas and places where expenses may be cut, they compare their costs to industry benchmarks.

1.2. INDUSTRY PROFILE

The aerospace industry is a high-technology industry that involves the design, development, and manufacturing of aircraft, spacecraft, satellites, and related systems and equipment. This sector is international in scope, with businesses spread across several nations.

High levels of R&D spending, cutting-edge technology, and intricate supply chains define the aerospace business. Boeing, Airbus, Lockheed Martin, Northrop Grumman, and Raytheon Technologies are just a few of the major participants in the aerospace sector.

Commercial aviation, military aviation, space systems, and unmanned aerial vehicles (UAVs) are among the segments that make up the aerospace business. Military aviation concentrates on the design and manufacture of aircraft and equipment for military use, whereas commercial aviation involves the construction of passenger and freight aircraft for commercial purposes. Spacecraft, launch vehicles, and other equipment required for space exploration and study are all included in the design and development of space systems. Unmanned aerial vehicles, or UAVs, commonly referred to as drones, are employed for a range of tasks like delivery, reconnaissance, and surveillance.

Due to rising demand for air travel as well as an increase in the need for defense and security-related items, the aerospace sector has experienced substantial expansion in recent years. Increased demand for aerospace parts and components as a result of this rise has sparked manufacturing process innovation.

To increase the effectiveness and precision of their manufacturing processes, aerospace component makers are investing in cutting-edge technologies like additive manufacturing (3D printing). Additionally, they are using cutting-edge materials and design strategies to boost strength, decrease weight, and increase fuel economy.

Overall, the creation of safe, dependable, and cutting-edge aircraft vehicles is made possible by the aerospace components manufacturing sector, which is

essential to the aerospace industry. The industry's continued growth and evolution will depend on its ability to adapt to new technologies, regulations, and market trends.

1.3. COMPANY PROFILE



Q2Q Solutions Private Limited is a Non-government company, established on July 28, 2010. It's a private unlisted company and is classified as 'company limited by shares'.

It is a precision engineering company located in MEPZ Special Economic Zone in Chennai, India. The company specializes in precision machining, design, sheet-metal fabrication and assembly testing for aerospace and allied industries.

In addition to having a thorough awareness of the FAA and EASA certification requirements that regulate the design of aircraft and aircraft subsystems, Q2Q Solutions also has a thorough understanding of client expectations, particularly with regard to quality and design.

They are well-versed in all engineering tools used and are incredibly knowledgeable of the key design considerations in this industry, such as cost, weight reduction, aesthetics, and ease of maintenance.

The company's authorized capital is Rs 500.0 lakhs, and its paid-up capital is 80.0% of that amount, or Rs 400.0 lakhs. On September 30, 2017, Q2Q Solutions Private Limited had its most recent annual general meeting (AGM). According to the Ministry of Corporate Affairs, the company last updated its financial information on March 31, 2017. (MCA).

1.4. PRODUCT PROFILE

Q2Q Solutions has an excellent understanding not only of the certification standards (FAA and EASA) governing aircraft and aircraft sub-systems design but also of customer expectations, particularly from a quality and design perspective.

They are extremely aware of the essential design factors in this business, including cost, weight reduction, aesthetics, and simplicity of maintenance, and are well-versed in all engineering tools that are employed.

Engineering Services:

Full project life cycle management is provided by Q2Q Solutions, who also have a dedicated floor with room for 250 employees. They offer quick turnaround solutions with centralised design, production, and quality services. They feature internal rapid turn capabilities to guarantee product quality and a smooth transition from prototype to production.

Manufacturing:

With Q2Q Solutions, you get a devoted centre of excellence with a team of manufacturing engineers who are skilled and experienced enough to offer end-to-end solutions throughout the whole manufacturing lifecycle with a focus on quality and on-time delivery.

Their engineering teams are highly skilled at providing process planning, NC programming and quality assistance, cost-out analysis, and numerous other outcome-based solutions. World-class manufacturing systems, cutting-edge tool technology, lean manufacturing, and tried-and-true CAM software for NC programming are used to achieve this.

Metrology:

At Q2Q Solutions, we offer thorough measuring system solutions with knowledge of GD&T to ensure total quality control of the product. High accuracy metrology tools and a capable crew are used to achieve this. Their comprehensive adherence to a broad range of international standards ensures product conformity.

Assembly & Testing:

Their capacity to manufacture and test products for a wide range of industries, including medical, telecommunications, and alternative energy, is one of the main priorities at Q2Q Solutions. They take special pleasure in utilising our global footprint for strategic supply chain management to address challenging mechanical assemblies and complex projects that clients have previously struggled to handle

Their assembling capabilities cover the entire spectrum of modern technology. They can create prototypes, set up small runs of production, or go all the way with high volume production for extended periods of time for any product or project you have in mind using electrical, mechanical, and/or electro-mechanical assembly and cutting-edge computer technology like Solid Works and AutoCAD.

Certification:

Q2Q Solutions offer comprehensive solutions that go beyond fabrication, machining, and assembly testing. Along with their experience in product quality and FAA regulatory functional skills, we also provide services on FAA-PMA, DO 254, and DO 178 certification solutions.

They have a certified FAA-DMIR who has dealt with direct shipments and has given Airbus, Boeing, and Bombardier 8130-3 tags. On a number of quality management systems, they can certify.

1.5. OBJECTIVES OF THE STUDY**1.5.1. Primary objective:**

- To study the various costs involved in the logistics management in Q2Q Solutions.

1.5.2. Secondary objectives:

- To find how to cut the excess expenses associated with warehousing.
- To examine the problem facing frequently in machinery handling and its maintenance in warehousing facility of Q2Q Solutions.
- To give suggestions to improve the maintenance in the warehouse.

1.6. NEED FOR STUDY

The need of the study is to analyze various logistical cost of Q2Q Solutions and to find best technique to reduce those expenses. An essential resource that is frequently employed in the warehouse is machinery. Therefore, if it is utilized in a large production line, it must be kept in excellent working order to prevent interruption of warehousing. The following are some major advantages of researching logistics cost; Rent, Labour, Utilities, Equipment, Inventory management, Security and Insurance.

1.7. SCOPE & SIGNIFICANCE OF THE STUDY

The scope of this study is to optimize the warehouse related logistics cost of Q2Q Solutions. It helps in the analysis of machinery handling issues in warehouse. To enhance the Improves of preventive machinery maintenance system in warehouse of Q2Q Solution.

1.8. LIMITATION OF STUDY

Warehouses are intricate systems made up of many different people, systems, and procedures. As a result, it can be challenging to completely comprehend all of the variables that affect warehouse costs and to pinpoint the best strategies for cost optimisation.

- This study is confined to Q2Q Solutions.
- This study is based on warehouse maintenance.
- The data collected for the research is fully on primary data given by the respondents. There is chance for personal bias. So, the accuracy is not true.

CHAPTER 2

REVIEW OF LITERATURE

Fabiana Tornese (2022) - Pallets are among the most often used returnable transport items (RTIs), and because of the enormous environmental and financial effects they have over the course of their entire life cycle, they are essential components of a supply chain. Pallets are uniquely made to be repeatedly mended and reinjected for use, unlike other packaging materials. While reducing trash is good for the environment, complicated relationships between manufacturers, pallet suppliers, users, and recyclers may result from this.

J. Jones, (2022) - By doing a thorough total cost analysis, this research advances the conversation on hydrogen vehicles as feasible tactical choices for resolving sustainability issues in urban logistics.

TrầnThị Thanh Xuân, (2022) -To study factors affecting logistics costs of enterprises in Lang Son province. Here, the author makes the suggestion that the cost of logistics can be reduced by lowering the cost of transportation infrastructure which include the transportation cost and warehousing cost.

AymenAloui (2021)- In recent years, new methods and models for designing transportation networks have become necessary due to factors including competition, globalisation-related issues, and environmental concerns. The design and management of sustainable supply chains have been viewed as utilising a new and creative technique known as horizontal logistics collaboration. This strategy is focused on resource sharing amongst participants in related supply chains.

A Aziz (2021) - The purpose of this study is to identify the factors affecting emissions reduction and logistical costs in Indonesia. The findings demonstrate that green logistics, which emphasises greater energy-efficient use, may reduce emissions and logistical costs in Indonesia. Fiscal policy encourages lowering emissions and boosting the logistics sector's competitiveness.

R. Yadav and S. Yadav (2021) - in their paper "Optimizing Warehouse Cost: A Review" have discussed the role of technology in warehouse cost optimization, including the use of warehouse management systems, barcoding, and RFID technology.

A. Roy and S. Mukhopadhyay (2021) - in their paper "A Literature Review on Warehouse Optimization and Cost Reduction" have reviewed recent research on warehouse optimization and cost reduction and have highlighted the importance of data analytics, sustainability, and customer satisfaction in warehouse management.

Sunee Wattanakomol (2021) - The operational process needs to be established and enhanced in a running firm with intense competition in order to lower logistical costs, which are unavoidable expenses in all corporate operations. In this study, a structural equations model was developed along with instructions for lowering logistics costs in the industrial business sector.

Xiaohong Fang (2020) - In this study, a survey of the literature on the optimisation of the logistics network under low carbon restrictions was done. This study examined the fundamental logistics network optimisation issues (such as distribution centre location and vehicle distribution route optimisation) as well as the logistics network optimisation problems with compound solutions. (forward logistics network optimization and reverse logistics network optimization).

P. T. Lin and C. H. Lai (2020) - in their paper "A study of cost-saving strategy in warehouse operation" have suggested several cost-saving strategies, including space utilization optimization, labor cost reduction, and energy-saving measures.

Smit Thakkar, (2020) - It is critical to have a well defined organizational structure that supports the company mission, enhances and influences the performance of the logistics system, and allows logistic and supply chain management to fulfill its goals.

Babasabpatil, (2020) - Since the world is changing and the business climate has changed significantly as a result of globalisation and liberalisation, logistics are crucial in today's corporate environment. It is essential in any business

organization because it is a component of supply chain management. Since logistics is considered the lifeblood of any business, the company should benefit from the shifting business climate.

Fabio Sgarbossa (2020) - Human labour in manufacturing and logistics systems is evolving. Operations procedures are changing as a result of technological advancement, Industry 4.0 applications, and sociological changes like an ageing workforce. For many businesses, this change is still a "black box," and new management strategies are needed to successfully meet upcoming production and logistical issues.

EffnuSubiyanto, (2020) -This study aims to reveal the specific logistical expenses that have up to now remained secret. Values are crucial for project planners to assess, manage, and monitor, and they are especially crucial for procurement activities.

Sebastian kummer, (2020) - Potential blockchain uses in logistics and transportation (LSCM) are becoming more and more popular in both academics and business. It is unclear which and to what degree organisational theories are utilised to examine blockchain technology in the field of LSCM because it is a young field with little theoretical underpinnings.

Edgar Ramos, (2020) - The expenses associated with logistics and supply chain operations and strategies are key areas of focus for both scholars and practitioners. Future study subjects, publications, and theme areas can all be determined using the findings. When difficulties in analysing logistics and supply chain costs are raised, the article highlights and suggests study topics to add to the literature.

Smit Thakkar (2020) -For the vast majority of domestic players, logistics has traditionally been limited to the simple movement of commodities. Although warehousing has expanded somewhat, other services are still in their infancy. The Indian logistics sector has introduced courier, cold chain, container freight, 3PL, and other services to meet expanding demand and necessity, with a focus on value-added services like packaging, labeling, bar coding, and reverse logistics.

Amelec Vilorio (2020) - This article tries to offer strategies for pharmaceutical and commercial provider chains to reduce their logistical expenses. The first suggestion is to raise the Minimum Order Value (MOV), which compels consumers to place larger, more expensive purchases that result in more goods being kept in warehouses and fewer orders being placed. Given the reductions in fixed

Dennis E.Blemenfeld (2020) - General Motors transports a wide range of materials, parts, and components from 20,000 supplier companies to more than 160 GM operations in order to produce cars and trucks. The TRANSPART decision tool was created to assist GM in cutting expenses associated with logistics.

Chun Di (2020) - In response to the rapidly changing market environment and adapting to many impacts such as political, economic and technological conditions, supply chain managers are increasingly demanding a high-speed and efficient way to adjust the design to optimise the supply chain structure. In order to facilitate the participating companies in the supply chain to quickly and effectively implement the supply chain design optimisation strategy.

Behzad Behdani (2020) - Most ports had persistent congestion, which increased transportation costs and restricted trade expansion. Importantly, these port delays rendered trade movements uneven and unpredictable, forcing producers, distributors, and retailers to maintain enormous inventories. Due to the addition of storage and carrying (capital) charges to the price of transportation, final commodities became more expensive.

Christine Vanovermeire (2020)- Companies might anticipate a large cost reduction by joining a horizontal logistics partnership. In this work, we demonstrate how the overall cost may be further reduced when the alliance partners adopt a flexible attitude (i.e., permit modifications to the conditions of their delivery). We contend that this flexibility should be promoted via the process utilised to divide the overall cost among the various parties.

Rui Ren (2019) - Government agencies, academics, industry professionals, and international organisations are paying more and more attention to and considering the idea of green and sustainable logistics. Both at the industrial and theoretical

levels, there has been a significant amount of actual progress. Through a three-step evaluation method, this study looked at 306 important contributions made to the field of G&LS over the previous 20 years.

Mu-Chen Chen, (2019) - In this study, it highlighted elements that need improvement and strengthening. The empirical results have important managerial ramifications for service providers in the pharmaceutical logistics sector who want to enhance their offerings, such as by investigating cutting-edge service content that takes into account client wants.

Bernardo Villarreal (2019)- The material flow diagrams and information flow diagrams created initially by Toyota are where value stream mapping got its start. It has been modified in this study to support initiatives aimed at increasing productivity in the setting of transportation operations. For transportation operations, a new value stream map and an efficiency metric are suggested.

Harpreet Sing, (2019) - This project was undertaken in order to investigate, suggest, and put into practise a number of fresh concepts of logistics in order to successfully complete the Andaman-Nicobar power infrastructure project.

Amit Das, (2019) - The purpose of this article is to clarify the idea of logistics cost and its optimization methods. Considering some identical cost factors , the overall logistics cost can be reduced significantly.

Edgar Granda (2019) - Due to the existing inadequate supply structure, it is of major importance and a challenge for Mexican businesses to lower truck transportation costs. This study examines the situation of a major Mexican tobacco producer who has to lower its outbound transportation costs in the event of a market downturn.

Xiaofeng Zhao (2019) - The cost of logistics is a key indicator of the level of development of the logistics sector, which is a significant contributor to the growth of the national economy. Effective logistics cost control has significant economic and social benefits and is now the most direct way to increase third-party profit. administrative and transportation expenses, this has a favourable effect on the logistics department's budget.

Pomorstvo, (2019) - Since improving the quality of logistics services for clients frequently results in higher logistics costs, managing logistics expenses presents some unique issues. Additionally, lowering the price of one logistical component raises the price of a different logistical component, raising the overall cost of logistics.

K. Narasimhan and B. Reddy (2019) - in their paper "Warehouse Optimization: A Review of Literature" have reviewed the literature on warehouse optimization and have suggested several strategies, including efficient material handling, process optimization, and lean management principles.

J. Goh and J. Lim (2019) - in their paper "Cost Reduction Strategies for Warehouse Management: A Systematic Review" have presented an overview of the most common cost reduction strategies in warehouse management, including inventory management, layout optimization, automation, and workforce management.

Sanjib Pohit(2019) - In this study, they attempt to examine the literature on logistics cost estimation, with a focus on India as a developing nation where calculation is difficult owing to data scarcity.

DarjaTopolsek (2018) - The terms transportation, logistics, forwarding, and other terms are all used often in the transport and logistics industry. Various academic fields and study programmes are also available, including logistics management, transport economics, and transport logistics. All of these positions are frequently connected to the plan's content, planning, organization, management, and control of the flow of people, things, information, and money.

KawtarAkoudad (2018) - Establishing a review of the literature on the assessment of logistics costs at the micro and macro levels is the goal of this effort. The logistics cost structure was also covered. They make an attempted to approach all of the logistics cost assessment methodologies in a non-exhaustive manner in accordance with two evaluation levels: micro and macro.

Sandra Yang (2018) - A recent development in logistics is reverse logistics. It has grown in prominence as a successful and long-lasting tactic. It is essential in light

of the growing onerous regulatory restrictions on end-of-life goods throughout the world.

Yazao Yang (2018) - The operational process needs to be established and enhanced in a running firm with intense competition in order to lower logistical costs, which are unavoidable expenses in all corporate operations. In this study, a structural equations model was developed along with instructions for lowering logistics costs in the industrial business sector.

Alexander T. C. Onstein (2018) - The spatial organisation of the products transport and storage system used to transfer items between production and consuming sites is referred to in this study as distribution structures. For businesses, deciding on this structure is crucial since it enables them to balance logistical costs and customer service standards.

KhalidAljohani (2018) - Since these facilities serve as key originators and recipients of products, their placement has a considerable impact on both urban goods movement activities and the urban environment. Academics and policymakers have recently begun to pay more attention to the problem of logistics sprawl, or the migration of logistical facilities from inner metropolitan regions to suburban locations.

John T. Mentzer (2018) - The best approach to maintain a competitive edge in the current market, when changes in pricing, marketing, and product are sometimes swiftly replicated, may be to make improvements to auxiliary services like logistics. Businesses may get and keep competitive advantage by utilising exceptional and superior logistics services that are closely related to marketing strategy.

Yuan Fang, (2018) - The activity-based costing (ABC) method is used to first identify the cost components incurred during the logistics process of precast components from the supplier's yard to the building site.

Anu E Obaro (2018) - We'll talk about the difficulties and logistics of CTC screening as well as the significance of test precision, acceptance, quality control, and cost-effectiveness. CTC is a less intrusive alternative to colonoscopy (the most popular whole-colon inquiry), requires less laxative, and may have the

advantage of allowing assessment of other colonic structures. Both have equivalent advanced adenoma detection rates.

Qingyou and Qian Zhang (2018) - Using soft time-window constraints that determine the earliest and latest client arrival timings, this research proposes a methodology for addressing a multiobjective vehicle routing issue. Extra inventory expenses are incurred if a customer is served before the earliest stipulated arrival time.

Luigi Ranieri (2018) - Urban regions are experiencing issues with transport, particularly with products movement. Modern cities require solutions to lower externalities costs, such as congestion, pollution, and others, which have risen in recent years, mostly as a result of the expansion of goods delivery.

Sangpil Ko (2018) - In order to evaluate the current issues, developments, and theories in the biomass transportation and logistics study, this paper analyses the peer-reviewed literature. The study's findings revealed the wide range of figures cited in the literature for the ideal shipping distance based on logistical considerations, as well as the fixed and variable costs of transportation.

Mary J. Meixell (2018) - The suggested methodology for categorizing transportation choice research is based on a thorough analysis of the peer-reviewed journal articles published over the previous 20 years, as well as a study of practitioner publications to pinpoint the most recent logistical difficulties. The study purpose/question, technique, conclusions, and obstacles addressed are all examined in the scholarly articles.

Parisa DolatiNeghbadi (2018) - One of the important subfields of supply chain management, urban logistics focuses on logistics and transportation operations in cities. Recent years have seen a rapid increase in publications in this field of study.

Martin Christopher (2017) - In essence, logistics management is an integrated process that aims to improve how supplies and materials move through an organisation and how they are used to serve customers. It is, in essence, a planning process and an information-based activity.

Thomas Poulsen (2017) - This article shows that, for offshore wind farms, logistics may, at a minimum, account for 18% of the levelized cost of electricity. This was the main conclusion of a thorough case study conducted within the world's top offshore wind farm developer and operator. The case study sought to identify and provide many potential prospects for offshore wind cost savings through innovative logistics.

Alan Mckinnon (2017) - The objective of this work is to establish a review of the literature on the evaluation of logistics costs at the micro and macro levels. The cost structure for logistics was also discussed. They seek to take a non-exhaustive approach to all logistics cost assessment approaches in accordance with two evaluation levels: micro and macro.

Nathalie Fabbe-Costes (2017) - Commercial and industrial organisations can be thought of as systems which are composed of operational processes structured and regulated by a set of functions that can become strategic; they are currently the object of intense environmental pressures.

Jane Lin (2017) - Urban delivery consolidation is one of the modern, cutting-edge city logistics solutions that has gained more academic and practical attention, mostly in Europe and Japan. With the correct atmosphere, it is thought to result in cost savings and environmental advantages. It has been determined that the potential logistical and environmental advantages of UCC.

Rajagopal (2017)- Companies have been pushed to alter their business models and tactics due to the emergence of fast technological advancement, fierce commercial competition, and changing client wants and expectations. All businesses, local, international, and worldwide, must cope with a number of new words, such as global supply chain, third party logistics, green logistics, e-logistics, and reverse logistics.

Jonas Volland (2017) - One important tool for cost containment to deal with continually rising healthcare expenditures in industrialised nations has been identified as hospital material management. The goal of this work is to give the most recent findings in the field of hospital material logistics management. Articles that use quantitative methodologies are given particular attention.

CHAPTER 3

RESEARCH METHODOLOGY

3.1. METHODOLOGY:

Research methodology is mainly needed for the purpose of framing the research process and the designs and tools that are to be used for the project purpose. Research methodology helps to find the ways to optimize the working of warehouse in Q2Q Solutions.

3.2. RESEARCH DESIGN:

Descriptive Research Design:

The goal of descriptive research design is to identify and characterize the traits of a population or a phenomenon. In order to find patterns, connections, or trends, it entails acquiring data by observation, surveys, interviews, or other techniques, then summarizing and interpreting the findings. In order to respond to inquiries concerning the current status of a population or phenomena, such as its demographics, behaviors, attitudes, or preferences, descriptive research design is utilized.

3.3. SAMPLING TECHNIQUE:

Probability Sampling Method:

Probability sampling is a sampling technique that entails picking a sample, or a section of the population, at random. It is also known as random sampling on occasion.

3.4. SOURCES OF DATA:

The process of preparing and gathering data is referred to as data collection. This study is based on primary data.

Primary Data:

The primary data are those that are newly acquired, gathered for the first time, and hence possess original character. To acquire the employees' direct views on the most important aspects, an informal interview and a questionnaire were used to collect primary data.

3.5. SAMPLE SIZE:**Sample design:**

Sample design is a predetermined strategy chosen before any data are actually obtained in order to create a sample from the available data. The population served as the source of the sample. There are 110 people in the sample. The study used the census methodology.

3.6. TOOLS FOR ANALYSIS:**Percentage method:**

In this study Percentage method test was used. The percentage is used for making comparison between two or more series of data.

Chi-square test:

Chi-square analysis in statistics is to test the goodness of fit to verify the distribution of observed data with assumed theoretical distribution. Therefore it is a measure to study the divergence of actual and expected frequencies.

One wayanova:

In order to ascertain whether there is statistical support that the linked population means are statistically substantially different, one-way ANOVA ("analysis of variance") examines the means of two or more independent groups. A parametric test is one-Way ANOVA. The One-Factor ANOVA is another name for this test.

Karl Pearson's correlation:

The linear relationship between two continuous variables is described by the Karl Pearson correlation, commonly known as Pearson's correlation coefficient. It can be between -1 and +1 and is represented by the symbol "r".

CHAPTER 4

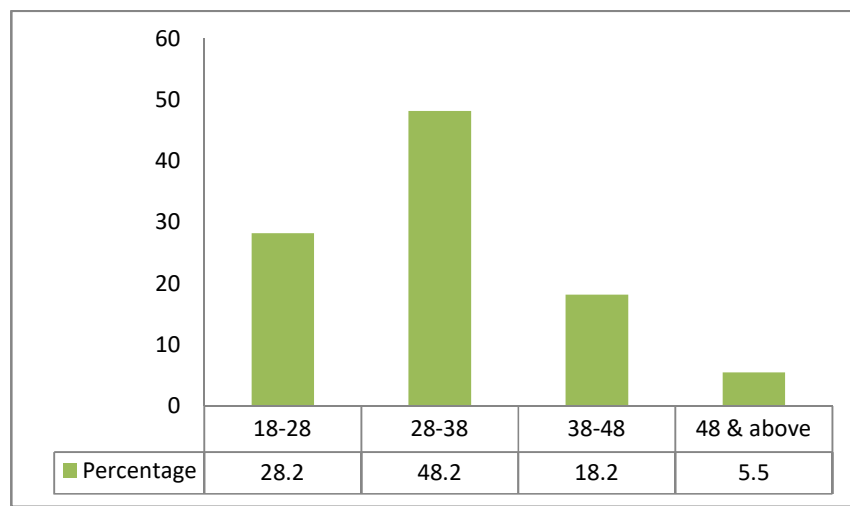
DATA ANALYSIS AND INTERPRETATION

4.1 PERCENTAGE ANALYSIS

4.1.1 Age of the respondents:

S.no	Particulars	Respondents	Percentage
1	18-28	31	28.2
2	28-38	53	48.2
3	38-48	20	18.2
4	48 & above	6	5.5

4.1.1 Age of the respondents



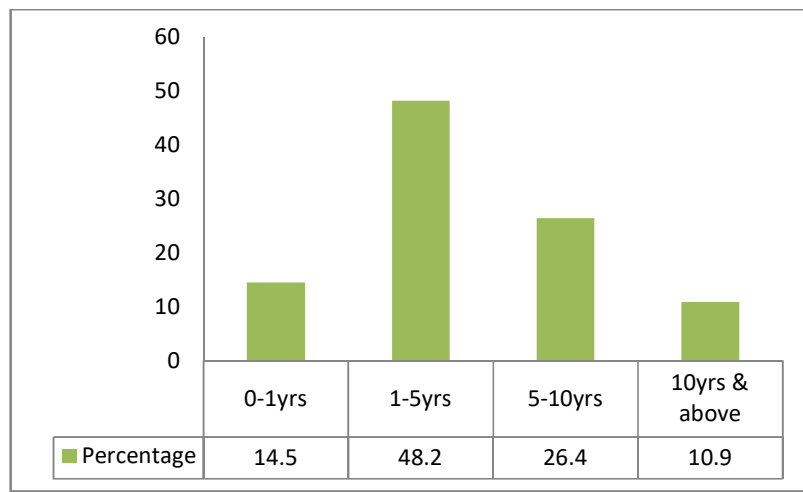
Interpretation

From the above table it is interpreted that the percentage of respondents are belong to the age category between 18-28 are 28.2%, between 28-38 are 48.2%, between 38-48 are 18.2%, 48 to above are 5.5%

4.1.2 Experience of the respondents

S. No	Experience	Respondents	Percentage
1	0-1yrs	16	14.5
2	1-5yrs	53	48.2
3	5-10yrs	29	26.4
4	10yrs & above	12	10.9

Chart 4.1.2 Experience of the respondents



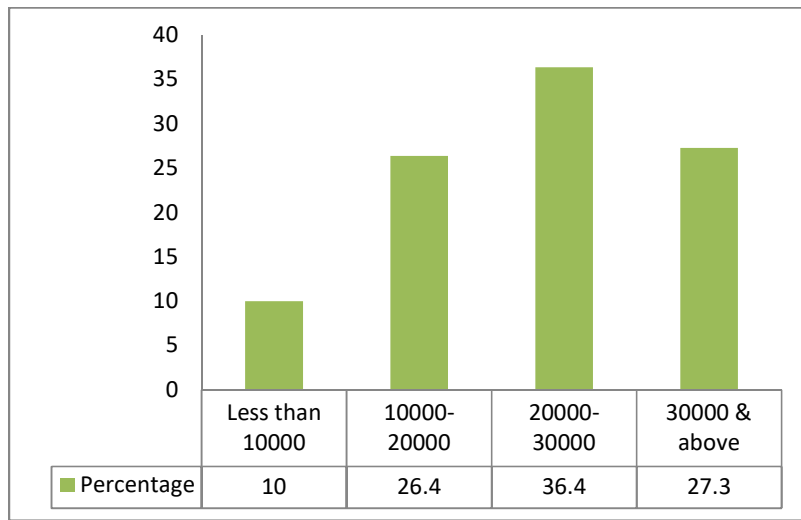
Interpretation

From the above table it is interpreted that 14.5% of respondents have an experience of 0-1 year, 48.2% have an experience of 1-5 years, 26.4% have an experience of 5–10 years and 10.9% have an experience of 10 years and above.

4.1.3 Income of the respondents

S. No	Income	Respondents	Percentage
1	Less than 10000	11	10
2	10000-20000	29	26.4
3	20000-30000	40	36.4
4	30000 & above	30	27.3

4.1.3 Income of the respondents



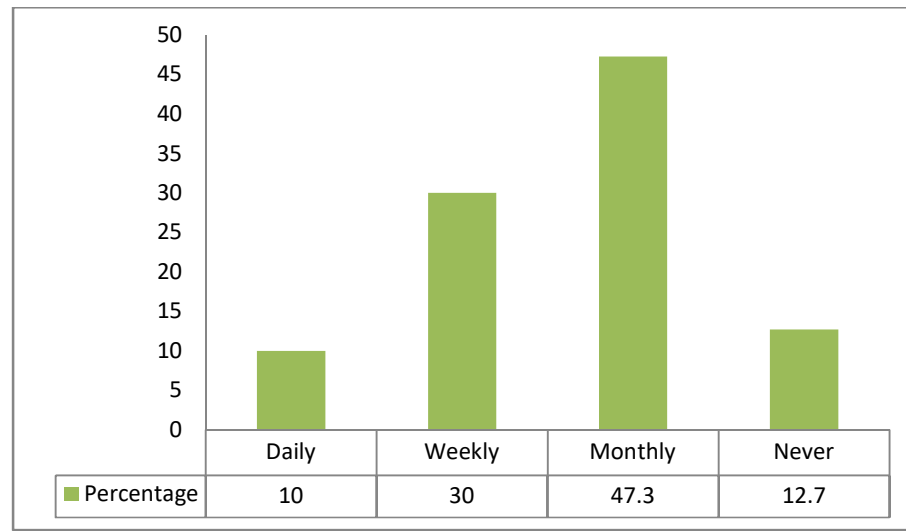
Interpretation:

From the above table it is interpreted that 10% of the respondents have an income level of less than 10000, 26.4% belongs to 10000-20000, 36.4% belongs to 20000 – 30000 and 27.3% belongs to 30000 and above.

4.1.4 Inspection period of machines

S.No	Inspection period	Respondents	Percentage
1	Daily	11	10
2	Weekly	33	30
3	Monthly	52	47.3
4	Never	14	12.7

4.1.4 Inspection period of machines



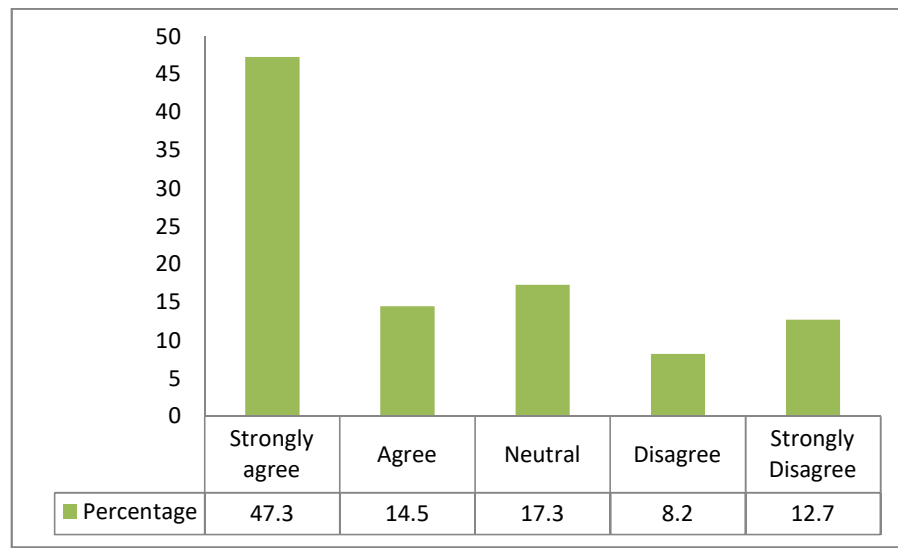
Interpretation:

From the above table it is interpreted that 10% of the respondents have chosen daily inspection, 30% have chosen weekly, 47.3% have chosen monthly, and 12.7% have chosen never.

4.1.5 Warehouse is kept organized

S.No	Particulars	Respondents	Percentage
1	Strongly agree	52	47.3
2	Agree	16	14.5
3	Neutral	19	17.3
4	Disagree	9	8.2
5	Strongly Disagree	14	12.7

4.1.5 Warehouse is kept organized



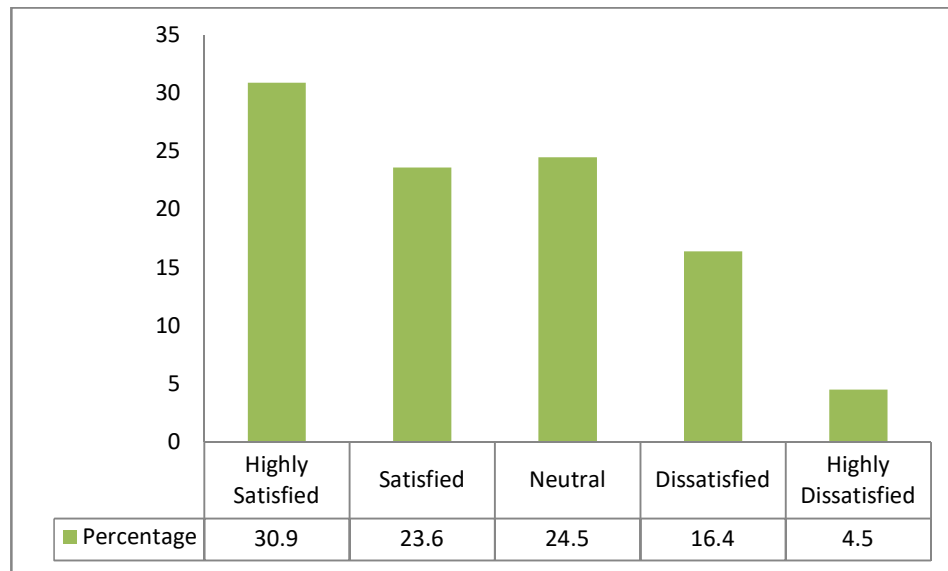
Interpretation

From the above table it is interpreted that 47.3% of the respondents were chosen Strongly agree, 14.5% were chosen agree, 17.8% were chosen neutral, 8.2% were chosen disagree, 12.7% were chosen strongly disagree.

4.1.6 Communication between maintenance team

S. No	Particulars	Respondents	Percentage
1	Highly Satisfied	34	30.9
2	Satisfied	26	23.6
3	Neutral	27	24.5
4	Dissatisfied	18	16.4
5	Highly Dissatisfied	5	4.5

4.1.6 Communication between maintenance team



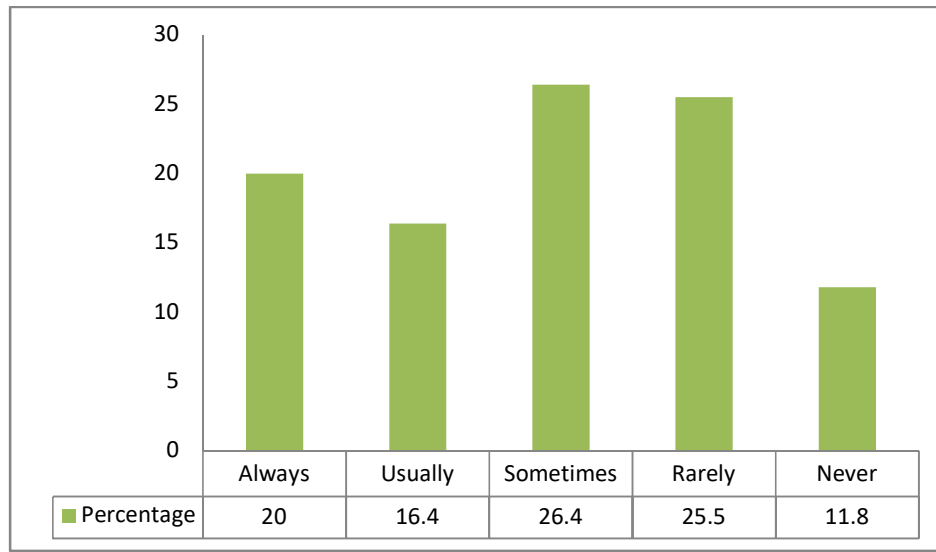
Interpretation

From the above table it is interpreted that 30.9% of the respondents chosen Highly satisfied, 23.6 % chosen Satisfied, 24.5%chosen Neutral, 16.4%chosen Dissatisfied and 4.5% chosen Highly dissatisfied.

4.1.7 Availability of maintenance team to identify and resolve issues

S.No	Particulars	Respondents	Percentage
1	Always	22	20
2	Usually	18	16.4
3	Sometimes	29	26.4
4	Rarely	28	25.5
5	Never	13	11.8

4.1.7 Availability of maintenance team to identify and resolve issues



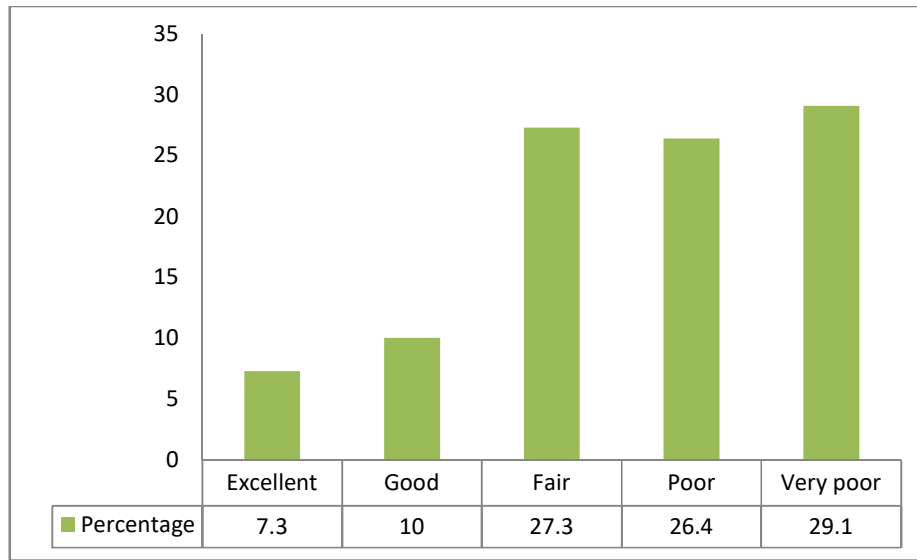
Interpretation

From the above table it is interpreted that 20% of the respondents says always, 16.4% says usually, 26.4% says sometimes, 25.5% says rarely, 11.8% says never.

4.1.8 Maintenance team addresses the issues

S. No	Particulars	Respondents	Percentage
1	Excellent	8	7.3
2	Good	11	10
3	Fair	30	27.3
4	Poor	29	26.4
5	Very poor	32	29.1

4.1.8 Maintenance team addresses the issues



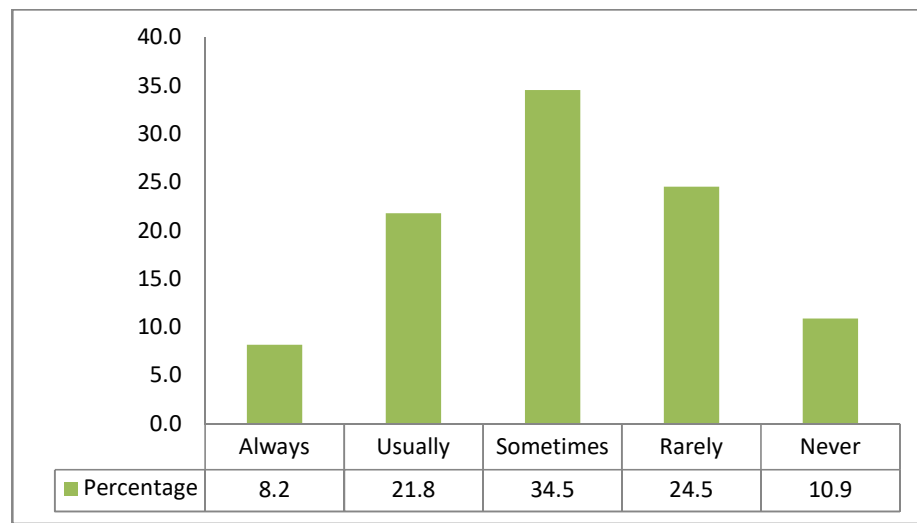
Interpretation

From the above table it is interpreted that 7.3% of respondents says Excellent, 10% says Good, 27.3% says Fair, 26.4% says Poor and 29.1% says Very poor for the way maintenance team address the issues.

4.1.9 Maintenance team responds to requests in a timely manner

S. No	Particulars	Respondents	Percentage
1	Always	9	20
2	Usually	19	16.4
3	Sometimes	38	26.4
4	Rarely	27	25.5
5	Never	17	11.8

Chart 4.1.9 Maintenance team responds to requests in a timely manner



Interpretation

From the above table it is interpreted that 8.2% of the respondents say always, 21.8% says usually, 34.5% says sometimes, 24.5% says rarely, 10.9% says never.

4.1.10 Maintenance team ensures the equipments are safe to use

S. No	Particulars	Respondents	Percentage
1	Excellent	14	12.7
2	Good	39	35.5
3	Fair	27	24.5
4	Poor	21	19.1
5	Very poor	9	8.2

4.1.10 Maintenance team ensures the equipments are safe to use



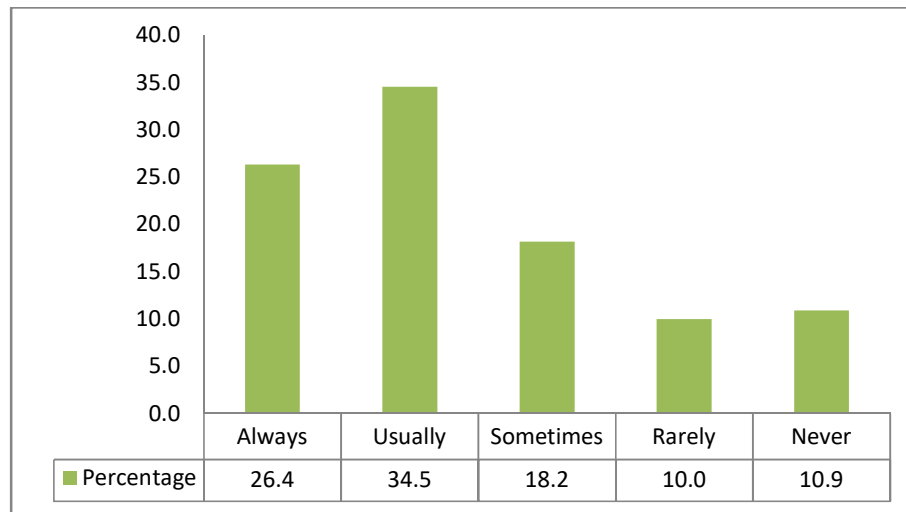
Interpretation

From the above table it is interpreted that 12.7% of respondents says Excellent, 35.5% says Good, 24.5% says Fair, 19.1% says Poor and 8.2% says Very poor for the way maintenance team address the issues.

4.1.11 Maintenance team replaces worn-out or damaged equipment

S. No	Particulars	Respondents	Percentage
1	Always	29	26.4
2	Usually	38	34.5
3	Sometimes	20	18.2
4	Rarely	11	10.0
5	Never	12	10.9

4.1.11 Maintenance team replaces worn-out or damaged equipment



Interpretation

From the above table it is interpreted that 26.4% of the respondents say always, 34.5% says usually, 18.2% says sometimes, 10% says rarely, 10.9% says never for how often the maintenance team replaces worn-out or damaged equipments.

4.1.12 Maintenance team handles emergency repairs

S. No	Particulars	Respondents	Percentage
1	Excellent	21	19.1
2	Good	33	30.0
3	Fair	29	26.4
4	Poor	21	19.1
5	Very poor	6	5.5

4.1.12 Maintenance team handles emergency repairs



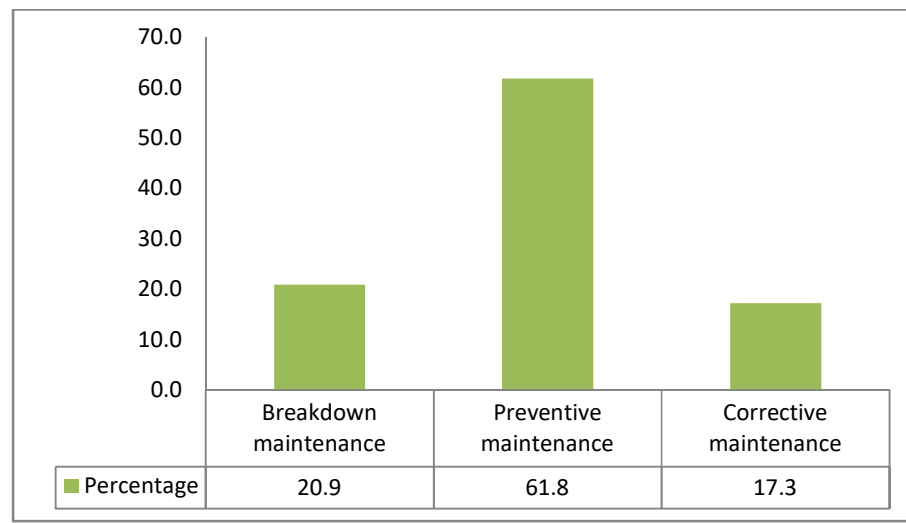
Interpretation

From the above table it is interpreted that 19.1% of respondents says Excellent, 30% says Good, 26.4% says Fair, 19.1% says Poor and 5.5% says Very poor for the way maintenance team handles emergency repairs.

4.1.13 Highly carried maintenance system

S. No	Particulars	Respondents	Percentage
1	Breakdown maintenance	23	20.9
2	Preventive maintenance	68	61.8
3	Corrective maintenance	19	17.3

4.1.13 Highly carried maintenance system



Interpretation

From the above table it is interpreted that the number of respondents were 20.9% are breakdown maintenance, 61.8% are Preventive Maintenance and 17.3% are Corrective maintenance.

4.1.14 Maintenance of warehouse equipment

S. No	Particulars	Respondents	Percentage
1	Excellent	8	7.3
2	Good	23	20.9
3	Fair	36	32.7
4	Poor	25	22.7
5	Very poor	18	16.4

4.1.14 Maintenance of warehouse equipment



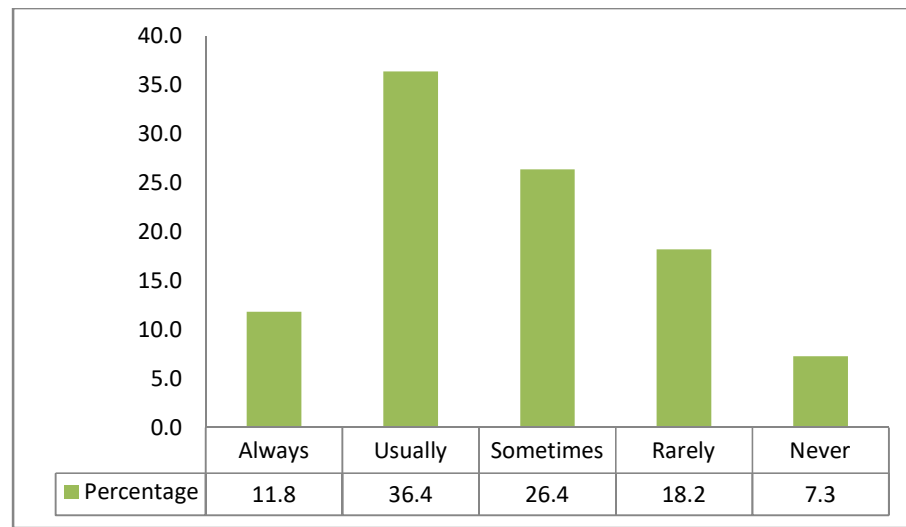
Interpretation

From the above table it is interpreted that 7.3% of respondents says Excellent, 20.9% says Good, 32.7% says Fair, 22.7% says Poor and 16.4% says Very poor for maintenance of warehouse equipments.

4.1.15 Warehouse equipment is maintained appropriately

S. No	Particulars	Respondents	Percentage
1	Always	13	11.8
2	Usually	40	36.4
3	Sometimes	29	26.4
4	Rarely	20	18.2
5	Never	8	7.3

4.1.15 Warehouse equipment is maintained appropriately



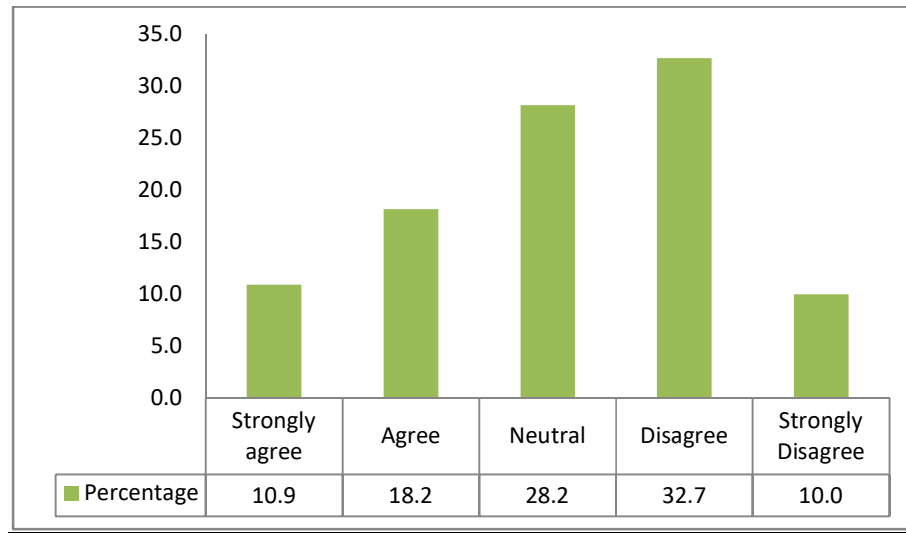
Interpretation

From the above table it is interpreted that 11.8% of the respondents say always, 36.4% says usually, 26.4% says sometimes, 18.2% says rarely and 7.3% says never for how often the warehouse equipments are maintained.

4.1.16 The warehouse is well-lit and easy to navigate

S. No	Particulars	Respondents	Percentage
1	Strongly agree	9	8.2
2	Agree	20	18.2
3	Neutral	46	41.8
4	Disagree	23	20.9
5	Strongly Disagree	12	10.9

4.1.16 The warehouse is well-lit and easy to navigate



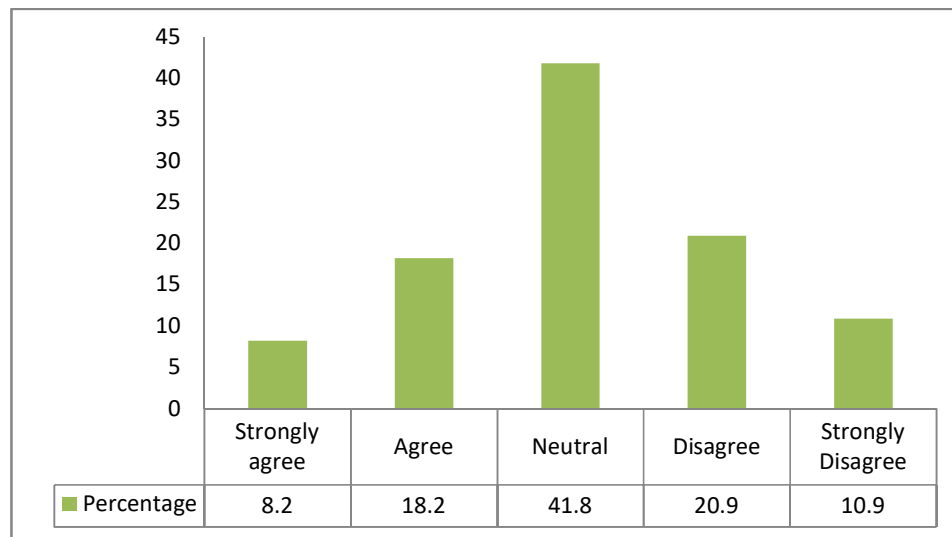
Interpretation

From the above table it is interpreted that 10.9% respond to Strongly agree, 18.2% - agree, 28.2% - neutral, 32.7% - disagree and 10% -strongly disagree for the warehouse is well-lit and easy to navigate.

4.1.17 Availability of 24/7 maintenance

S.No	Particulars	Respondents	Percentage
1	Strongly agree	9	8.2
2	Agree	20	18.2
3	Neutral	46	41.8
4	Disagree	23	20.9
5	Strongly Disagree	12	10.9

4.1.17 Availability of 24/7 maintenance



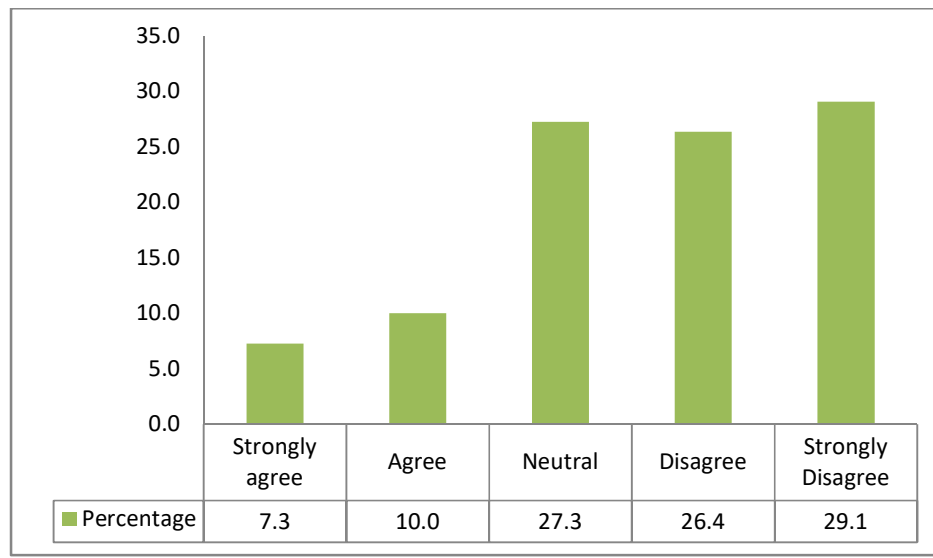
Interpretation

From the above table it is interpreted that 8.2% respond to Strongly agree, 18.2% - agree, 41.8% - neutral, 20.9% - disagree and 10.9% -strongly disagree for the availability of 24/7 maintenance.

4.1.18 Sufficient number of employees in warehouse

S. No	Particulars	Respondents	Percentage
1	Strongly agree	8	7.3
2	Agree	11	10.0
3	Neutral	30	27.3
4	Disagree	29	26.4
5	Strongly Disagree	32	29.1

4.1.18 Sufficient of number employees in warehouse



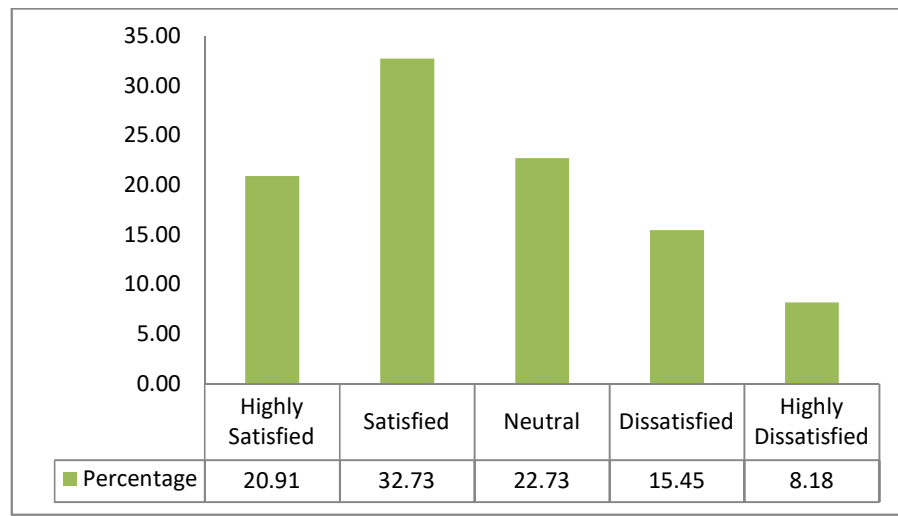
Interpretation

From the above table it is interpreted that 7.3% of the respondents were chosen Strongly agree, 10% were chosen agree, 27.3% were chosen neutral, 26.4% were chosen disagree and 29.1% were chosen strongly disagree for the availability of sufficient number of employees in warehouse.

4.1.19 Satisfaction level of overall maintenance of warehouse

S.No	Particulars	Respondents	Percentage
1	Highly Satisfied	23	20.91
2	Satisfied	36	32.73
3	Neutral	25	22.73
4	Dissatisfied	17	15.45
5	Highly Dissatisfied	9	8.18

4.1.19 Satisfaction level of overall maintenance of warehouse



Interpretation

From the above table it is interpreted that 17.27% of the respondents chosen Highly satisfied, 29.09 % chosen Satisfied, 20.91% chosen Neutral, 12.73 % chosen Dissatisfied and 20% chosen Highly dissatisfied as the overall satisfaction of the warehouse maintenance.

4.2 CHI-SQUARE TEST

Null hypothesis (Ho):

There is no relationship between the age wise classification of respondent and experience wise classification of respondent.

Alternate hypothesis (H1):

There is a relationship between the age wise classification of respondent and experience wise classification of respondent.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
AGE WISE CLASSIFICATION OF RESPONDENT * EXPERIENCE WISE CLASSIFICATION OF RESPONDENT	110	100.0%	0	0.0%	110	100.0%

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	175.111 ^a	9	.000
Likelihood Ratio	163.863	9	.000
Linear-by-Linear Association	90.100	1	.000
N of Valid Cases	110		

a. 10 cells (62.5%) have expected count less than 5. The minimum expected count is .33.

Chi-Square Test :

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

$$= 3*3= 9$$

Calculated value = 175.111

Tabulated value = 16.919

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

$$Z = 175.111 > 16.919$$

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 age wise classification of respondent and experience wise classification of respondent.

4.3 ONE-WAY ANOVA

Null hypothesis (Ho):

There is a significance difference between the availability of maintenance team with maintenance team responds in timely manner.

Alternate hypothesis (H1):

There is no significance difference between the availability of maintenance team with maintenance team responds in timely manner

AVAILABILITY OF MAINTENANCE TEAM

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	15	1.00	.000	.000	1.00	1.00	1	1
2	43	1.91	.294	.045	1.82	2.00	1	2
3	19	2.74	.452	.104	2.52	2.95	2	3
4	15	3.80	.414	.107	3.57	4.03	3	4
5	18	4.72	.461	.109	4.49	4.95	4	5
Total	110	2.65	1.268	.121	2.41	2.89	1	5

Test of Homogeneity of Variances

AVAILABILITY OF MAINTENANCE TEAM

Levene Statistic	df1	df2	Sig.
11.253	4	105	.000

ANOVA

AVAILABILITY OF MAINTENANCE TEAM

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	161.849	4	40.462	318.883	.000
Within Groups	13.323	105	.127		
Total	175.173	109			

Calculated value = 318.883

Tabulated value = 2.46

$F = F_{cal} > F_{tab}$ $F = 318.883 > 2.46$

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 availability of maintenance team with maintenance team responds in timely manner.

4.4 ANALYSIS USING KARL PEARSON'S CORRELATION

Null hypothesis (H0):

There is positive relationship between the availability of maintenance team with maintenance team addresses the issues.

Alternate hypothesis (H1):

There is negative relationship between the relationship between the availability of maintenance team with maintenance team addresses the issues.

		AVAILABILITY OF MAINTENANCE TEAM	MAINTENANCE TEAM ADDRESSES THE ISSUES
AVAILABILITY OF MAINTENANCE TEAM	Pearson Correlation	1	.891**
	Sig. (2- tailed)		.000
	N	110	110
MAINTENANCE TEAM ADDRESSES THE ISSUES	Pearson Correlation	.891**	1
	Sig. (2- tailed)	.000	
	N	110	110

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

r= .891

INFERENCE:

Since r is positive, there is positive relationship between the availability of maintenance team with maintenance team addresses the issues.

CHAPTER 5

FINDINGS, SUGGESTIONS AND CONCLUSION

5.1. FINDINDS

- From the above chart it is observed that the majority of the respondents are belong to the age category of 28-38 (48.2 %).
- The above chart shows that the majority of the respondents have 1-5 years of experience (48.2%).
- Majority of the respondents are with the income level of 20000 – 30000(36.4%).
- Majority of (47.3%) respondents have chosen monthly inspection as inspection period of machineries.
- Majority of (47.3%) of the respondents strongly agree that the warehouse is kept organised.
- Majority of (30.9%) of the respondents highly satisfied with the availability of communication between maintenance team.
- Majority of (26.4%) of the respondents respond to sometimes for the availability of maintenance team to identify and resolve issues.
- Majority (29.1%) of the respondents says Very poor for the way the maintenance team address the issues.
- Majority of (34.5%) of the respondents respond to sometimes for response time of the maintenance team is in timely manner.
- Majority (35.5%) of the respondents says Good for the maintenance team ensures the equipments are safe to use.
- Majority of (34.5%) of the respondents respond to usually for how often the maintenance team replaces worn-out or damaged equipments.
- Majority (30%) of the respondents says Good for the maintenance team handles emergency repairs.

- Majority of (61.8%) respondents to Preventive maintenance as highly carried maintenance system.
- Majority (32.7%) of the respondents says fair for the maintenance of warehouse equipments.
- Majority of (36.4%) of the respondents respond to usually for how often the warehouse equipments are maintained.
- Majority of 32.7% respond to disagree for the warehouse is well-lit and easy to navigate.
- Majority of 41.8% respond to neutral for the availability of 24/7 maintenance.
- Majority of (29.1%) of the respondents strongly disagree for the availability of sufficient number of employees in warehouse.
- Majority of 29.09% of the respondents has chosen Satisfied as the satisfaction level for the overall maintenance of warehouse.

5.2 SUGGESTIONS & RECOMMENDATIONS

- The company's maintenance division must adhere to maintenance schedules and hire qualified personnel for the duties.
- The management must provide the maintenance department with strong assistance, and the business must keep an eye on the maintenance operations. If the business reduces the availability of spare parts, the outcomes will be positive.
- The business takes action to close the communication gap between contract workers and permanent employees which results in good maintenance of machineries in warehouse.
- Warehouse maintenance is a team effort, and educating employees on how to detect and report concerns may assist avoid minor problems from becoming significant ones. Training on correct equipment usage and safety measures can also assist to decrease the risk of accidents and equipment damage.
- Creating a maintenance schedule can assist guarantee that maintenance activities are completed on a regular and consistent basis. This can aid in the prevention of equipment failure and the reduction of repair expenses.

- As technology and best practises improve, it is critical to assess and update warehouse maintenance practises on a regular basis to ensure they are effective and efficient.

5.3. CONCLUSION

Proper warehouse maintenance is critical to ensuring the facility's optimal operation, increasing efficiency, reducing downtime, and avoiding safety issues. Regular inspections, cleaning, repair, and replacement of equipment, and adherence to safety regulations are all examples of maintenance practices.

The research might have assessed the efficacy of various maintenance practices, identified common concerns, and advised best practices for warehouse facility maintenance. Furthermore, the research may have examined the costs and advantages of various maintenance procedures in order to optimize warehouse operations while minimizing expenditures.

Overall, the findings of a warehouse maintenance give important insights into how to successfully manage and maintain warehouse facilities in order to increase their efficiency and production.

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APPENDIX

Questionnaire

Age

- 18-28
- 28-38
- 38-48
- 48 and above

Experience

- 0 - 1 years
- 1 - 5 years
- 5 - 10 years
- 10 years and above

Income

- Less than 10,000
- 10,000 - 20,000
- 20,000 - 30,000
- 30,000 and above

How often do you think the maintenance team inspects the warehouse machines?

- Daily
- Weekly
- Monthly
- Never

To what extent do you agree or disagree with the following statement: "The warehouse is kept organized."

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

How satisfied are you with the communication between the maintenance team

- Highly Satisfied
- Satisfied
- Neutral
- Dissatisfied
- Highly dissatisfied

How often do you think the maintenance team proactively identifies and resolves issues before they become major problems?

- Always
- Usually
- Sometimes
- Rarely
- Never

How well do you think the maintenance team addresses the issues you report?

- Excellent
- Good
- Fair
- Poor
- Very poor

How often do you think the maintenance team responds to requests in a timely manner?

- Always
- Usually
- Sometimes
- Rarely
- Never

How well do you think the maintenance team ensures that the warehouse equipment is safe to use?

- Excellent
- Good
- Fair
- Poor

- Very poor

How often do you think the maintenance team replaces worn-out or damaged equipment?

- Always
- Usually
- Sometimes
- Rarely
- Never

How well do you think the maintenance team handles emergency repairs?

- Excellent
- Good
- Fair
- Poor
- Very poor

Which maintenance is highly carried on in warehouse

- Breakdown maintenance
- Preventive maintenance
- Corrective maintenance

How well do you think the warehouse equipment is maintained?

- Excellent
- Good
- Fair
- Poor
- Very poor

How often do you think the warehouse equipment is maintained appropriately?

- Always
- Often
- Sometimes
- Rarely
- Never

To what extent do you agree or disagree with the following statement: "The warehouse is well-lit and easy to navigate."

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Do you agree with availability of 24/7 maintenance?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Is there sufficient number of employees in the warehouse?

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

How satisfied are you with the overall maintenance of the warehouse?

- Highly satisfied
- Satisfied
- Neutral
- Dissatisfied
- Highly dissatisfied

A STUDY ON ANALYSIS OF COST FACTORS OF LOGISTICS TOWARDS Q2Q SOLUTION

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ABSTRACT

A vital component of warehouse management is logistics cost analysis, which helps companies to streamline their logistics processes and cut expenses related to warehousing. An introduction of logistics cost analysis for warehouse management is given in this abstract, along with information on the various expenses involved, cost analysis techniques, and the advantages of cost analysis for enterprises. Rent, utilities, labor, maintenance and repairs, insurance, as well as technology and equipment, can all be included in warehouse expenses. Businesses can find chances to save costs by optimizing warehouse structure and design, automating operations, managing inventory, and other tactics by performing a complete cost analysis. Businesses may gain a competitive edge in the market, better profitability, and more customer satisfaction by using logistics cost analysis. The study focuses on logistics warehouse maintenance, which is an important part of effective supply chain management.

Key words: Logistics, Warehouse, Cost optimization, Maintenance, Aerospace.

I. INTRODUCTION

The success of an organisation depends heavily on its ability to maximise profit in a highly competitive marketplace. Any expense made by a company to manage its logistics is referred to as a logistical cost. Logistics cost analysis is a critical process for businesses that need to optimize their supply chain operations and control expenses.

The logistics sector is a vital part of the world economy because it makes it easier for commodities to be transported from producers to retailers and consumers. Warehouse management, which comprises the storage and movement of items inside a warehouse facility, is a crucial component of logistics management. In order to fulfil client demand while keeping expenses to a minimum, warehouse management is crucial for businesses to guarantee that items are kept and moved in a safe and effective manner. Logistics costs, which might include costs for rent, labour, utilities, and equipment, are one of the major expenses linked to warehouse management. Businesses need to regularly perform logistics cost analysis to make sure that warehouse operations are both affordable and effective.

COMPANY PROFILE:

Q2Q Solutions Private Limited is a non-government company, established on July 28, 2010. It's a private unlisted company and is classified as 'company limited by shares'. It is a precision engineering company located in MEPZ Special Economic Zone in Chennai, India. The company specializes in precision machining, design, sheet-metal fabrication and assembly testing for aerospace and allied industries.

In addition to having a thorough awareness of the FAA and EASA certification requirements that regulate the design of aircraft and aircraft subsystems, Q2Q Solutions also has a thorough understanding of client expectations, particularly with regard to quality and design.

II. REVIEW OF LITERATURE

- **Fabiana Tornese (2022)** - Pallets are among the most often used returnable transport items (RTIs), and because of the enormous environmental and financial effects they have over the course of their entire life cycle, they are essential components of a supply chain. Pallets are uniquely made to be repeatedly mended and reinjected for use, unlike other packaging materials. While reducing trash is good for the environment, complicated relationships between manufacturers, pallet suppliers, users, and recyclers may result from this.
- **J. Jones, (2022)** - By doing a thorough total cost analysis, this research advances the conversation on hydrogen vehicles as feasible tactical choices for resolving sustainability issues in urban logistics.
- **TrầnThị Thanh Xuân, (2022)** -To study factors affecting logistics costs of enterprises in Lang Son province. Here, the author makes the suggestion that the cost of logistics can be reduced by lowering the cost of transportation infrastructure which include the transportation cost and warehousing cost.
- **AymenAloui (2021)**- In recent years, new methods and models for designing transportation networks have become necessary due to factors including competition, globalisation-related issues, and environmental concerns. The design and management of sustainable supply chains have been viewed as utilising a new and creative technique known as horizontal logistics collaboration. This strategy is focused on resource sharing amongst participants in related supply chains.

- **A Aziz (2021)** - The purpose of this study is to identify the factors affecting emissions reduction and logistical costs in Indonesia. The findings demonstrate that green logistics, which emphasises greater energy-efficient use, may reduce emissions and logistical costs in Indonesia. Fiscal policy encourages lowering emissions and boosting the logistics sector's competitiveness.

III.OBJECTIVES

- To study the various costs involved in the logistics management in Q2Q Solutions.
- To find how to cut the excess expenses associated with warehousing.
- To examine the problem facing frequently in machinery handling and its maintenance in warehousing facility of Q2Q Solutions.
- To give suggestions to improve the maintenance in the warehouse.

IV.RESEARCH METHODOLOGY

RESEARCH DESIGN:

Descriptive Research Design:

The goal of descriptive research design is to identify and characterize the traits of a population or a phenomena. In order to find patterns, connections, or trends, it entails acquiring data by observation, surveys, interviews, or other techniques, then summarizing and interpreting the findings. In order to respond to inquiries concerning the current status of a population or phenomena, such as its demographics, behaviors, attitudes, or preferences, descriptive research design is utilized

SAMPLING TECHNIQUE:

Probability Sampling Method:

Probability sampling is a sampling technique that entails picking a sample, or a section of the population, at random. It is also known as random sampling on occasion.

SOURCES OF DATA:

The process of preparing and gathering data is referred to as data collection. This study is based on primary data.

Primary Data:

The primary data are those that are newly acquired, gathered for the first time, and hence possess original character. To acquire the employees' direct views on the most important aspects, an informal interview and a questionnaire were used to collect primary data.

SAMPLE SIZE:

Sample design:

Sample design is a predetermined strategy chosen before any data are actually obtained in order to create a sample from the available data. The population served as the source of the sample. There are 110 people in the sample. The study used the census methodology.

TOOLS FOR ANALYSIS:

Percentage method:

In this study Percentage method test was used. The percentage is used for making comparison between two or more series of data.

Chi-square test:

Chi-square analysis in statistics is to test the goodness of fit to verify the distribution of observed data with assumed theoretical distribution. Therefore it is a measure to study the divergence of actual and expected frequencies.

One-way anova:

In order to ascertain whether there is statistical support that the linked population means are statistically substantially different, one-way ANOVA ("analysis of variance") examines the means of two or more independent groups. A parametric test is one-Way ANOVA. The One-Factor ANOVA is another name for this test.

Karl Pearson's correlation:

The linear relationship between two continuous variables is described by the Karl Pearson correlation, commonly known as Pearson's correlation coefficient. It can be between -1 and +1 and is represented by the symbol "r".

LIMITATION OF STUDY

- This study is confined to Q2Q Solutions.
- This study is based on warehouse maintenance.
- It can be challenging to completely comprehend all of the variables that affect warehouse costs and to pinpoint the best strategies for cost optimisation.

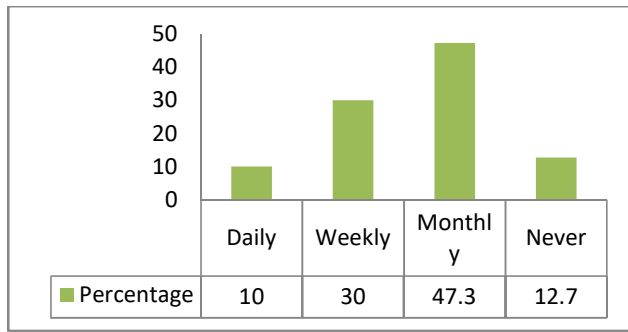
- The data collected for the research is fully on primary data given by the respondents. There is chance for personal bias. So, the accuracy is not true.

V. DATA ANALYSIS AND INTERPRETATION

A. PERCENTAGE ANALYSIS

Inspection period of machines

S. No	Inspection period	Respondents	Percentage
1	Daily	11	10
2	Weekly	33	30
3	Monthly	52	47.3
4	Never	14	12.7

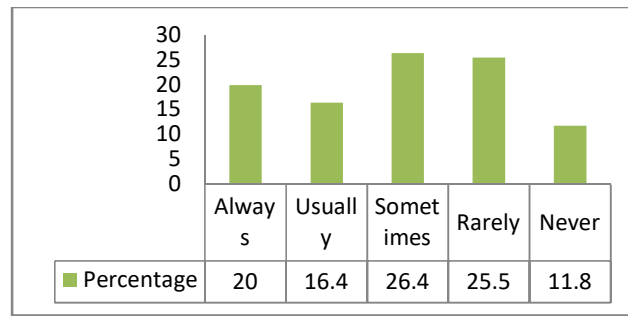


Interpretation:

From the above table it is interpreted that 10% of the respondents have chosen daily inspection, 30% have chosen weekly, 47.3% have chosen monthly, and 12.7% have chosen never.

Availability of maintenance team to identify and resolve issues

S. No	Particulars	Respondents	Percentage
1	Always	22	20
2	Usually	18	16.4
3	Sometimes	29	26.4
4	Rarely	28	25.5
5	Never	13	11.8

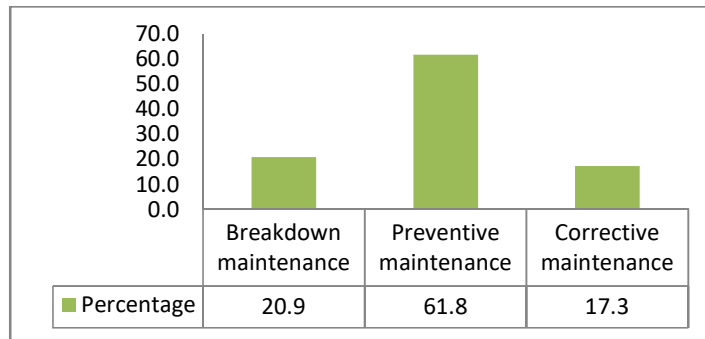


Interpretation

From the above table it is interpreted that 20% of the respondents says always, 16.4% says usually, 26.4% says sometimes, 25.5% says rarely, 11.8% says never.

Highly carried maintenance system

S. No	Particulars	Respondents	Percentage
1	Breakdown maintenance	23	20.9
2	Preventive maintenance	68	61.8
3	Corrective maintenance	19	17.3



Interpretation

From the above table it is interpreted that the number of respondents were 20.9% are breakdown maintenance, 61.8% are Preventive Maintenance and 17.3% are Corrective maintenance.

B. ONE-WAY ANOVA

Null hypothesis (H₀):

There is a significance difference between the availability of maintenance team with maintenance team responds in timely manner.

Alternate hypothesis (H₁):

There is no significance difference between the availability of maintenance team with maintenance team responds in timely manner

AVAILABILITY OF MAINTENANCE TEAM

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1	15	1.00	.000	.000	1.00	1.00	1	1
2	43	1.91	.294	.045	1.82	2.00	1	2
3	19	2.74	.452	.104	2.52	2.95	2	3
4	15	3.80	.414	.107	3.57	4.03	3	4
5	18	4.72	.461	.109	4.49	4.95	4	5
Total	110	2.65	1.268	.121	2.41	2.89	1	5

Test of Homogeneity of Variances

AVAILABILITY OF MAINTENANCE TEAM

Levene Statistic	df1	df2	Sig.
11.253	4	105	.000

AVAILABILITY OF MAINTENANCE TEAM

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	161.849	4	40.462	318.883	.000
Within Groups	13.323	105	.127		
Total	175.173	109			

Calculated value = 318.883

Tabulated value = 2.46

$F = F_{cal} > F_{tab}$ $F = 318.883 > 2.46$

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 availability of maintenance team with maintenance team responds in timely manner.

C. ANALYSIS USING KARL PEARSON'S CORRELATION

Null hypothesis (H0):

There is positive relationship between the availability of maintenance team with maintenance team addresses the issues.

Alternate hypothesis (H1):

There is negative relationship between the relationship between the availability of maintenance team with maintenance team addresses the issues.

	AVAILABILITY OF MAINTENANCE TEAM	MAINTENANCE TEAM ADDRESSES THE ISSUES
Pearson Correlation	1	.891**
Sig. (2-tailed)		.000
N	110	110
Pearson Correlation	.891**	1
Sig. (2-tailed)	.000	
N	110	110

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

$r = .891$

INFERENCE:

Since r is positive, there is positive relationship between the availability of maintenance team with maintenance team addresses the issues.

VI.FINDINGS

- Majority of (47.3%) respondents have chosen monthly inspection as inspection period of machineries.
- Majority of (26.4%) of the respondents respond to sometimes for the availability of maintenance team to identify and resolve issues.
- Majority of (61.8%) respondents to Preventive maintenance as highly carried maintenance system.

- 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 availability of maintenance team with maintenance team responds in timely manner.
- Since r is positive, there is positive relationship between the availability of maintenance team with maintenance team addresses the issues.

SUGGESTIONS & RECOMMENDATIONS

- The company's maintenance division must adhere to maintenance schedules and hire qualified personnel for the duties.
- The management must provide the maintenance department with strong assistance, and the business must keep an eye on the maintenance operations. If the business reduces the availability of spare parts, the outcomes will be positive.
- The business takes action to close the communication gap between contract workers and permanent employees which results in good maintenance of machineries in warehouse.
- Warehouse maintenance is a team effort, and educating employees on how to detect and report concerns may assist avoid minor problems from becoming significant ones. Training on correct equipment usage and safety measures can also assist to decrease the risk of accidents and equipment damage.
- Creating a maintenance schedule can assist guarantee that maintenance activities are completed on a regular and consistent basis. This can aid in the prevention of equipment failure and the reduction of repair expenses.

VII.CONCLUSION

Proper warehouse maintenance is critical to ensuring the facility's optimal operation, increasing efficiency, reducing downtime, and avoiding safety issues. Regular inspections, cleaning, repair, and replacement of equipment, and adherence to safety regulations are all examples of maintenance practices. The research might have assessed the efficacy of various maintenance practices, identified common concerns, and advised best practices for warehouse facility maintenance. Furthermore, the research may have examined the costs and advantages of various maintenance procedures in order to optimize warehouse operations while minimizing expenditures. Overall, the findings of a warehouse maintenance give important insights into how to successfully manage and maintain warehouse facilities in order to increase their efficiency and production.

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