

# **A STUDY ON TRANSPORTATION FLEET AND CARGO MANAGEMENT AT PICASTRA LOGISTICS PRIVATE LIMITED**

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

**APRIL 2023**



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## SCHOOL OF MANAGEMENT STUDIES

### BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **ANTAN DAVIS S (41410023)** who carried out the project entitled "**A STUDY ON TRANSPORTATION FLEET AND CARGO MANAGEMENT AT PICASTRA LOGISTICS PRIVATE LIMITED**" under my supervision from January 2023 to April 2023.

**Dr. SEETHAL K**

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External Guide

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## **DECLARATION**

I **ANTAN DAVIS S (41410023)** hereby declare that the Project Report entitled **“A STUDY ON TRANSPORTATION FLEET AND CARGO MANAGEMENT AT PICASTRA LOGISTICS PRIVATE LIMITED”** done by me under the guidance of **Dr. SEETHAL K** is submitted in partial fulfillment of the requirements for the award of Master of Business Administration degree.

**DATE:** 05/05/2023

**PLACE:** Chennai

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I would like to express my sincere and deep sense of gratitude to my Project Guide **Dr. SEETHAL K.** for her valuable guidance, suggestions and constant encouragement paved way for the successful completion of my project work.

I wish to express my thanks to all Teaching and Non-teaching staff members of the **School of Management Studies** who were helpful in many ways for the completion of the project.

**ANTAN DAVIS S**



30-03-2023

**TO WHOMSOEVER IT MAY CONCERN**

**Sub: Completion of MBA Project**

We wish to confirm that **Mr. S Antan Davis (Reg.Num: 41410023)**, who is pursuing final year MBA in Sathyabama Institute Of Science And Technology, Chennai, has successfully completed the MBA main project in Logistics in our concern titled “ **A STUDY ON TRANSPORTATION FLEET AND CARGO MANAGEMENT**” from 09-01-2023 to 30-03-2023.

During the tenure with us, his conduct & behavior was observed to be good.

We wish success in all the future endeavors.

For Picastra Logistics,

*Govindhan*

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---

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## **ABSTRACT**

The management assumes that cargo management is not the major part of the organization. But it sometimes fails because cargo management should be monitored in every part of the movement of goods in both export as well as import of the goods done by the organization.

Cargo management is a complex part of logistics where safety of cargo is concerned and depends purely on this. Cargo management involves many personnel and also equipment for a safer transportation. It is required to find out the problem based on certain aspects of transportation fleet (price, fuel, Income, problem faced by the industry). So it is necessary for Picastra Logistics Private Limited to monitor the transportation fleet and cargo managements.

Primary objective is to study the transportation fleet and cargo management in Picastra Logistics Private Limited. Secondary objectives are to assess the finance related problems in transportation fleet, analyze the tools and equipment used to handle cargo and find out and analyze various other problems in transportation fleet.

Convenience sampling method has been used in the research work. Multiple choice questions have been chosen to collect the responses from 120 employees. The data collected has been analyzed through various statistical tools like Karl Pearson's Correlation, Chi- square test and One-way Anova test. Numerous new findings has been derived from this research has helped to provide suitable suggestions to improve the transportation fleet and cargo management in Picastra Logistics Private Limited.

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## **LIST OF ABBREVIATIONS**

|       |   |                                          |
|-------|---|------------------------------------------|
| DM's  | - | Decision Maker's                         |
| FCL   | - | Full Container Load                      |
| FSP   | - | Fleet Sizing Problem                     |
| ICT   | - | Information and Communication Technology |
| LCL   | - | Less than Container Load                 |
| SAEVs | - | Shared Autonomous Electric Vehicles      |
| ULDs  | - | Unit Load Devices                        |
| VOTT  | - | Value of Travel Time                     |

# CHAPTER 1

## INTRODUCTION

### 1.1 INTRODUCTION

**Fleet** vehicles are groups of motor vehicles owned or leased by a business, government agency or other organization rather than by an individual or family. Typical examples are vehicles operated by car rental companies, taxicab companies, public utilities, public bus companies, and police departments.

*Fleet management* is the management of:

- Commercial motor vehicles such as cars, vans, trucks, specialist vehicles (such as mobile construction machinery), and trailers
- Private vehicles used for work purposes (the 'grey fleet')
- Aviation machinery such as aircraft (planes and helicopters)
- Ships
- Rail cars.

Fleet (vehicle) management can include a range of functions, such as vehicle financing, vehicle maintenance, vehicle telematics (tracking and diagnostics), driver management, speed management, fuel management and health and safety management. Fleet Management is a function which allows companies which rely on transportation in business to remove or minimize the risks associated with vehicle investment, improving efficiency, productivity and reducing their overall transportation and staff costs, providing 100% compliance with government legislation (duty of care) and many more. These functions can be dealt with by either an in-house fleet-management department or an outsourced fleet-management provider.

Fleet management software enables people to accomplish a series of specific tasks in the management of any or all aspects relating to a company's fleet of vehicles. These specific tasks encompass all operations from vehicle acquisition to disposal. Software, depending on its capabilities, allows functions such as recording driver and vehicle details, the tracking of procurement costs, scheduling of maintenance and servicing tasks, import of fuel transactions, and measuring of fleet performance via reports and charts.

Many firms, like Parcelforce, FedEx and R+L Carriers transport all types of cargo by road. Delivering everything from letters to houses to cargo containers, these firms offer fast, sometimes same-day, delivery.

A good example of road cargo is food, as supermarkets require deliveries daily to replenish their shelves with goods. Retailers and manufacturers of all kinds rely upon delivery trucks, be they full size semi trucks or smaller delivery vans. These smaller road haulage companies constantly strive for the best routes and prices to ship out their products. Indeed, the level of commercial freight transported by smaller businesses is often a good barometer of healthy economic development as it is these types of vehicles that move and transport literally anything, including couriers transporting parcel and mail. You can see the different types and weights of vehicles that are used to move cargo around.

Air cargo, commonly known as *air freight*, is collected by firms from shippers and delivered to customers. Aircraft were first used for carrying mail as cargo in 1911. Eventually manufacturers started designing aircraft for other types of freight as well.

There are many commercial aircraft suitable for carrying cargo such as the Boeing 747 and the bigger An-124, which was purposely built for easy conversion into a cargo aircraft. Such large aircraft employ quick-loading containers known as unit load devices (ULDs), much like containerized cargo ships. The ULDs are located in the front section of the aircraft.

Most nations own and utilize large numbers of military cargo aircraft such as the C-17 Globemaster III for logistical needs.

Popular commercial aircraft transformed to a cargo aircraft such as Saab 340A is designed for high revenue and profitability in short / medium haul operations.

Seaport terminals handle a wide range of maritime cargo.

- Automobiles are handled at many ports and are usually carried on specialized roll-on/roll-off ships.
- Break bulk cargo is typically material stacked on pallets and lifted into and out of the hold of a vessel by cranes on the dock or aboard the ship itself. The volume of break bulk cargo has declined dramatically worldwide as containerization has grown. One way to secure break bulk and freight in intermodal containers is by using Dunnage Bags.
- Bulk cargo, such as salt, oil, tallow, and scrap metal, is usually defined as commodities that are neither on pallets nor in containers. Bulk cargoes are not handled as individual pieces, the way heavy-lift and project cargoes are. Alumina, grain, gypsum, logs, and wood chips, for instance, are bulk cargoes.
- Neo-bulk cargo comprises individual units that are counted as they are loaded and unloaded, in contrast to bulk cargo that is not counted, but that are not containerized.<sup>[2]</sup>
- Containers are the largest and fastest growing cargo category at most ports worldwide. Containerized cargo includes everything from auto parts, machinery and manufacturing components to shoes and toys to frozen meat and seafood.
- Project cargo and the heavy lift cargo include items like manufacturing equipment, air conditioners, factory components, generators, wind turbines, military equipment, and almost any other oversized or overweight cargo which is too big or too heavy to fit into a container.

## **1.2 INDUSTRY PROFILE**

Logistics is regarded as the backbone of the economy, providing efficient and cost effective flow of goods on which other commercial sectors depend. Logistic industry in India is evolving rapidly, it is the interplay of infrastructure, technology and new types of service providers, which defines whether the logistic industry is able to help its customers reduce their costs in logistic sector and provide effective services.

Despite of the weak economic sentiments, the logistics industry continues to witness growth due to the growth in retail, e-commerce and manufacturing sectors. The Global Logistics sector was expected to grow 10-15% in the period 2013-14. Logistics industry is expected to reach over USD 2 billion by 2019. Rise of e-commerce logistics and increased domestic consumption will lead the way for the industry in the coming years. With a promise of growth and improvements, the service oriented logistics industry is ready to expand beyond the horizons in the latter half of this decade.

### **1.2.1 *Recent Scenario***

The recent Indian logistics sector comprises of inbound and outbound segments of the manufacturing and service supply chains. Of late, the logistics infrastructure has gained a lot of attention both from business industry as well as policy makers. The role of managing this infrastructure, to effectively compete has been slightly under-emphasized. Inadequate logistics infrastructure has an effect of creating bottlenecks in the growth of an economy. The logistics management regimen has the capability of overcoming the disadvantages of the infrastructure in the short run while providing cutting edge competitiveness in the long term. There exist several challenges and opportunities for logistics sector in the Indian economy.

### **1.2.2 *Challenges Faced by the Recent Logistics Industry in India***

The most essential challenge faced by the industry today is insufficient integration of transport networks, information technology and warehousing &

distribution facilities. Regulations exist at a number of different tiers, is imposed by national, regional and local authorities. However, the regulations differ from city to city, hindering the creation of national networks.

Trained Manpower is essential both for the third party logistics sector as well as the manufacturing and retailing sectors, which is very weak at a practical level, i.e., IT, driving and warehouse as well as at a higher strategic level. The disorganized nature of the logistics sector in India, its perception as a manpower-heavy industry and lack of adequate training institutions has led to a shortfall in skilled management and client service personnel. There is a lack of IT standard, equipment and poor systems integration.

### **1.2.3      *Popular Read: I have data. I need insights. Where do I start?***

Poor facilities and management are the reason for high levels of loss, damage and deterioration of stock, mainly in the perishables sector. Part of the problem is insufficient specialist equipment, i.e. proper refrigerated storage and containers, but it is also partly down to lack of training. The practitioners and the academicians are now aware of the importance of logistics and supply chain; however the field is still under penetrated as far as research is concerned. It is essential to prioritize research and development so that the weaknesses in the industry can be taken care of and improved.

### **1.2.4      *Solutions to some of the Challenges***

Infrastructure is the backbone of every country's growth and prosperity and for the logistics industry to flourish special emphasis has to be on building world-class road networks, integrated rail corridors, modern cargo facilities at airports and creation of logistics parks which need to be given a status equivalent to Special Economic Zones.

It is necessary to realize that the benefits which can bestly be practiced in logistics industry can be brought about by the companies by establishing training intuitions, so that there is improvement in the overall service quality of the sector. Good storage and Warehousing facilities are important for the growth of the

logistics industry. With the increase in the transportation of perishable products, the logistics agencies need to give a lot of importance to enhancing the Warehousing facilities.

Warehousing is required to go to the next level taking into account the changing dynamics of JIT manufacturing, global procurement and new models of sales and distribution. Emphasis on research and development is potent mainly because it encourages the use of indigenous technology which can make the industry cost competitive and can also bring about improvement in services thereby using better, effective and efficient services. Particular focus has to be on research in process excellence which can help to eliminate inefficiencies and bring Indian logistics on par with global practices.

#### ***1.2.5 Popular Read: Factors Influencing the Paradigm Shift in the Logistics Sector in India***

##### *Future prospects*

The logistics firms are moving from a traditional setup to the integration of IT and technology to their operations to reduce the costs incurred as well as to meet the service demands. The growth of the Indian logistics sector depends upon its soft infrastructure like education, training and policy framework as much as the hard infrastructure.

To support India's fast paced economy growth of logistics industry is very essential. It is estimated that the Indian logistics industry will continue to show robust growth of 10-15% annually, leading the pace of growth of the economy at large.

The global economic outlook, indeed that of India is expected to significantly improve as India Inc begins to tackle the economic downturn. With a new government many policies are expected to be implemented which will give a fresh impetus to India's growth engine particularly in the corporate and SME sector which in turn will expand demand for the logistics sector.

With the implementation of GST, the logistics companies, which are currently forced to set up many small warehouses across multiple cities can set up just a few, big warehouses region wise and can follow the hub-and-spoke model for freight movement from the warehouses to the different manufacturing plants, wholesale outlets, retail outlets and the various POS. This growth is backed by the boom in the e-commerce sector and expansionary policies of the FMCG firms.

This has increased the service geography of the logistics firms but they also have to meet the demands of quick delivery and tight service level agreements. The industry has moved from being just a service provider to the position which provides end to end supply chain solutions to their customers. Thus, all this has paved the way for further growth of Logistics and Warehousing industry in the coming years.

### **1.3 COMPANY PROFILE**

Picastra logistics is your one stop shop - solution and your cargo to be delivered in a timely manner. Logistic Companies have successfully revolutionized the freight services in India. The company's team of experienced logistics experts will give updates during the product movement process. The company will complete the long paper-work, follow up with the crew to find out the present position of the item and then going through the tedious system of the respective port after reaching the destination.

Once the clients have contacted the team of freight professionals will get the privilege of selecting the most efficient cargo delivery option to experience Shipping Project work India at an affordable rate. Clients can comfortably choose between the air or ship freight and get the products delivered as early as possible. Team is known for helping the ship your product at any place in the world. The best thing about the services is that, clients will get continuous update about the product position. This Project Movement India service will help in timely customs clearance and then delivers the merchandise within the deadline. The staffs are well trained and they offer a myriad of services from which you may select the most suited one.

The freight option allows to select from the list of services, namely door to door services, Air freight, import & export services, documentation handling & processing, insurance, local air freight, cartage and delivery. Client may even check out the customized ship freight services and transfer the good to any major international ports around the world. Contact us as we are reliable and with years of experience ensures safe delivery of the products within time.

Company believes that business is not measured purely in financial terms. It also believe that the way they go about achieving their success is as important as success itself.

The Logistics division has strategically located facilities in all capital city ports and provides road and rail container transport, customs and quarantine services, container parks, intermodal terminals, warehousing and international freight forwarding.

Detailed information on these services, facility locations and contacts are contained under the divisional tabs above.

### ***Vision & Values***

They believe that their primary purpose is to connect people and products. Their vision guides in the efforts to achieve this. And their values articulate what they stand for and how they will act. Together they keep us focused on what is important: our people , their customers, our shareholders and their wider community .

It also provides the framework for our mission: to harness our significant resources, know-how and passion to deliver the optimal logistics solutions for our customers.

### ***Our Vision***

Our vision is to be:

- able to provide an unrivalled set of supply chain capabilities

- an integral component of their customer's success
- a group of businesses that are individually excellent and collectively unbeatable
- creating sustainable value for our shareholders

### *Our Values*

We value:

- integrity and trust
- safety
- continuous improvement
- teamwork
- being open and transparent

### *Our Core Beliefs*

We believe that:

- all injuries are preventable and everyone has a right to go home safely
- people perform best when they are empowered, accountable and recognized
- if they show other people respect, they will be respected
- they will not always get things right and learning from our mistakes is part of their progress
- how they go about achieving success is as important as success itself
- they must act ethically and within the law
- Their customer's success creates our success.

## **1.4 INDUSTRY PROFILE**

### **1.4.1 *Corporate Responsibility***

They know the role of logistics within local communities is far-reaching - they understand that the use of human and natural resources in meeting the business needs impacts the people they work with, the communities we work in and the planet they inhabit.

While they're committed to creating sustainable value for their shareholders, they're also committed to expanding their business sustainably, with integrity and with respect for the communities they work in.

### **1.4.2 *Services***

PICASTRA Logistics invented the idea of connecting like port services into one operating group and as the only Indian company to offer all international and land logistics services in-house they retain control over the entire process.

At the top of their game, our highly-trained and experienced personnel are experts in their own right. Competent and of high integrity, they constantly provide creative, innovative and smart solutions to any shipping request.

Together their individual strengths have helped create a power-packed team who are always on their toes. They live by the philosophy that the customer comes first, no matter how demanding the request or how challenging the deadline.

1. Air freight Forwarding
2. Ocean Freight Forwarding
3. Contract Logistics
4. Supply chain logistics
5. Warehousing & Distribution
6. Transport
7. Multi-Modal Transportation

### **1.4.3      *Air Freight Forwarding***

We provide special handling services for sensitive freight - high value items, precision equipment, dangerous goods and temperature controlled transportation.

#### *Air Freight Import*

PICASTRA Logistics offers a comprehensive, worldwide airfreight service, including coordination of customer's orders with overseas suppliers, consolidation, confirmation of dispatch, pre-alert and arrival notices, Customs clearance & delivery.

#### *Air Freight Export*

Our team of experienced operators are trained in all aspects of export handling requirements, including Customs Declaration, Quarantine Permit & Consular document processing.

### **1.4.4      *Ocean Freight Forwarding***

Frequent sailing services enable greater flexibility in managing the supply chain.

They offer a wide range of sea freight services, including Full Container Load (FCL) and Less than Container Load (LCL) consolidation services and project cargo movement, throughout their global network.

#### *Sea Freight Import*

PICASTRA Logistics offers a comprehensive, worldwide sea freight service, including coordination of customer's orders with suppliers, confirmation of dispatch, pre-alert and arrival notices, Customs clearance & delivery.

### *Sea Freight Export*

Our experienced export team is well versed in all aspects of export sea freight shipping, including specialised freight, temperature controlled items, dangerous goods and project shipments.

#### **1.4.5 Contract Logistics**

They combine the skills and experience of our operations managers and supply chain designers, to design, implement and operate logistics solutions that improve availability while reducing inventory.

### *Supply Chain Logistics*

PICASTRA Logistics' precise planning, execution and reporting skills set the industry standard for supply chain logistics solutions. Their team will ascertain your business goals and challenges and create innovative and cost-effective solutions in line with your business strategies.

#### **1.4.6 Transport**

PICASTRA Logistics' 16+ prime movers and extensive range of trailers across all Chennai's key ports quickly and effectively move cargo from port to warehouses, retail stores, or directly to your customer. Plus our outstanding IT capabilities capture and record every freight movement.



#### **1.4.7      *Warehousing and Distribution***

PICASTRA Logistics is a well-being supplier of Chennai-wide warehousing and distribution solutions. They offer complete warehousing services including all modes of distributions, FMCG import specialist services, customs services and an IT system for end-to-end visibility. Most of their warehouses are located either on the port or at an inland port location. By location alone, the ports-to-warehouse synergies are the best in the business.



#### **1.4.8      *Multi- Modal Transportation***

This is a service provided under the Supply Chain Management solution tailored to the specific customers, using a combination of road and rail transportation providing them with the most cost effective way of moving their raw materials or finished goods. Currently they are transporting plastic resin, steel billet, feldspar, clinker and gypsum board.

To support the inter-modal transportation services, Infinity operates a number of terminals and yards at strategic locations for loading/unloading activities as well as container storage, servicing and cleaning.

#### **1.4.9      *Liquid Bulk Packaging***

At the PICASTRA Logistics Group, they realise the need for highly specialised tanks for liquid bulk packaging. Liquids such as food-based or non-hazardous chemicals and even solids require a packaging that is durable, convenient and cost-effective.

In a nutshell, our services include:

- Dedicated services, door-to-door shipments, JIT deliveries
- Short and long-term storage
- Providing Spacekraft IBC with both domestic and export shipments of a wide variety of solid and liquid products

#### **1.4.10      *Facilities***

All PICASTRA Logistics assets are located to maximise efficiencies for their clients. PICASTRA Logistics' multi-user terminals are all strategically located for port shuttles, interstate and regional rail services. This allows a seamless connection to warehousing, depot and container park facilities as well as all import and export movements.

And by operating 24/7 in our largest ports they can offer our clients unparalleled synergies. This comprehensive network of owned facilities.

#### **1.4.11      *Value Added Services***

##### *Lead Logistics Provider*

As a Lead Logistics Provider we rely on our superior Information and Communication Technology and our specialized resources to handle the extended supply chain and the challenges of multiple suppliers and service providers across the globe.

### *Advisory and Consultation*

They provide expert Advisory and Consultation in matters related to Customs formalities, Certifications and Approvals by Other Governmental Agencies in all Export and Import shipments. Together with their partners, they are able to do consultation on Project Shipment, Cargo handling and transportation.

### *End to End*

Our End to End service provide peace of mind to the customers knowing that their cargo would be picked up at their premises and delivered right up to their customers doorsteps. They ensure the security and the integrity of the cargo and take care of the Customs formalities from point of origin to the point of destination.

### ***Integration***

They believe in Integration to integrate their 8 core business effortlessly to serve and meet the specific requirements of the customers. Customers should be able to enjoy a seamless service through a single window from the rather than having to run around communicating with various channels just to find out the status of the delivery.

#### **1.4.12 Technology**

Our state-of-the-art technology system provides unparalleled real-time, 24/7 tracking and status. The technology we offer includes:

- GPS-based Geofence technology
- Transport and warehouse visibility system
- Global track and trace system

PICASTRA Logistics operates one national system for all landside business operations. It is updated in real time for 24/7 online tracking. Freight is tracked in real time with status messages sent automatically based on Geofences

and without driver activation. Any customer can enjoy B2B interfaces on their operating systems with real-time data updates.

#### **1.4.13     *Smart in Motion***

Exceeding expectations by delivering extraordinary results.

Picastra Logistics has a formidable track record in developing Smart supply chain solutions for local and global clients across a multitude of industries. And by Smart a mean sustainable, measurable, adaptable, resourceful and transformational solutions. Solutions that drive performance, productivity and profitability.

They do this by forming powerful partnerships with their clients. By aligning their supply chain to their business strategy. They identify hidden problems by knowing what to look for and where to find them. They then integrate and harness the collective capabilities of their supply chain, transforming them into profitable business opportunities.

By thinking and working smart, they've developed a new breed of sustainable supply chains that are more efficient, effective, flexible and responsive to ever changing market needs.

### **1.5            NEED FOR THE STUDY**

The management assumes that cargo management is not the major part of the organization. But it sometimes fails because cargo management should be monitored in every part of the movement of goods in both export as well as import of the goods done by the organization.

Cargo management is a complex part of logistics where safety of cargo is concerned and depends purely on this. Cargo management involves many personnel and also equipment for a safer transportation. It is required to find out the problem based on certain aspects of transportation fleet (price, fuel, Income, problem faced by the industry). So it is necessary for Picastra Logistics Private Limited to monitor the transportation fleet and cargo managements.

## **1.6 SCOPE OF THE STUDY**

- Assess the transportation fleet and cargo managements in a transportation process.
- To find out the legal issues faced in transportation fleet and find out solution for the same.
- Effective transportation fleet and cargo managements can be determined.
- Safety measures carried out during cargo management can be defined.
- Tools and equipment used to handle cargo can be defined.
- Time required to handle the cargo can be measured.

## **1.7 OBJECTIVES OF THE STUDY**

### **1.7.1 *Primary Objective***

To study the transportation fleet and cargo management in Picastra Logistics Private Limited.

### **1.7.2 *Secondary Objectives***

1. To assess the finance related problems in transportation fleet
2. To analyze the tools and equipment used to handle cargo.
3. To examine the measures of care taken on cargo.
4. To find out and analyze various other problems in transportation fleet
5. To evaluate the cargo management process during transportation.
6. To check for effective packaging of cargo.
7. To provide suitable suggestions to improve the transportation fleet and cargo management in Picastra Logistics Private Limited

## **CHAPTER**

### **REVIEW OF LITERATURE**

**Ion Nicolae, Stancel et al., (2017)** in their article “Fleet Management System for Truck Platoons - Generating an Optimum Route in Terms of Fuel Consumption” they addressed that the development of a system that monitors and informs a road train, that forms in real-time, about the length of a selected route, the travel time on the route, and especially the route fuel consumption. By collecting information from fleets of trucks, the communication interface between the vehicle and the fleet monitoring and information system will cover a large area of interest. The system will receive data from the vehicles and after a specific processing stage, will display optimal routes in terms of fuel consumption.

**A.N.Melnikoval, I. Lyubimov et al., (2016)** “Improvement of the Vehicles Fleet Structure of a Specialized Motor Transport Enterprise” This article considers the developed system of solid domestic waste collection and removal. The scientists’ contribution and various methods to improve this system are analyzed. A mathematical model estimating the efficiency of a specialized motor transport enterprise functioning, engaged in collecting and removing solid domestic waste is drawn. The optimum rolling stock structure for the specialized motor transport enterprise is determined. Also, the results and the conclusions of the executed research are presented.

**Alfonso J. Pedraza-Martinez, Luk N. Van Wassenhove et al., (2012)** in their paper “Transportation and vehicle fleet management in humanitarian logistics: challenges for future research” they discussed about Transportation and vehicle fleet management in humanitarian logistics have characteristics virtually unexplored by OR researchers. They provide evidence-based insights into the logistics challenges imposed by the dual objective of relief and development, decentralization, earmarked funding, and field operating conditions. They comment

on why these characteristics help explaining the persistence of aging fleets, excessive fleet sizes, low fleet standardization, and service delays: problems humanitarian fleet managers fight on a daily basis to improve their service levels. They propose avenues for future research to address strategic, tactical, and operational challenges derived from the defining characteristics of humanitarian logistics discussed in the paper.

**Shidong Liang, Minghui Ma and Shengxue He et al., (2019)** in this research article “Multi objective Optimal Formulations for Bus Fleet Size of Public Transit under Headway-Based Holding Control” they give solutions for the bus transportation with the development of advanced technologies for data collection, real-time bus control strategies have been implemented to improve the daily operation of transit systems, especially headway-based holding control which is a proven strategy to reduce bus bunching and improve service reliability for high-frequency bus routes, with the concept of regulating headways between successive buses. This hot topic has inspired the reconsideration of the traditional issue of fleet size optimization and the integrated bus holding control strategy. The traditional headway-based control method only focused on the regulation of bus headways, without considering the number of buses on the route. The number of buses is usually assumed as a given in advance and the task of the control method is to regulate the headways between successive buses. They did not consider the bus fleet size problem integrated with headway-based holding control method. Therefore, this work has presented a set of optimal control formulations to minimize the costs for the passengers and the bus company through calculating the optimal number of buses and the dynamic holding time, taking into account the randomness of passenger arrivals. A set of equations were formulated to obtain the operation of the buses with headway-based holding control or the schedule-based control method. The objective was to minimize the total cost for the passengers and the bus company in the system, and a Monte Carlo simulation based solution method was subsequently designed to solve the optimization model. The effects of this optimization method were tested under different operational settings. A comparison of the total costs was conducted between the headway-based holding control and the schedule-based holding control. It was found that the model was capable of reducing the costs of the Bus Company and

passengers through utilizing headway-based bus holding control combined with optimization of the bus fleet size. The proposed optimization model could minimize the number of buses on the route for a guaranteed service level, alleviating the problem of redundant bus fleet sizes caused by bus bunching in the traditional schedule-based control method.

**Hongbo Du, Ziaul Huque, and Raghava R. Kommalapati et al., (2018)** in their research “Impacts of Biodiesel Applied to the Transportation Fleets in the Greater Houston Area” they giving idea to decrease fossil fuel use and greenhouse gas emissions from fleet vehicles, more and more biodiesel is used in vehicles in the Houston metropolis. The GREET model was used for simulating the fuel cycle emissions of diesel vehicles using different biodiesel blends in Houston. The fuels examined were diesel-biodiesel blends of B0, B5, B20, B50, B80, and B100. The energy and water use and emissions from vehicles fueled with the blends were investigated. The study shows that the reductions in GHG emissions are significant at the Well-to-Pump stage, and all the emissions, except GHGs and, reduce at the Pump-to-Wheel stage. The overall Well-to-Wheel analysis shows that biodiesel is beneficial for both passenger cars and heavy duty trucks. However, the benefits are more pronounced for passenger cars compared to heavy duty vehicles. When 50% of diesel passenger cars and HDDTs are switched to B20 in the Greater Houston area in 2025, the daily GHG emissions will be reduced by 2.0 and 712.1 CO<sub>2</sub>-equivalent tonnes, respectively.

**Patrick M. Boesch, Francesco Ciari, Kay W. Axhausen et al., (2016)** in their papern “Autonomous Vehicle Fleet Sizes Required to Serve Different Levels of Demand” they present transportation and vehicle fleet management in humanitarian logistics have characteristics virtually unexplored by OR researchers. They provide evidence-based insights into the logistics challenges imposed by the dual objective of relief and development, decentralization, earmarked funding, and field operating conditions. They comment on why these characteristics help explaining the persistence of aging fleets, excessive fleet sizes, low fleet standardization, and service delays: problems humanitarian fleet managers fight on a daily basis to improve their service levels. They proposed avenues for future

research to address strategic, tactical, and operational challenges derived from the defining characteristics of humanitarian logistics.

**T. Donna Chen, Kara M. Kockelman et al., (2016)** “Management of a Shared Autonomous Electric Vehicle Fleet: Implications of Pricing Schemes”. The market potential of a fleet of shared autonomous electric vehicles (SAEVs) is explored by using a multinomial logit mode choice model in an agent-based framework and different fare settings. The mode share of SAEVs in the simulated midsize city (modeled roughly after Austin, Texas) is predicted to lie between 14% and 39% when the SAEVs compete with privately owned, manually driven vehicles and city bus service. The underlying assumptions are that SAEVs are priced between \$0.75/mi and \$1.00/mi, which delivers significant net revenues to the fleet owner–operator under all modeled scenarios; that they have an 80-mi range and that Level 2 charging infrastructure is available; and that automation costs are up to \$25,000 per vehicle. Various dynamic pricing schemes for SAEV fares indicate that specific fleet metrics can be improved with targeted strategies. For example, pricing strategies that attempt to balance available SAEV supply with anticipated trip demand can decrease average wait times by 19% to 23%. However, trade-offs exist within this price setting: fare structures that favor higher revenue-to-cost ratios—by targeting travelers with a high value of travel time (VOTT) - reduce SAEV mode shares, while those that favor larger mode shares - by appealing to a wider VOTT range - produce lower payback.

**Jacek Żak, Adam Redmer and Piotr Sawicki et al, (2011)** in their study “Multiple objective optimization of the fleet sizing problem for road freight transportation” they considered A fleet sizing problem (FSP) in a road freight transportation company with heterogeneous fleet and its own technical back-up facilities. The mathematical model of the decision problem is formulated in terms of multiple objective mathematical programming based on queuing theory. Technical and economic criteria as well as interests of different stakeholders are taken into account in the problem formulation. The solution procedure is composed of two steps. In the first one, a sample of Pareto-optimal solutions is generated by an original program called MEGROS. In the second step, this set is reviewed and evaluated, according to the Decision Maker's (DM's) model of preferences. The

evaluation of solutions is carried out with an application of an interactive multiple criteria analysis method, called Light Beam Search (LBS). Finally, the DM selects the most desirable, compromise solution.

**Alessandro Perego , Riccardo Mangiaracina and Sara Perotti et al, (2011)** in their study “ICT for logistics and freight transportation: a literature review and research agenda” they identified the most important issues that need to be addressed in future research. The purpose of this paper is to classify research on information and communication technology (ICT) for logistics and freight transportation on the basis of the main themes and methods and proposes directions for future research. The review is based on 44 papers published from 1994 to 2009 in international peer-reviewed journals. The academic papers are analysed and classified according to the research methodology adopted and the themes addressed. While there are many contributions taking the “public transportation” perspective (i.e. the viewpoint of public stakeholders), papers focussing on the “private transportation” perspective (i.e. the viewpoint of the private companies offering logistics and transportation services) are fewer and relatively more recent. Additionally, even though in recent years researchers have also started to examine the decision-making process of ICT adoption, many themes are under-represented in literature, such as the subject of integration among different application types, empirical research on ICT adoption and the role of technology providers in the adoption process. As far as the methodology is concerned, the review revealed that many of the papers examined are either conceptual papers or empirical studies (i.e. mostly based on surveys, or else on case studies or interviews), while simulation and modelling are rarely present. While efforts were made to be all inclusive, significant research efforts may have been inadvertently omitted. However, the authors believe that this review is an accurate representation of the body of research on ICT for logistics and transportation companies published during the specified timeframe, and feel that confidence may be placed on the resulting assessments.

**Sebastiaan A. Meijer, Igor S. Mayer et al., (2011)** in their paper “Gaming Rail Cargo Management: Exploring and Validating Alternative Modes of Organization” Stakeholders in the Netherlands’ The authors present the results of

a research project that used gaming to explore and validate alternative organizational methods for the management of rail cargo capacity with decision makers and subject matter experts from ProRail, the Netherlands' railway infrastructure manager. Various scenarios for the organization of rail cargo capacity management were played out, tested, and extensively debriefed in three project phases. The gaming sessions demonstrated that open information sharing among stakeholders does not depend on the introduction of price mechanisms and is, indeed, a more effective way of managing capacity. The authors conclude that it is vital to introduce gaming gradually and build up organizational acceptance for this method. However, once acceptance has been achieved, gaming can generate valuable insight into strategic behavior and the performance of sociotechnical infrastructures. The rail cargo sector exhibit strategic behavior that causes irregularity and unpredictability in freight trains. This leads to the suboptimal use of scarce rail capacity.

**P. BartodziejU, Derigs et al., (2007)** in their paper "O&D revenue management in cargo airlines - a mathematical programming approach" they present a mathematical programming based approach for revenue management in cargo airlines. The approach is based on a modified version of a multi-commodity network flow model which has been developed in a decision support approach for schedule planning in cargo airlines. Authors think that using the same concept for planning and revenue management is essential for consistency of planning and operation. To meet the real-time requirements of revenue management special computational strategies for solving the large models are necessary.

**Li Yen Shue , Li Yen Shue (2003)**, in their paper "A study of logistics infomediary in air cargo tracking" they explains the importance of infomediary. In ecommerce, the infomediary is rapidly becoming an important business model on the Web. A low cost Web based infomediary for the air cargo industry can help integrate Air Cargo service providers and their customers, and thus improve the productivity of the logistics chain. Customers can access flight information of cargo carriers through the infomediary in a much more simplified way, thus management can better plan the subsequent operations. They Proposes a three tier paradigm for developing an air cargo logistics infomediary. This paradigm integrates

emerging technologies of the next generation Web based systems to address the three issues for the development. A prototype system was developed to demonstrate its capability in accepting requests from general browsers, retrieving data from different platforms, and presenting data in a consistent and personalized format.

**R.E. Gregson (1993)**, in their study “Logistics Systems Modelling: An Application to Cargo Handling Research” In investigating a principal area of a certain African country's total distribution network, viz the cargo handling operations within its main Port, a logistics systems model was used as a basis of the research design to measure the current cargo handling performance. In this article, the reader is taken step by step through the research method, data collection and analysis, hopefully to demonstrate the practical application of the model and the implications for its further use.

**Johnson, M. E. (2002)** Product design collaboration: capturing lost supply chain value in the apparel industry. Tuck School of Business Working Paper, (02-08) the apparel exports supply chain falls under the category of buyer-driven value chains. In this kind of chain large retailers, marketers and branded manufacturers play the pivotal roles in setting up decentralized production networks in a variety of exporting countries, typically located in developing countries with low entry barriers. In buyer-driven chains, profits come from combinations of high-value research, design, sales, marketing and financial services that allow the retailers.

**Christopher et al., (2004)** Creating agile supply chains in the fashion industry. With consumers demanding more variety, more fashion, more product access and lower prices; business is always looking for new suppliers, sourcing strategies and techniques. These characterize a complex supply chain. Interestingly availability of data makes the industry a suitable repository for efficient supply chain management research and practices

**Hasan and Alim (2010)** Bangladesh, which is one of the leading garment exporting countries has many logistics related issues and challenges which affect lead time of apparel export process. Delay in export documentation

activities, delay due to bureaucratic process, port congestion (lack of efficiency and sufficient infrastructural facilities), poor infrastructure in railway and road transport, lack of communication facilities are major logistics hindrances.

The definition of **de Broses (2004)** also clearly positions tracking to the field of logistics and distribution. Traceability, however, has to be ensured in any parts of the value adding processes and there are several critical traceability points, i.e. points where materials are portioned, divided, mixed, separated, formed, cooked, turned, bored or wrapped, in any production process. Traceability data is also used in a wide range of applications. Besides logistics applications, traceability data is used for recall applications, product-liability-prevention applications, quality- and process improvement applications, proof-of-quality and proof-of-origin applications, security applications, after-sales applications, and accounting applications.

## **CHAPTER 3**

### **RESEARCH METHODOLOGY**

#### **3.1 RESEARCH DESIGN**

The research design indicates the type of research methodology under taken to collect the information for the study.

**Claire seltizental** defines as “research design is a catalogue of these phases and facts relating to the formulation of a research effort. It is the arrangement of collections and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure”.

Descriptive research includes surveys and fact finding enquiries of different kinds. The major purpose of descriptive research is description of the state of affairs as it exists at present. In social science and business research we acquire often use the term “Ex post facto” research for descriptive research studies. The main characteristics of this method are that the researcher has no control over the variables; he can only report what has happened or what is happening.

##### **3.1.1 Questionnaire Design**

The questionnaire framed for the research study is a structured questionnaire in which all the questions are predetermined before conducting the survey. The questions in the questionnaire are close-ended.

## **3.2 TYPES OF DATA**

### **3.2.1 *Primary Data***

Primary data are collected through questionnaire method.

### **3.2.2 *Secondary Data***

The secondary data are collected through literature review, websites, and magazines and also from the past records maintained by the company.

## **3.3 SAMPLING DESIGN**

A Sample design is a definite plan for obtaining a sample from a given population. It is the procedure used in selecting items for the sample.

### **3.3.1 *Sample Size***

Sample size=120 respondents

### **3.3.2 *Sampling Technique***

*Convenience sampling*

In this method the sample units are chosen primarily on the basis of the convenience to the investigator. The units selected may be each person who comes across the investigator very frequently.

## **3.4 TOOLS FOR ANALYSIS**

### **3.4.1 *Statistical Tools***

*Percentage Analysis*

Percentage method refers to a specified kind which is used in making comparison between two or more series of data. Percentages are based on descriptive relationship. It compares the relative items. Since the percentage reduces everything to a common base and thereby allow meaning comparison.

$$\text{Percentage} = \frac{\text{Number of respondents}}{\text{Total no of respondents}} \times 100$$

### 3.4.2 **Chi-Square Test**

A chi-square test (also chi squared test or  $\chi^2$  test) is any statistical hypothesis test in which the sampling distribution of the test statistic is a chi-square 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-square distribution as closely as desired by making the sample size large enough.

*Formula for Chi-Square test*

$$\chi^2 = \sum (\text{O}_i - \text{E}_i)^2 / \text{E}_i$$

Where  $\chi^2$  = Chi-square  
 $\text{O}_i$  = Observed Frequency  
 $\text{E}_i$  = Expected Frequency

$\chi^2$  is always positive and it ranges from 0 to  $\infty$ .

The expected value for the contingency tabulated as follows

$$\text{E} = ((\text{Row total} \times \text{Column total}) / \text{Grand total})$$

The sum of the observed and expected frequencies is always zero

$$\text{i.e. } (\text{O}_i - \text{E}_i) = 0$$

The  $\chi^2$  test depends on the set of observed and expected values and on the degrees of freedom

The  $\chi^2$  distribution is the limiting approximation of multinomial distribution.

### 3.4.3 One – Way ANOVA

In statistics one – way analysis of variance (abbreviated **one – way ANOVA**) is a technique used to compare means of two or more samples (using the F distribution). This technique can be used only for numerical data.

The ANOVA tests the null hypothesis that samples in two or more groups are drawn from the same population. To do this, two estimates are made of the population variance. These estimates rely on various assumptions (see below). The ANOVA produces an F statistic, the ratio of variance calculated among the means to the variance within the samples.

If the group means are drawn from the same population, the variance between the group means should be lower than the variance of the samples, following central limit theorem. A higher ratio therefore implies that the samples were drawn from different populations.

### 3.4.4 Coefficient of Correlation

The quantity  $r$ , called the linear correlation coefficient, measures the strength and the direction of a linear relationship between two variables. The linear correlation coefficient is sometimes referred to as the Pearson product moment correlation coefficient in honor of its developer Karl Pearson. The mathematical formula for computing  $r$  is:

$$r = \frac{n \sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2} \sqrt{n(\sum y^2) - (\sum y)^2}}$$

where  $n$  is the number of pairs of data.

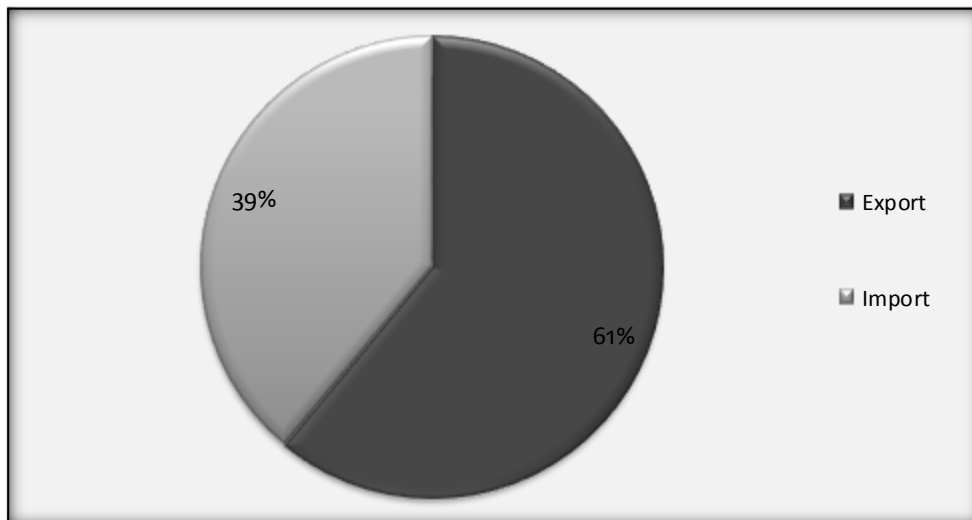
## CHAPTER 4

### DATA ANALYSIS AND INTERPRETATION

#### 4.1 PERCENTAGE ANALYSIS

**Table 4.1.1: Type of the Shipment**

| S.NO | PARTICULARS | NO.OF SHIPMENTS | PERCENTAGE |
|------|-------------|-----------------|------------|
| 1    | Export      | 73              | 61%        |
| 2    | Import      | 47              | 39%        |
| 3    | Total       | 120             | 100%       |



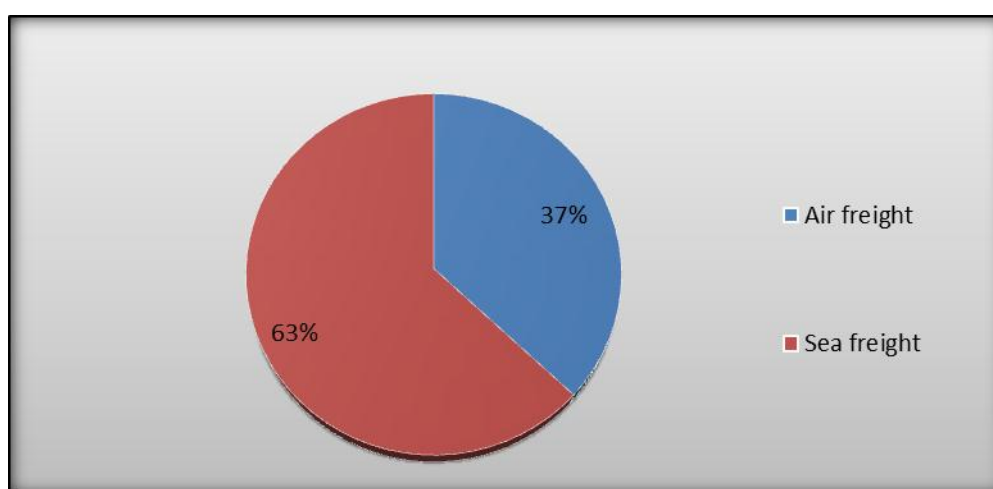
**Chart 4.1.1: Type of the Shipment**

#### ***Inference***

From the above table and chart it is inferred that 61% of the shipments are exported and 39% of the shipments are imported

**Table 4.1.2: Mode of the Shipment**

| S.NO | PARTICULARS | NO.OF SHIPMENTS | PERCENTAGE |
|------|-------------|-----------------|------------|
| 1    | Air freight | 44              | 37%        |
| 2    | Sea freight | 76              | 63%        |
| 3    | Total       | 120             | 100%       |



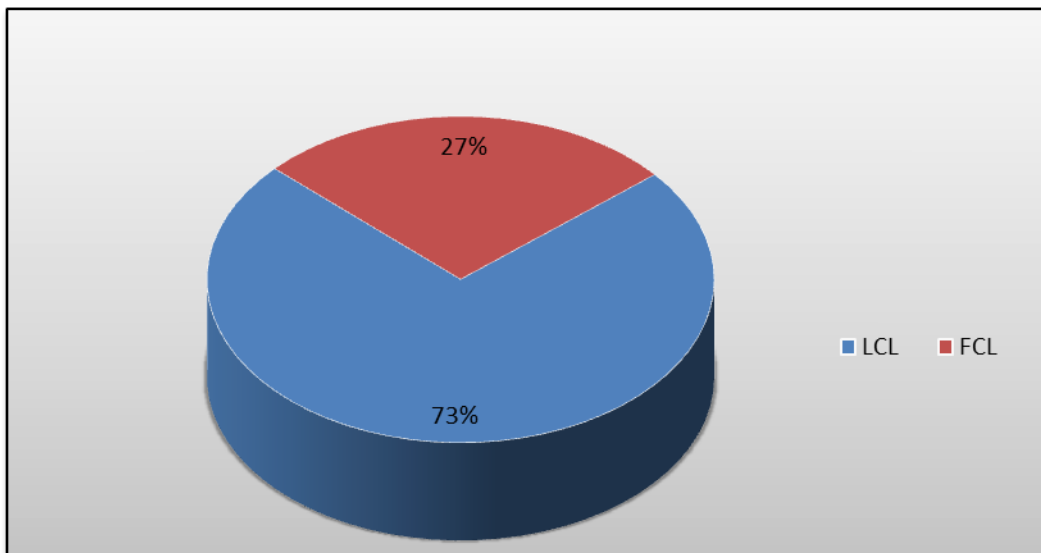
**Chart 4.1.2: Mode of the Shipment**

***Inference***

From the above table and chart it is inferred that 63% of the shipments are handled by sea and 37% through air freight.

**Table 4.1.3: Container Load of the Shipment**

| S.NO | PARTICULARS | NO.OF SHIPMENTS | PERCENTAGE |
|------|-------------|-----------------|------------|
| 1    | LCL         | 87              | 73%        |
| 2    | FCL         | 33              | 27%        |
| 3    | Total       | 120             | 100%       |



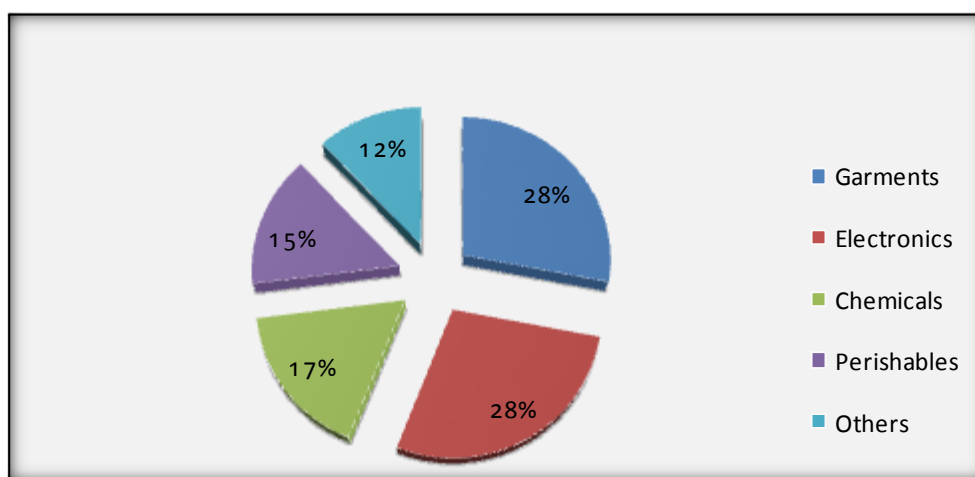
**Chart 4.1.3: Container Load of the Shipment**

***Inference***

From the above table and chart it is inferred that 73% of the shipments are loaded by LCL and 27% by FCL containers.

**Table 4.1.4: Type of Cargo Handled**

| S.NO | PARTICULARS | NO.OF SHIPMENTS | PERCENTAGE |
|------|-------------|-----------------|------------|
| 1    | Garments    | 34              | 28%        |
| 2    | Electronics | 33              | 28%        |
| 3    | Chemicals   | 21              | 17%        |
| 4    | Perishables | 18              | 15%        |
| 5    | Others      | 14              | 12%        |
| 6    | Total       | 120             | 100%       |



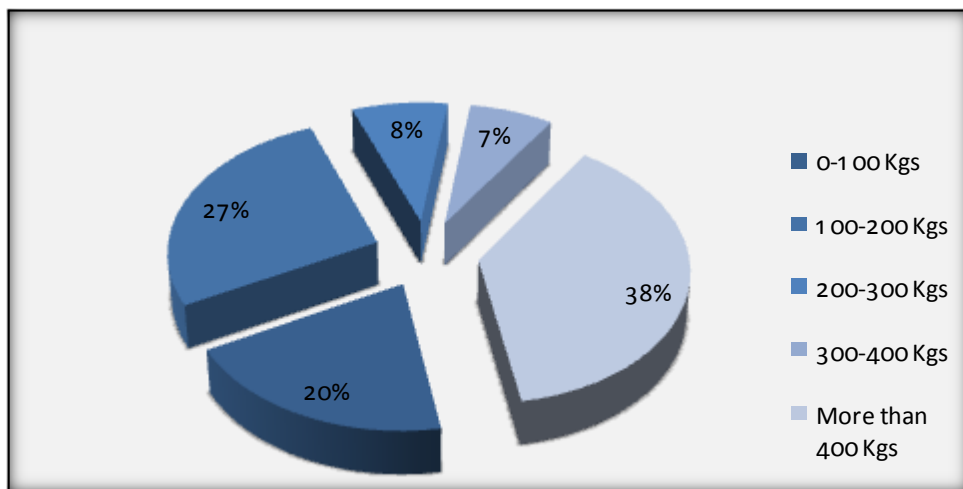
**Chart 4.1.4: Type of Cargo Handled**

***Inference***

From the above table and chart it is inferred that 28% of shipment are garments and electronics each, 17% of the shipments are chemicals, 15% are perishables and 12% are other shipments handled.

**Table 4.1.5: Weight of the CargoHandled**

| S.NO | PARTICULARS       | NO.OF SHIPMENTS | PERCENTAGE |
|------|-------------------|-----------------|------------|
| 1    | 0-100 Kgs         | 24              | 20%        |
| 2    | 100-200 Kgs       | 32              | 27%        |
| 3    | 200-300 Kgs       | 10              | 8%         |
| 4    | 300-400 Kgs       | 9               | 7%         |
| 5    | More than 400 Kgs | 45              | 38%        |
| 6    | Total             | 120             | 100%       |



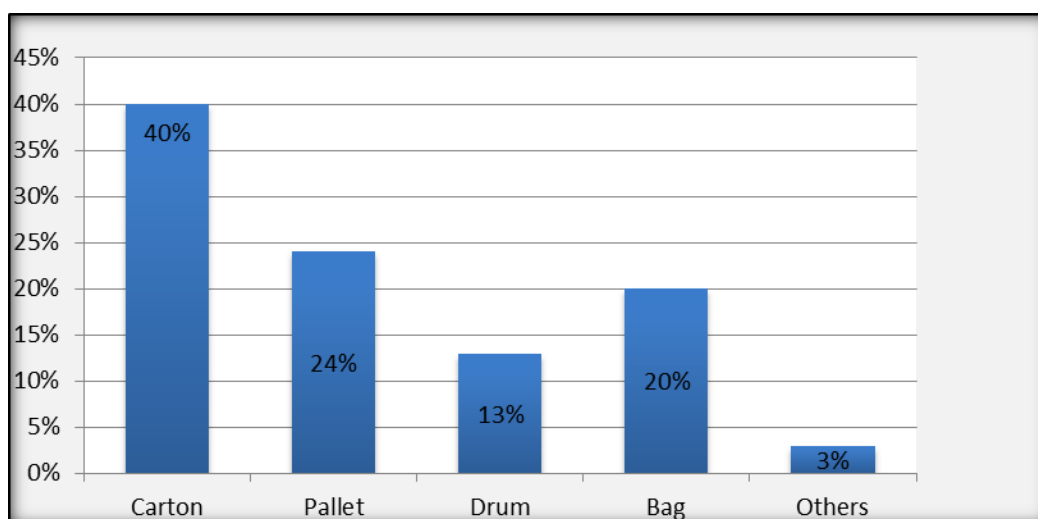
**Chart 4.1.5: Weight of the Cargo Handled**

***Inference***

From the above table and chart it is inferred that 38% of the shipments are more than 400 kgs of weight, 27% of cargo are 100-200kgs, 20% are 0-100kgs, 8% are 200-300kgs and 7% are 300-400 kgs of cargo.

**Table 4.1.6: Type of the Package Used**

| S.NO | PARTICULARS | NO.OF SHIPMENTS | PERCENTAGE |
|------|-------------|-----------------|------------|
| 1    | Carton      | 48              | 40%        |
| 2    | Pallet      | 29              | 24%        |
| 3    | Drum        | 16              | 13%        |
| 4    | Bag         | 23              | 20%        |
| 5    | Others      | 04              | 3%         |
| 6    | Total       | 120             | 100%       |



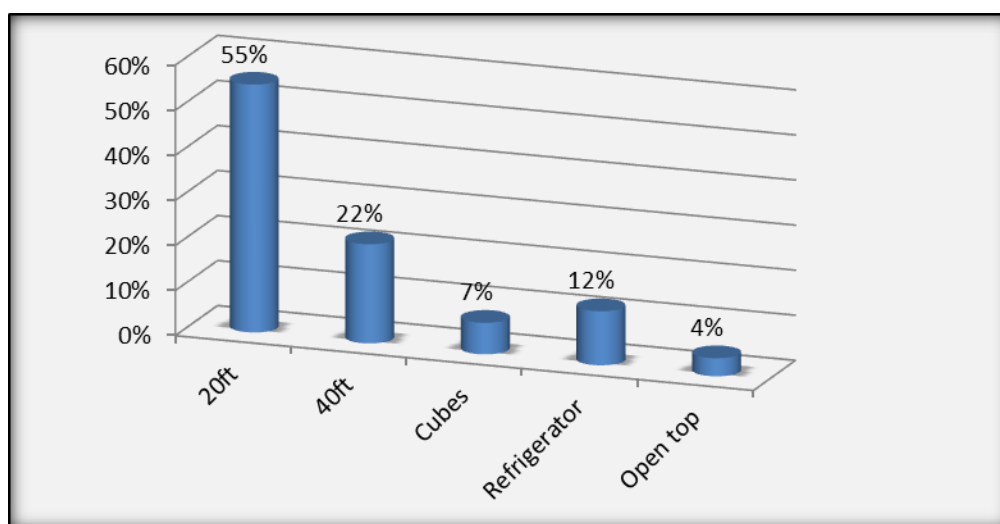
**Chart 4.1.6: Type of the Package Used**

### **Inference**

From the above table and chart it is inferred that 40% of shipments are packed in carton, 24% in pallet, 20% in bag, 13% in drum and 3% of shipments are packed by other modes.

**Table 4.1.7: Type of the Container Used**

| S.NO | PARTICULARS  | NO.OF SHIPMENTS | PERCENTAGE |
|------|--------------|-----------------|------------|
| 1    | 20ft         | 66              | 55%        |
| 2    | 40ft         | 26              | 22%        |
| 3    | Cubes        | 08              | 7%         |
| 4    | Refrigerator | 15              | 12%        |
| 5    | Open top     | 05              | 4%         |
| 6    | Total        | 120             | 100%       |



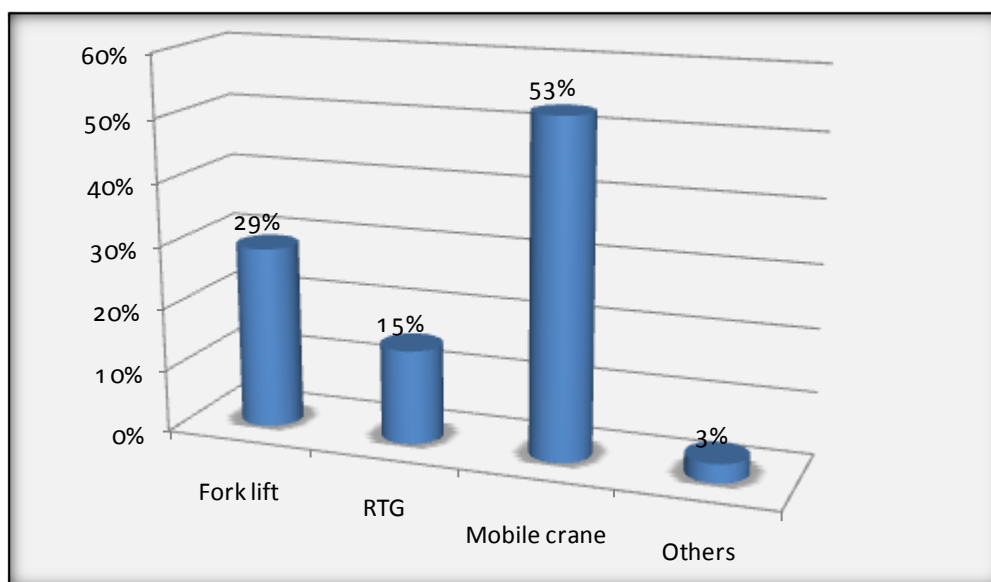
**Chart 4.1.7: Type of the Container Used**

***Inference***

From the above table and chart it is inferred that 55% of shipments are carried through 20ft container, 22% through 40ft, 12% through refrigerator, 7% through cubes and 4% through open top containers for carriage of cargo.

**Table 4.1.8: Type of the Equipment Used to Handle Cargo**

| S.NO | PARTICULARS  | NO.OF SHIPMENTS | PERCENTAGE |
|------|--------------|-----------------|------------|
| 1    | Fork lift    | 35              | 29%        |
| 2    | RTG          | 18              | 15%        |
| 3    | Mobile crane | 63              | 53%        |
| 4    | Others       | 04              | 3%         |
| 5    | Total        | 120             | 100%       |



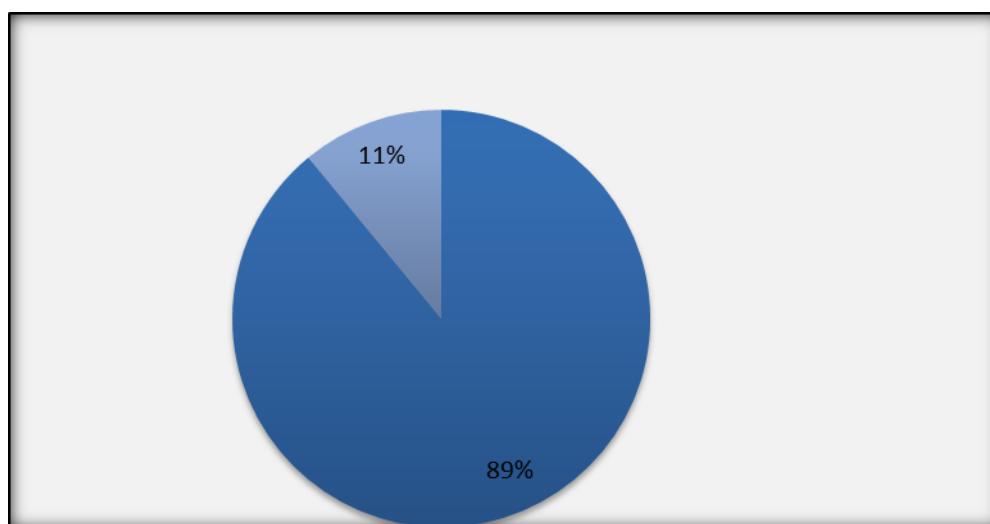
**Chart 4.1.8: Type of the Equipment Used to Handle Cargo**

***Inference***

From the above table and chart it is inferred that 53% of cargo are handled by mobile crane, 29% by fork lift, 15% by RTG and 3% by other modes of equipment.

**Table 4.1.9: Usage of Equipments is Good Enough**

| S.NO | PARTICULARS | NO.OF SHIPMENTS | PERCENTAGE |
|------|-------------|-----------------|------------|
| 1    | Yes         | 107             | 89%        |
| 2    | No          | 13              | 11%        |
| 3    | Total       | 120             | 100%       |



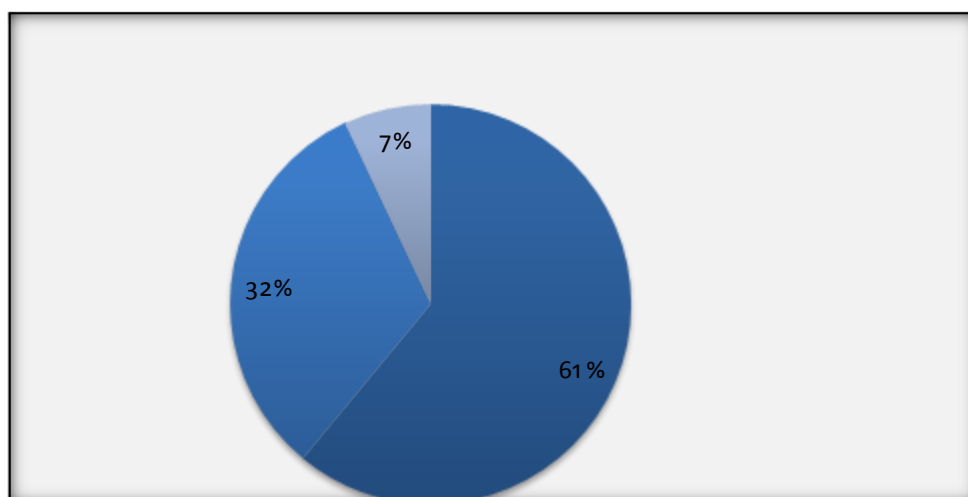
**Chart 4.1.9: Usage of Equipments is Good Enough**

***Inference***

From the above table and chart it is inferred that 89% of the shipments are handled with good equipment and 11% with less efficient equipment.

**Table 4.1.10: No of Persons Required in Handling Cargo**

| S.NO | PARTICULARS | NO.OF SHIPMENTS | PERCENTAGE |
|------|-------------|-----------------|------------|
| 1    | 0-2         | 73              | 61%        |
| 2    | 2-4         | 39              | 32%        |
| 3    | More than 4 | 8               | 7%         |
| 4    | Total       | 120             | 100%       |



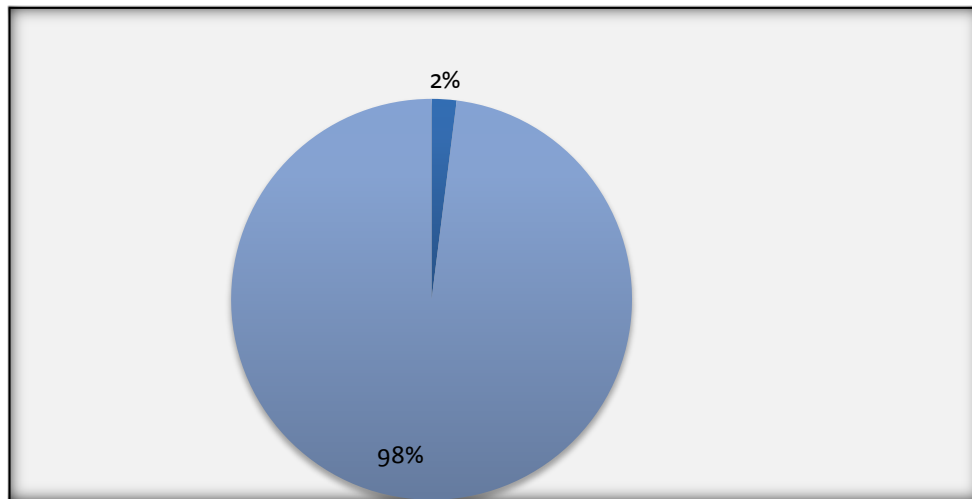
**Chart 4.1.10: No of Persons Required in Handling Cargo**

***Inference***

From the above table and chart it is inferred that 61% of shipments requires less than 2 persons, 32% requires 2-4 persons and 7% requires more than 4 persons for handling cargo.

**Table 4.1.11: Condition of the Cargo Accepted**

| S.NO | PARTICULARS | NO.OF SHIPMENTS | PERCENTAGE |
|------|-------------|-----------------|------------|
| 1    | Yes         | 3               | 2%         |
| 2    | No          | 117             | 98%        |
| 3    | Total       | 120             | 100%       |



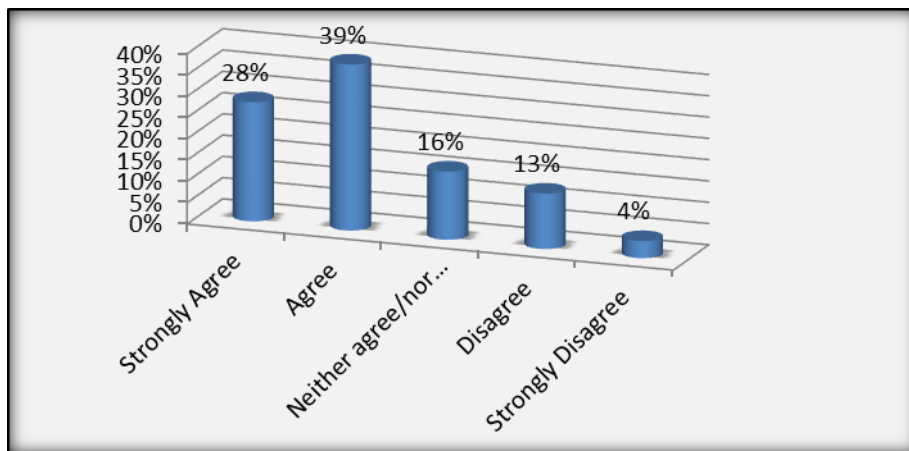
**Chart 4.1.11: Condition of the Cargo Accepted**

***Inference***

From the above table and chart it is inferred that 98% of the cargo is not accepted in damaged condition while only 2% of the cargo is accepted in damaged packages.

**Table 4.1.12: Container's Fitness for Use**

| S.NO | PARTICULARS                | NO.OF SHIPMENTS | PERCENTAGE |
|------|----------------------------|-----------------|------------|
| 1    | Strongly Agree             | 33              | 28%        |
| 2    | Agree                      | 47              | 39%        |
| 3    | Neither agree/nor disagree | 19              | 16%        |
| 4    | Disagree                   | 16              | 13%        |
| 5    | Strongly Disagree          | 05              | 4%         |
| 6    | Total                      | 120             | 100%       |



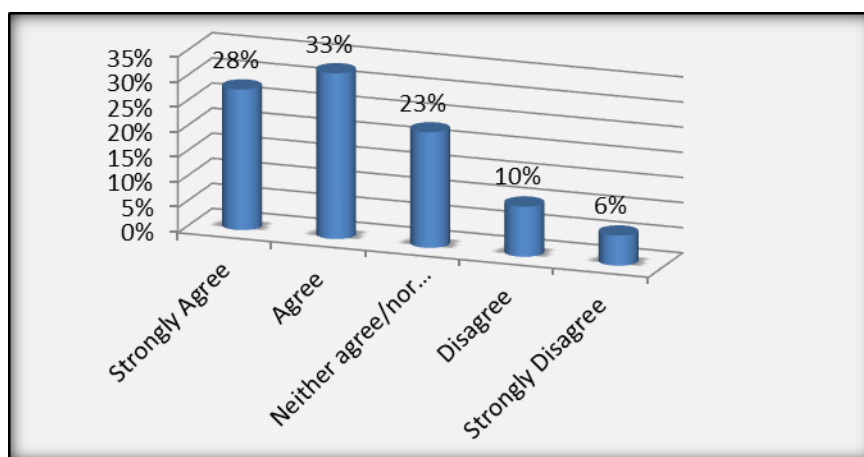
**Chart 4.1.12: Container's Fitness for Use**

***Inference***

From the above table and chart it is inferred that 28% strongly agree, 39% agree, 16% neither agree nor disagree, 13% disagree and 4% strongly disagree to the containers condition about the fitness for usage.

**Table 4.1.13: Use of Appropriate Package**

| S.NO | PARTICULARS                | NO.OF SHIPMENTS | PERCENTAGE |
|------|----------------------------|-----------------|------------|
| 1    | Strongly Agree             | 34              | 28%        |
| 2    | Agree                      | 39              | 33%        |
| 3    | Neither agree/nor disagree | 27              | 23%        |
| 4    | Disagree                   | 12              | 10%        |
| 5    | Strongly Disagree          | 08              | 6%         |
| 6    | Total                      | 120             | 100%       |



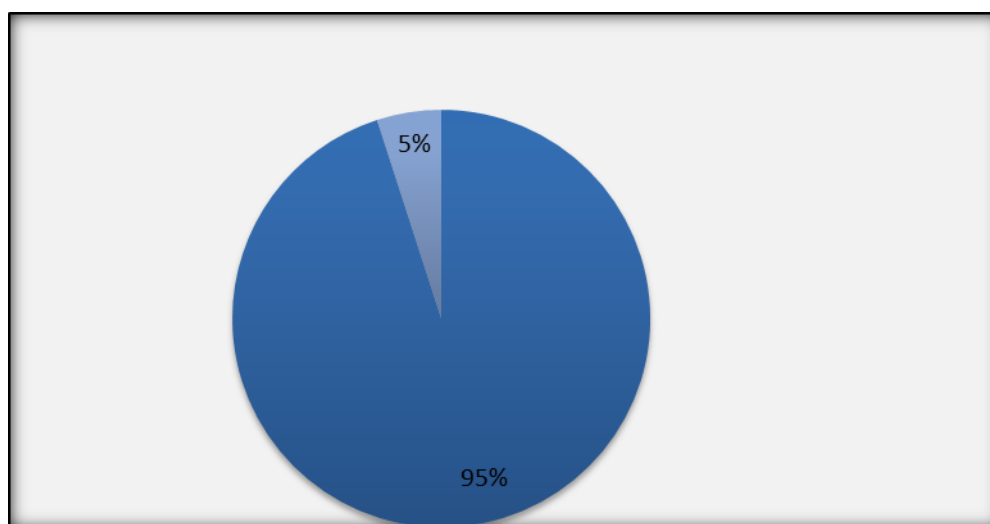
**Chart 4.1.13: Use of Appropriate Package**

***Inference***

From the above table and chart it is inferred that 28% strongly agree, 33% agree, 23% neither agree nor disagree, 10% disagree and 6% strongly disagree that the shipments are using appropriate packages.

**Table 4.1.14: Correct Display of Identification Numbers**

| S.NO | PARTICULARS | NO.OF SHIPMENTS | PERCENTAGE |
|------|-------------|-----------------|------------|
| 1    | Yes         | 114             | 95%        |
| 2    | No          | 06              | 5%         |
| 3    | Total       | 120             | 100%       |



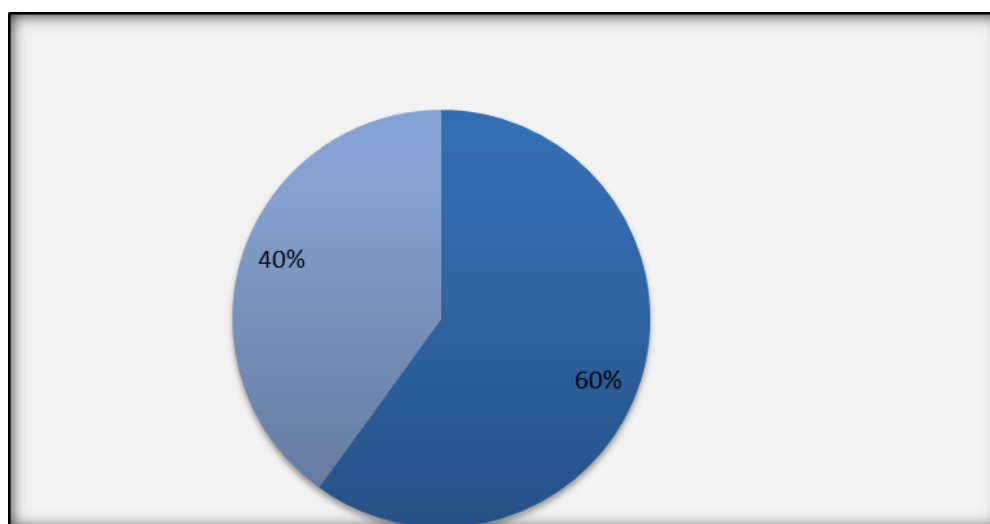
**Chart 4.1.14: Correct Display of Identification Numbers**

***Inference***

From the above table and chart it is inferred that 95% of the shipments have correct identification numbers while only 5% of the shipments are marked wrongly with the identification numbers.

**Table 4.1.15: Arrangement of Transportation**

| S.NO | PARTICULARS | NO.OF SHIPMENTS | PERCENTAGE |
|------|-------------|-----------------|------------|
| 1    | Yes         | 72              | 60%        |
| 2    | No          | 48              | 40%        |
| 3    | Total       | 120             | 100%       |



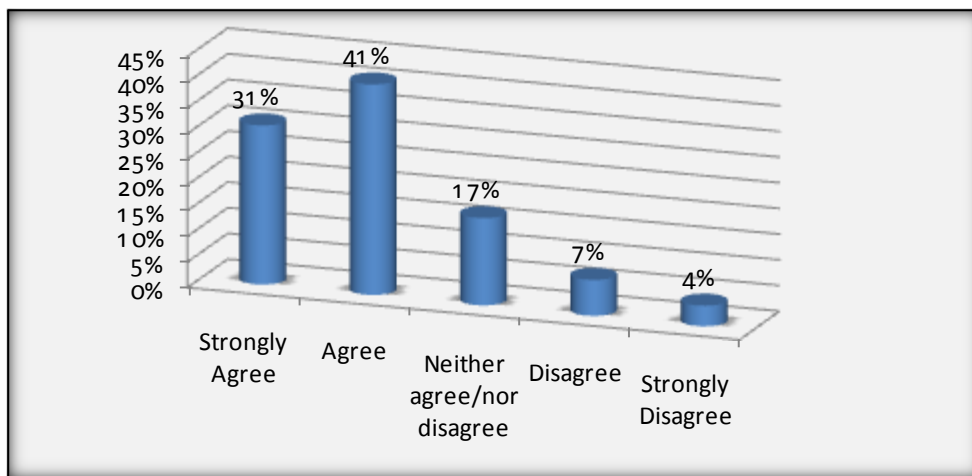
**Chart 4.1.15: Arrangement of Transportation**

***Inference***

From the above table and chart it is inferred that 60% of the shipments are transported through company and 40% through the client itself.

**Table 4.1.16: Usage of Equipment**

| S.NO | PARTICULARS                | NO.OF SHIPMENTS | PERCENTAGE |
|------|----------------------------|-----------------|------------|
| 1    | Strongly Agree             | 37              | 31%        |
| 2    | Agree                      | 49              | 41%        |
| 3    | Neither agree/nor disagree | 21              | 17%        |
| 4    | Disagree                   | 08              | 7%         |
| 5    | Strongly Disagree          | 05              | 4%         |
| 6    | Total                      | 120             | 100%       |



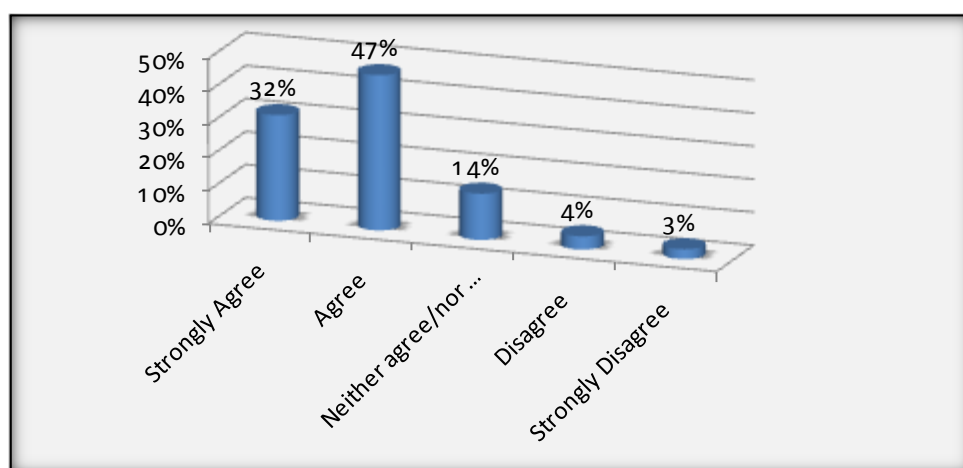
**Chart 4.1.16: Usage of Equipment**

***Inference***

From the above table and chart it is inferred that 31% strongly agree, 41% agree, 17% neither agree nor disagree, 7% disagree and 4% strongly disagree that the shipments are handled through good equipment.

**Table 4.1.17: Transportation Occurs Without Any Damage**

| S.NO | PARTICULARS                | NO.OF SHIPMENTS | PERCENTAGE |
|------|----------------------------|-----------------|------------|
| 1    | Strongly Agree             | 39              | 32%        |
| 2    | Agree                      | 56              | 47%        |
| 3    | Neither agree/nor disagree | 17              | 14%        |
| 4    | Disagree                   | 5               | 4%         |
| 5    | Strongly Disagree          | 3               | 3%         |
| 6    | Total                      | 120             | 100%       |



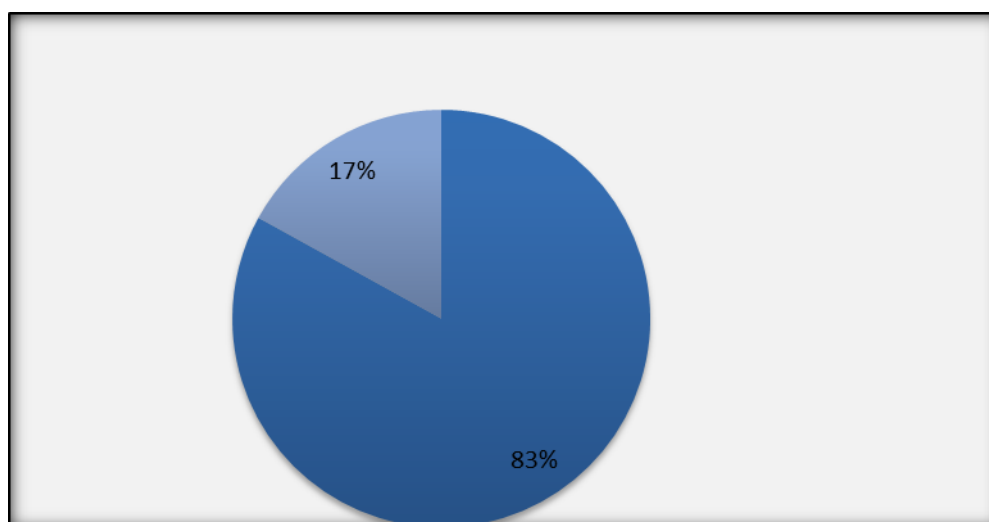
**Chart 4.1.17: Transportation Occurs Without Any Damage**

### ***Inference***

From the above table and chart it is inferred that 32% strongly agree, 47% agree, 14% neither agree nor disagree, 4% disagree and 3% strongly disagree that transportation occurs without any damage.

**Table 4.1.18: Entry of Cargo to Port on Time**

| S.NO | PARTICULARS | NO.OF SHIPMENTS | PERCENTAGE |
|------|-------------|-----------------|------------|
| 1    | Yes         | 99              | 83%        |
| 2    | No          | 21              | 17%        |
| 3    | Total       | 120             | 100%       |



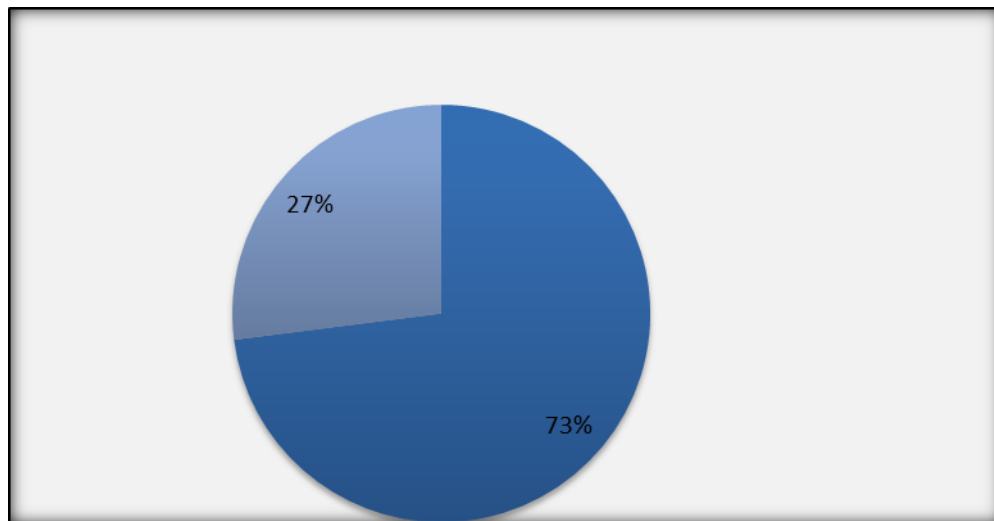
**Chart 4.1.18: Entry of Cargo to Port on Time**

***Inference***

From the above table and chart it is inferred that 83% of shipments arrive to port at correct time while 17% of shipments enter late to the port.

**Table 4.1.19: Engagement of Signal Man**

| S.NO | PARTICULARS | NO.OF SHIPMENTS | PERCENTAGE |
|------|-------------|-----------------|------------|
| 1    | Yes         | 88              | 73%        |
| 2    | No          | 32              | 27%        |
| 3    | Total       | 120             | 100%       |



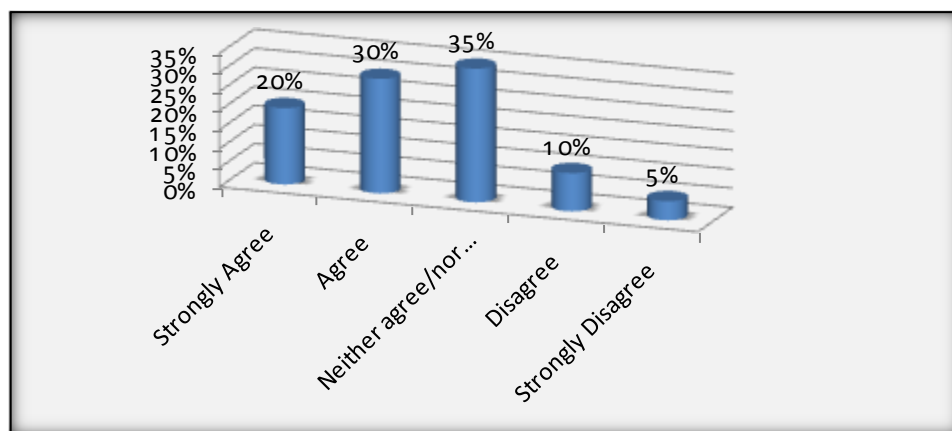
**Chart 4.1.19: Engagement of Signal Man**

***Inference***

From the above table and chart it is inferred that 73% of the shipments are handled with the help of signalman while 27% without signalman help.

**Table 4.1.20: Safety Measures on Dangerous Goods**

| S.NO | PARTICULARS                | NO.OF SHIPMENTS | PERCENTAGE |
|------|----------------------------|-----------------|------------|
| 1    | Strongly Agree             | 24              | 20%        |
| 2    | Agree                      | 36              | 30%        |
| 3    | Neither agree/nor disagree | 42              | 35%        |
| 4    | Disagree                   | 12              | 10%        |
| 5    | Strongly Disagree          | 6               | 5%         |
| 6    | Total                      | 120             | 100%       |



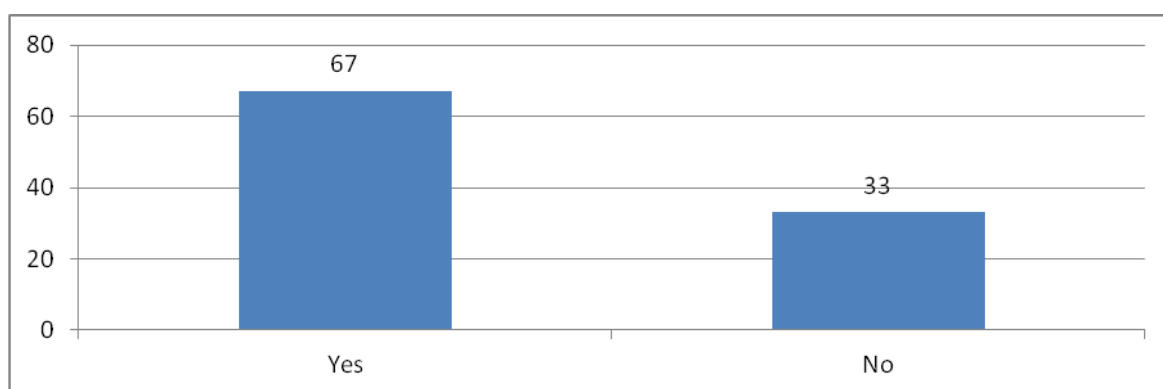
**Chart 4.1.20: Safety Measures on Dangerous Goods**

### ***Inference***

From the above table and chart it is inferred that 20% strongly agree, 30% agree, 35% neither agree nor disagree, 10% disagree and 5% strongly disagree that safety measures are taken on the dangerous goods.

**Table 4.1.21: Have Own Transportation Fleet**

| PARTICULARS | NO. OF RESPONDENTS | PERCENTAGE |
|-------------|--------------------|------------|
| Yes         | 80                 | 67         |
| No          | 40                 | 33         |
| Total       | 120                | 100        |



**Chart 4.1.21: Have Own Transportation Fleet**

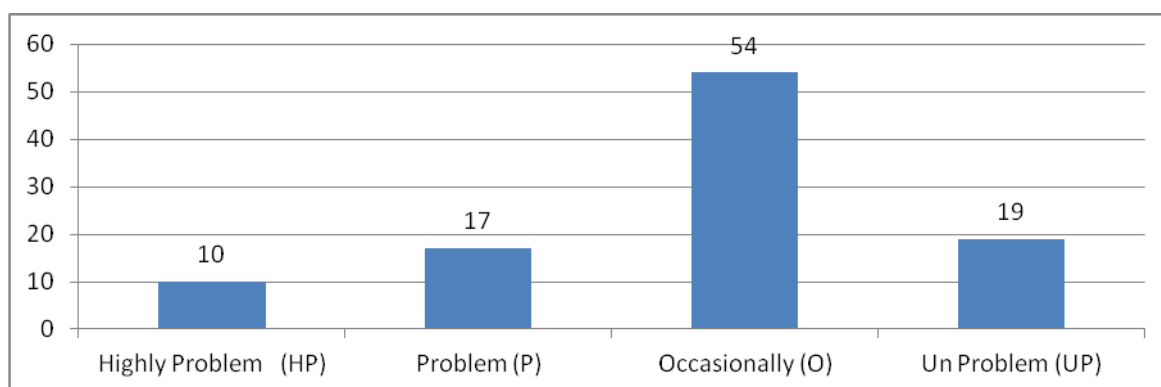
***Interpretation***

From the above table it can be interpreted that 67% of the respondents are having own transportation fleet and 33% of the respondents are didn't have own transportation fleet.

Most of the respondents are having own transportation fleet.

**Table 4.1.22: Hire a Transportation Fleet**

| <b>PARTICULARS</b>  | <b>NO. OF RESPONDENTS</b> | <b>PERCENTAGE</b> |
|---------------------|---------------------------|-------------------|
| Highly Problem (HP) | 12                        | 10                |
| Problem (P)         | 20                        | 17                |
| Occasionally (O)    | 65                        | 54                |
| Un Problem (UP)     | 23                        | 19                |
| Total               | 120                       | 100               |



**Chart 4.1.22: Hire a Transportation Fleet**

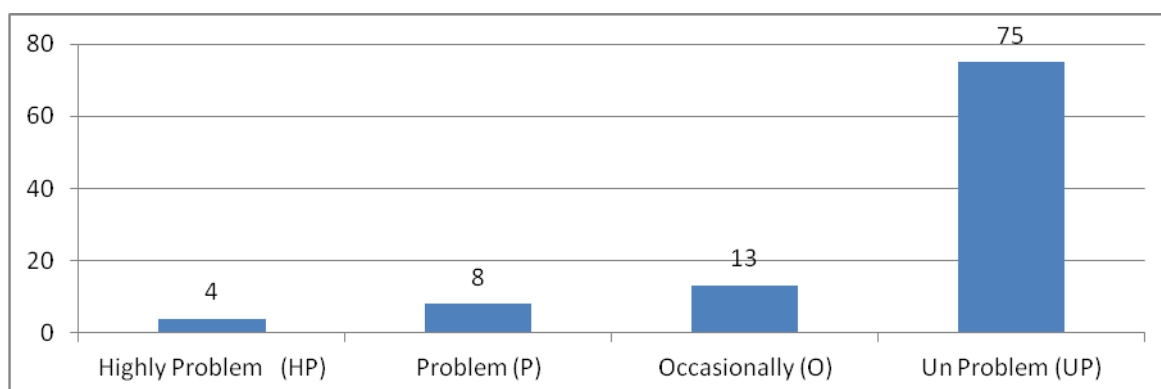
***Interpretation***

From the above table it can be interpreted that 54% of the respondents are facing problem occasionally while hiring a transportation fleet and 19% of the respondents are not facing problem while hiring a transportation fleet.

Most of the respondents are facing problem occasionally while hiring a transportation fleet.

**Table 4.1.23: Pay Insurance Every Year**

| PARTICULARS         | NO. OF RESPONDENTS | PERCENTAGE |
|---------------------|--------------------|------------|
| Highly Problem (HP) | 5                  | 4          |
| Problem (P)         | 10                 | 8          |
| Occasionally (O)    | 15                 | 13         |
| Un Problem (UP)     | 90                 | 75         |
| Total               | 120                | 100        |



**Chart 4.1.23: Pay Insurance Every Year**

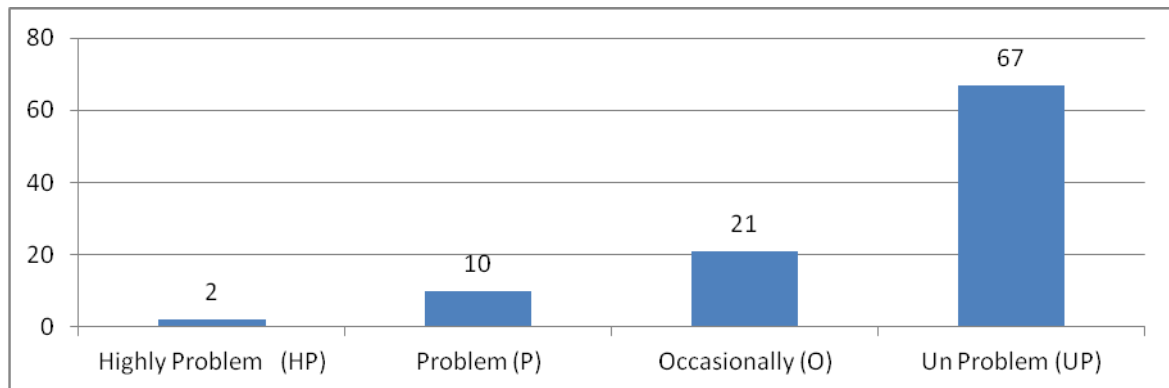
### ***Interpretation***

From the above table it can be interpreted that 75% of the respondents are not facing problem while paying insurance every year and 13% of the respondents are occasionally facing problem while paying insurance every year.

Most of the respondents are not facing problem while paying insurance every year.

**Table 4.1.24: Pay Income Tax Every Year**

| PARTICULARS         | NO. OF RESPONDENTS | PERCENTAGE |
|---------------------|--------------------|------------|
| Highly Problem (HP) | 2                  | 1          |
| Problem (P)         | 12                 | 10         |
| Occasionally (O)    | 25                 | 22         |
| Un Problem (UP)     | 81                 | 67         |
| Total               | 120                | 100        |



**Chart 4.1.24: Pay Income Tax Every Year**

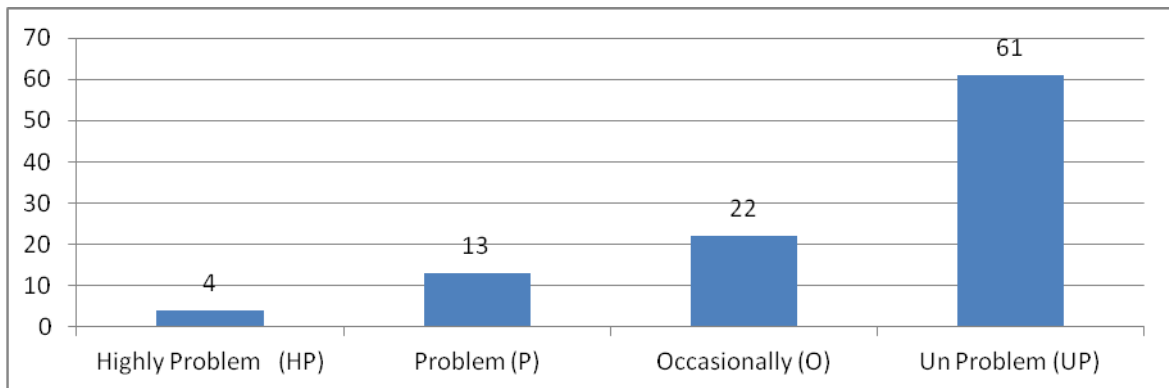
### ***Interpretation***

From the above table it can be interpreted that 67% of the respondents are not facing problem while paying income tax every year and 22% of the respondents are facing problem occasionally while paying income tax every year.

Most of the respondents are not facing problem while paying income tax every year.

**Table 4.1.25: Customers Creates**

| <b>PARTICULARS</b>  | <b>NO. OF RESPONDENTS</b> | <b>PERCENTAGE</b> |
|---------------------|---------------------------|-------------------|
| Highly Problem (HP) | 5                         | 4                 |
| Problem (P)         | 15                        | 13                |
| Occasionally (O)    | 26                        | 22                |
| Un Problem (UP)     | 74                        | 61                |
| Total               | 120                       | 100               |



**Chart 4.1.25: Customers Creates**

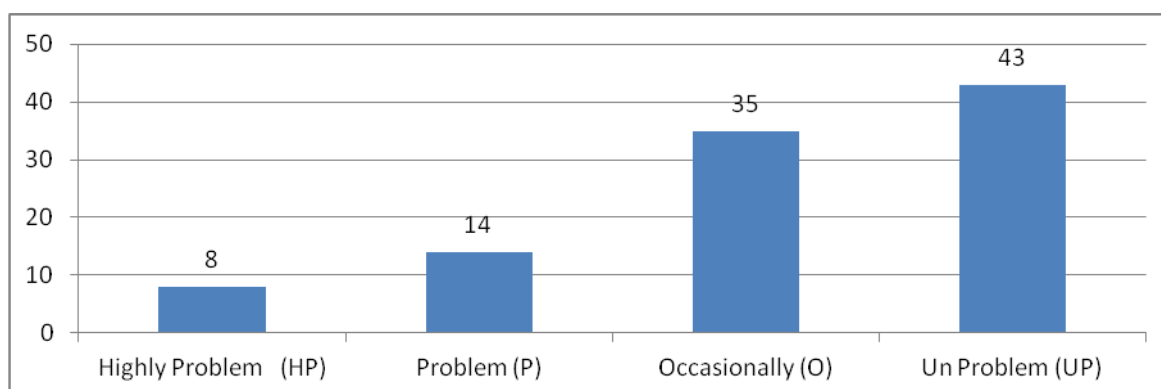
***Interpretation***

From the above table it can be interpreted that 61% of the respondents say that the customer doesn't create the problem and 22% of the respondents say that the customer creates the problem occasionally.

Most of the respondents say that the customer doesn't create the problem.

**Table 4.1.26: Brokering Process**

| PARTICULARS         | NO. OF RESPONDENTS | PERCENTAGE |
|---------------------|--------------------|------------|
| Highly Problem (HP) | 10                 | 8          |
| Problem (P)         | 17                 | 14         |
| Occasionally (O)    | 42                 | 35         |
| Un Problem (UP)     | 51                 | 43         |
| Total               | 120                | 100        |



**Chart 4.1.26: Brokering Process**

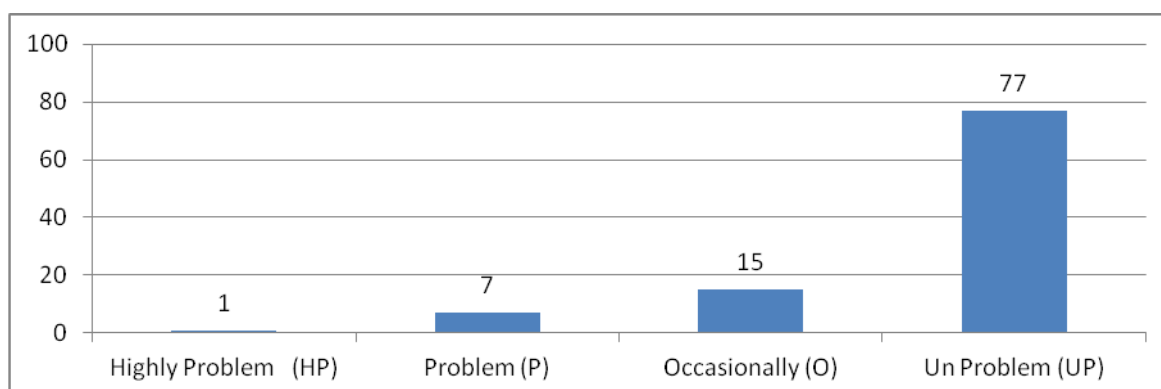
### ***Interpretation***

From the above table it can be interpreted that 43% of the respondents say they are not having problem with the brokering process and 35% of the respondents say they are having problem occasionally with the brokering process.

Most of the respondents say they are not having problem with the brokering process.

**Table 4.1.27: Unload the Goods**

| PARTICULARS         | NO. OF RESPONDENTS | PERCENTAGE |
|---------------------|--------------------|------------|
| Highly Problem (HP) | 2                  | 1          |
| Problem (P)         | 8                  | 7          |
| Occasionally (O)    | 18                 | 15         |
| Un Problem (UP)     | 92                 | 77         |
| Total               | 120                | 100        |



**Chart 4.1.27: Unload the Goods**

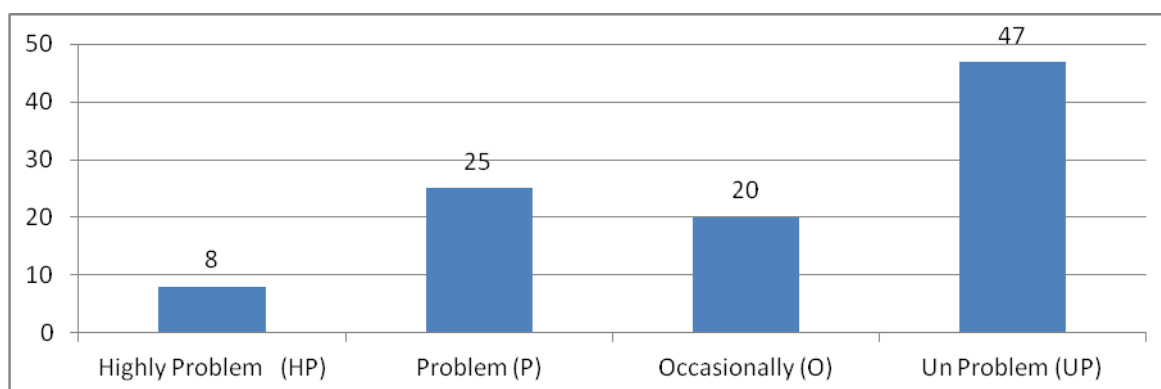
### ***Interpretation***

From the above table it can be interpreted that 77% of the respondents say that they are not having problem to unload the goods and 15% of the respondents say that they are having problem occasionally to unload the goods.

Most of the respondents say that they are not having problem to unload the goods.

**Table 4.1.28: Thefts Creates**

| PARTICULARS         | NO. OF RESPONDENTS | PERCENTAGE |
|---------------------|--------------------|------------|
| Highly Problem (HP) | 10                 | 8          |
| Problem (P)         | 30                 | 25         |
| Occasionally (O)    | 24                 | 20         |
| Un Problem (UP)     | 56                 | 47         |
| Total               | 120                | 100        |



**Chart 4.1.28: Thefts Creates**

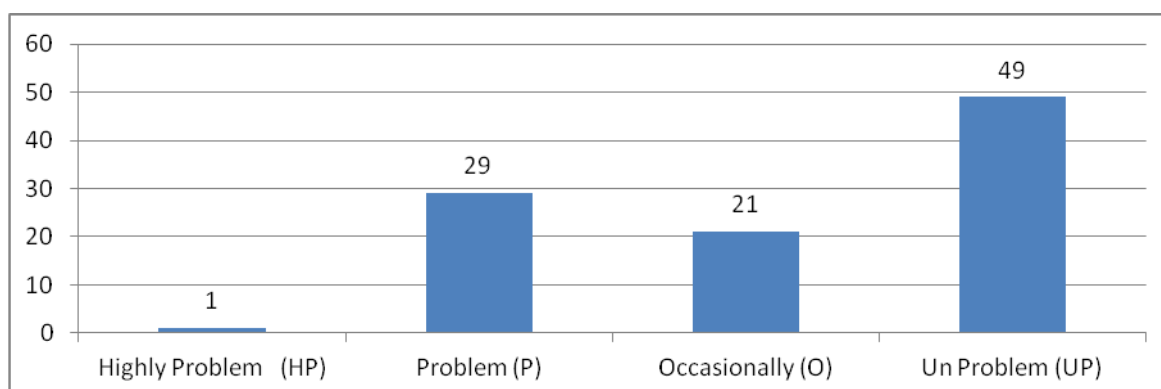
### ***Interpretation***

From the above table it can be interpreted that 47% of the respondents say that they are not having problem with thefts creates and 25% of the respondents say that they are having problem with thefts creates.

Most of the respondents say that they are not having problem with thefts creates.

**Table 4.1.29: Price of Spare Parts & Accessory**

| PARTICULARS         | NO. OF RESPONDENTS | PERCENTAGE |
|---------------------|--------------------|------------|
| Highly Problem (HP) | 2                  | 1          |
| Problem (P)         | 34                 | 29         |
| Occasionally (O)    | 25                 | 21         |
| Un Problem (UP)     | 59                 | 49         |
| Total               | 120                | 100        |



**Chart 4.1.29: Price of Spare Parts & Accessory**

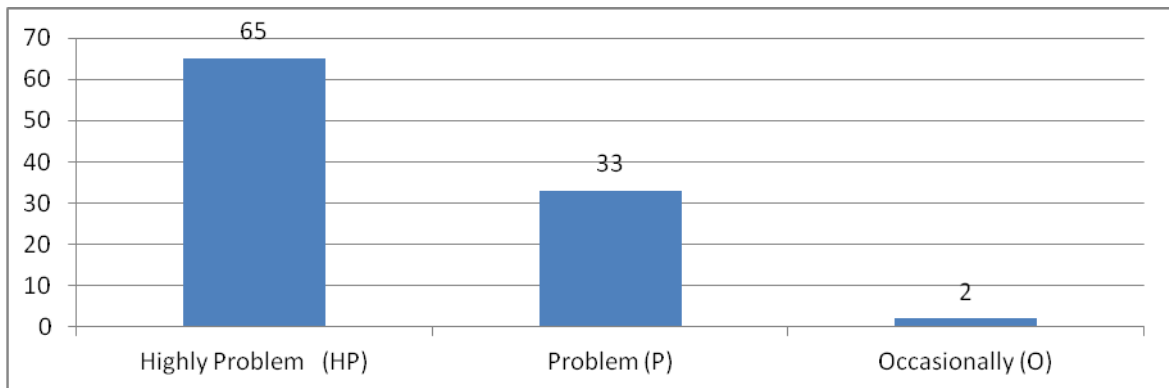
***Interpretation***

From the above table it can be interpreted that 49% of the respondents say that they are not having problem with price of the spare parts & accessory and 29% of the respondents say that they are having problem with price of the spare parts & accessory.

Most of the respondents say that they are not having problem with price of the spare parts & accessory.

**Table 4.1.30: Price of Diesel**

| PARTICULARS         | NO. OF RESPONDENTS | PERCENTAGE |
|---------------------|--------------------|------------|
| Highly Problem (HP) | 78                 | 65         |
| Problem (P)         | 40                 | 33         |
| Occasionally (O)    | 2                  | 2          |
| Un Problem (UP)     | 0                  | 0          |
| Total               | 120                | 100        |



**Chart 4.1.30: Price of Diesel**

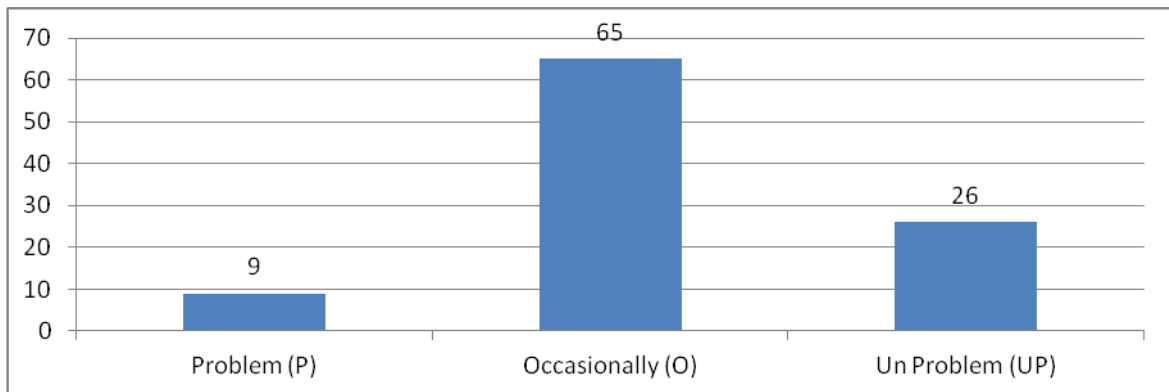
### ***Interpretation***

From the above table it can be interpreted that 65% of the respondents say that they are having highly problem with the price of diesel and 33% of the respondents say that they are having problem with the price of diesel.

Most of the respondents say that they are having highly problem with the price of diesel.

**Table 4.1.31: Break Down**

| <b>PARTICULARS</b>  | <b>NO. OF RESPONDENTS</b> | <b>PERCENTAGE</b> |
|---------------------|---------------------------|-------------------|
| Highly Problem (HP) | 0                         | 0                 |
| Problem (P)         | 11                        | 9                 |
| Occasionally (O)    | 79                        | 65                |
| Un Problem (UP)     | 30                        | 26                |
| Total               | 120                       | 100               |



**Chart 4.1.31: Break Down**

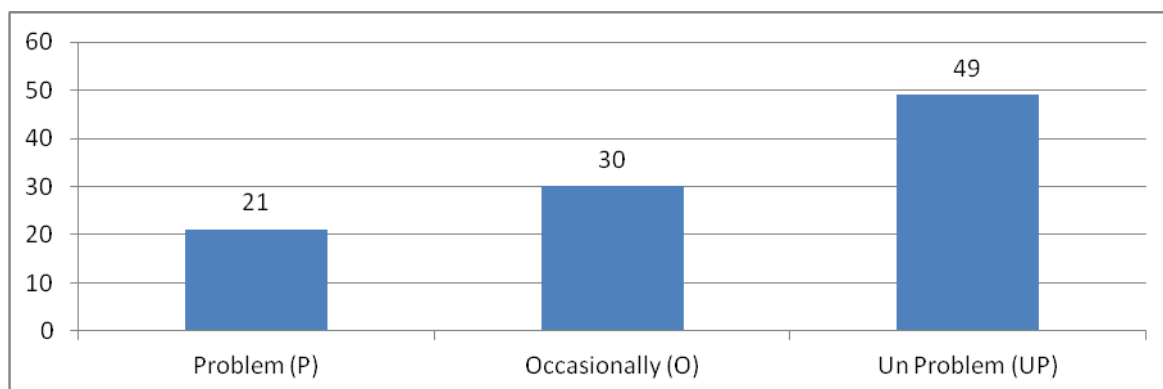
***Interpretation***

From the above table it can be interpreted that 65% of the respondents say that they are having problem occasionally with break down and 26% of the respondents say that they are not having problem with break down.

Most of the respondents say that they are having problem occasionally with break down.

**Table 4.1.32: Delivery Schedule**

| <b>PARTICULARS</b>  | <b>NO. OF RESPONDENTS</b> | <b>PERCENTAGE</b> |
|---------------------|---------------------------|-------------------|
| Highly Problem (HP) | 0                         | 0                 |
| Problem (P)         | 25                        | 21                |
| Occasionally (O)    | 36                        | 30                |
| Un Problem (UP)     | 59                        | 49                |
| Total               | 120                       | 100               |



**Chart 4.1.32: Delivery Schedule**

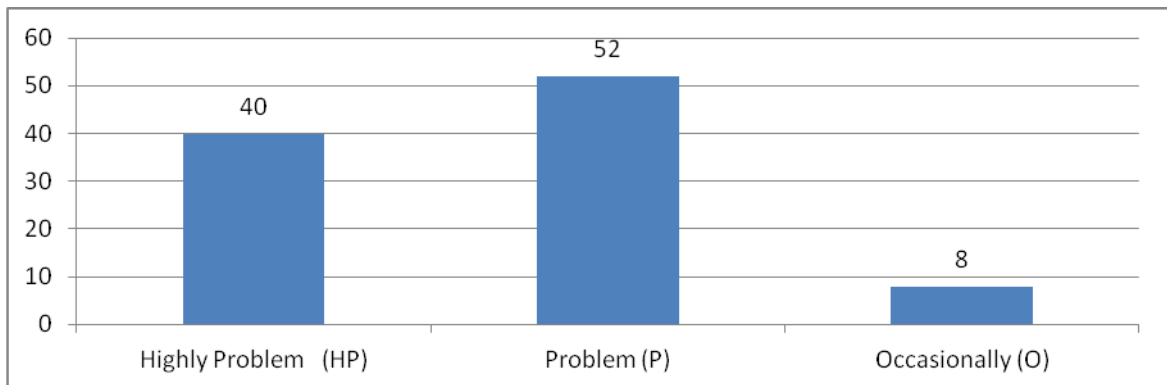
***Interpretation***

From the above table it can be interpreted that 49% of the respondents are not having problem with delivery schedule and 30% of the respondents are having problem with delivery schedule occasionally.

Most of the respondents are not having problem with delivery.

**Table 4.1.33: Strikes**

| PARTICULARS         | NO. OF RESPONDENTS | PERCENTAGE |
|---------------------|--------------------|------------|
| Highly Problem (HP) | 48                 | 40         |
| Problem (P)         | 62                 | 52         |
| Occasionally (O)    | 10                 | 8          |
| Un Problem (UP)     | 0                  | 0          |
| Total               | 120                | 100        |



**Chart 4.1.33: Strikes**

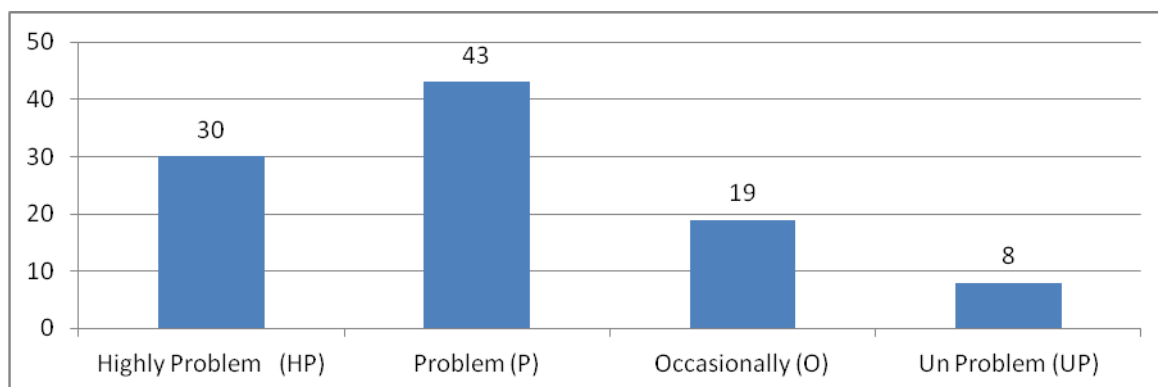
***Interpretation***

From the above table it can be interpreted that 52% of the respondents say that they are having problem with strike and 40% of the respondents say that they are having highly problem with strike.

Most of the respondents say that they are having problem with strike.

**Table 4.1.34: When Fleet Driver Does Unethical Practice**

| <b>PARTICULARS</b>  | <b>NO. OF RESPONDENTS</b> | <b>PERCENTAGE</b> |
|---------------------|---------------------------|-------------------|
| Highly Problem (HP) | 36                        | 30                |
| Problem (P)         | 52                        | 43                |
| Occasionally (O)    | 23                        | 19                |
| Un Problem (UP)     | 9                         | 8                 |
| Total               | 120                       | 100               |



**Chart 4.1.34: When Fleet Driver Does Unethical Practice**

***Interpretation***

From the above table it can be interpreted that 43% of the respondents are facing problem when fleet driver does unethical practice and 30% of the respondents are facing highly problem when fleet driver does unethical practice

Most of the respondents are facing problem when driver does unethical practice.

## 4.2 STATISTICAL TOOLS

### *Chi-square*

**H<sub>0</sub>:** There is **no significant** association between the weight of the cargo and the equipment used to handle it.

**H<sub>1</sub>:** There is **significant** association between the weight of the cargo and the equipment used to handle it.

**Table 4.2.1: Chi-square**

| <b>Factors</b> | <b>Fork lift</b> | <b>RTG</b> | <b>Mobile crane</b> | <b>Others</b> | <b>Total</b> |
|----------------|------------------|------------|---------------------|---------------|--------------|
| 0-100          | 7                | 3          | 13                  | 1             | <b>24</b>    |
| 100-200        | 10               | 6          | 15                  | 1             | <b>32</b>    |
| 200-300        | 3                | 2          | 5                   | 0             | <b>10</b>    |
| 300-400        | 2                | 1          | 6                   | 0             | <b>9</b>     |
| More than 400  | 13               | 6          | 24                  | 2             | <b>45</b>    |
| <b>Total</b>   | <b>35</b>        | <b>18</b>  | <b>63</b>           | <b>4</b>      | <b>120</b>   |

### **Formula:**

The CHI-SQUARE test is carried out using the formula,

$$\chi^2 = \sum (O_{ij} - E_{ij})^2 / E_{ij}$$

| Observed ( $O_{ij}$ ) | Expected ( $E_{ij}$ ) | $(O_{ij}-E_{ij})^2$ | $(O_{ij}-E_{ij})^2/E_{ij}$ |
|-----------------------|-----------------------|---------------------|----------------------------|
| 7                     | 7                     | 0                   | 0.0000                     |
| 3                     | 5.1                   | 4.41                | 0.8647                     |
| 13                    | 12.6                  | 0.16                | 0.0127                     |
| 1                     | 0.8                   | 0.04                | 0.0500                     |
| 10                    | 9.3                   | 0.49                | 0.0527                     |
| 6                     | 4.8                   | 1.44                | 0.3000                     |
| 15                    | 16.8                  | 3.24                | 0.1929                     |
| 1                     | 1.06                  | 0.0036              | 0.0034                     |
| 3                     | 2.91                  | 0.0081              | 0.0028                     |
| 2                     | 1.5                   | 0.25                | 0.1667                     |
| 5                     | 5.25                  | 0.0625              | 0.0119                     |
| 0                     | 0.33                  | 0.1089              | 0.3300                     |
| 2                     | 2.63                  | 0.3969              | 0.1509                     |
| 1                     | 1.35                  | 0.1225              | 0.0907                     |
| 6                     | 4.73                  | 1.6129              | 0.3410                     |
| 0                     | 0.3                   | 0.09                | 0.3000                     |
| 13                    | 13.13                 | 0.0169              | 0.0013                     |
| 6                     | 6.75                  | 0.5625              | 0.0833                     |
| 24                    | 23.63                 | 0.1369              | 0.0058                     |
| 2                     | 1.5                   | 0.25                | 0.1667                     |
| Total                 |                       |                     | 3.1274                     |

Calculated  $\chi^2$  value = 3.1274

Degree of Freedom =  $(R-1)(C-1) = 12$

Level of significance = 5%

Table  $\chi^2$  value = 21.026

From the calculations it is found that the calculated value is lesser than the table value, therefore the hypothesis is good to hold.

Hence the **Null hypothesis** is **accepted**.

### ***Inference***

There is **no significant** association between the weight of the cargo and the equipment used to handle it.

### 4.3 ONE-WAY ANOVA

#### ***Calculations Based on One-Way ANOVA Transportation Arrangement by Company And Damage Occurrence of Cargo***

**Null Hypothesis ( $H_0$ ):** There is no significant association transportation arrangement by company and damage occurrence of cargo.

**Alternative Hypothesis ( $H_1$ ):** There is significant association transportation arrangement by company and damage occurrence of cargo.

**Table 4.3.1: Relationship between transportation arrangement by company and damage occurrence of cargo**

| Factors                    | Yes | No | Total | $(X1)^2$ | $(X2)^2$ |
|----------------------------|-----|----|-------|----------|----------|
| Strongly agree             | 26  | 13 | 39    | 676      | 169      |
| Agree                      | 34  | 22 | 56    | 1156     | 484      |
| Neither agree nor disagree | 9   | 8  | 17    | 81       | 64       |
| Disagree                   | 2   | 3  | 5     | 4        | 9        |
| Strongly disagree          | 1   | 2  | 3     | 1        | 4        |
| Total                      | 72  | 48 | 120   | 1918     | 730      |

STEP 1:  $N = 8$

STEP 2:  $T^2 / N = (120)^2 / 8 = 1800$

STEP 3: SUM OF SQUARES =  $1918 + 730 = 2648$

STEP 4: TOTAL SUM OF SQUARES (SST) =  $2648 - 1800 = 848$

STEP 5: SUM OF SQUARES COLUMNS (SSC) =  $(72)^2 / 2 + (48)^2 / 2 - 1800$   
 $= 2592 + 1152 - 1800$   
 $= 1944$

STEP 6: SSE = SST – SSC =  $848 - 1944 = 1096$

| Sources | Sum of squares | Degree of freedom | Mean square | F ratio |
|---------|----------------|-------------------|-------------|---------|
| Columns | 1944           | $C = (2-1) = 1$   | 1944        | 0.0805  |
| Error   | 1096           | $(N-C) = 8-1 = 7$ | 156.57      | (1,7)   |

Calculated F = 0.0805

Table value @ 5%

Table F (1, 7)

= 5.59

### **Conclusion**

Calculated F < Table F

Therefore  $H_0$  is accepted

### **Inference**

There is no significant association transportation arrangement by company and damage occurrence of cargo.

## **4.4 COEFFICIENT OF CORRELATION**

### **Calculation of correlation coefficient**

X: Type of the package

Y: Type of the container

| X          | Y          | X*X         | Y*Y         | XY          |
|------------|------------|-------------|-------------|-------------|
| 48         | 66         | 2304        | 4356        | 3168        |
| 29         | 26         | 841         | 676         | 754         |
| 16         | 08         | 256         | 64          | 128         |
| 23         | 15         | 529         | 225         | 345         |
| 04         | 05         | 16          | 25          | 20          |
| <b>120</b> | <b>120</b> | <b>3946</b> | <b>5346</b> | <b>4415</b> |

$$r = \frac{n \sum xy - (\sum x)(\sum y)}{\sqrt{n(\sum x^2) - (\sum x)^2} \sqrt{n(\sum y^2) - (\sum y)^2}}$$

$$\frac{[5*4415-(120)(120)]}{\sqrt{[(5*3946)-(14400)]} \sqrt{[(5*5346)-(14400)]}}$$

$$\frac{[22075-14400]}{\sqrt{[(19730-14400) * (26730-14400)]}}$$

$$\frac{[7675]}{\sqrt{[(5330) *(12330)]}}$$

$$\frac{[ 7675]}{\sqrt{[65718900]}}$$

$$\frac{[7675]}{8106.71}$$

$$= 0.9467$$

This correlation has stronger relationship.

### ***Inference***

There is a strong relationship between the type of the container used and type of the package of the cargo handled.

### ***Calculation of coefficient of correlation***

X: Equipment used to load cargo.

Y: Safety measures taken on the cargo.

| <b>x</b> | <b>y</b> | $X = x - \bar{x}$ | $Y = y - \bar{y}$ | <b>X<sup>2</sup></b> | <b>Y<sup>2</sup></b> | <b>XY</b> |
|----------|----------|-------------------|-------------------|----------------------|----------------------|-----------|
| 37       | 24       | 13                | 0                 | 169                  | 0                    | 0         |
| 49       | 36       | 25                | 12                | 625                  | 144                  | 300       |
| 21       | 42       | -3                | 18                | 9                    | 324                  | -54       |
| 08       | 12       | -16               | -12               | 256                  | 144                  | 192       |
| 05       | 6        | -19               | -18               | 361                  | 324                  | 342       |
| 120      | 120      |                   |                   | 1420                 | 936                  | 780       |

$$\bar{X} = 120/5 = 24$$

$$\bar{Y} = 120/5 = 24$$

$$r = \sum xy / \sqrt{\sum x^2 \times \sum y^2}$$

$$= 780 / \sqrt{1420 \times 936}$$

$$= 780 / 1152.875$$

$$r = 0.67$$

From the calculation, the value of  $r=0.67$  (nearby +1).

### ***Inference***

There is strong positive correlation between equipment used and safety measures taken on the cargo.

So it is advisable that company should use appropriate equipment in handling cargo.

### **4.5 CHI- SQUARE TEST I – ( $\chi^2$ )**

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 (Ho)**

There is no relationship between age and education.

**Alternate hypothesis (H1)**

There is relationship between age and education.

**Table 4.5.1: Case Processing Summary**

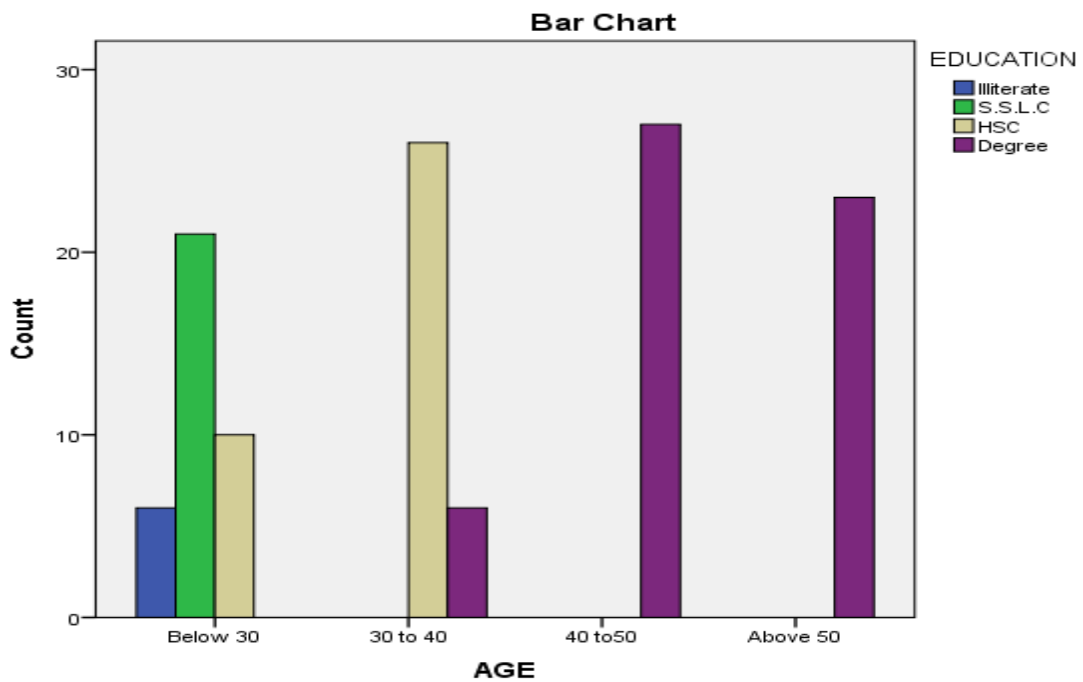
|                 | Cases |         |         |         |       |         |
|-----------------|-------|---------|---------|---------|-------|---------|
|                 | Valid |         | Missing |         | Total |         |
|                 | N     | Percent | N       | Percent | N     | Percent |
| AGE * EDUCATION | 119   | 100.0%  | 0       | 0.0%    | 119   | 100.0%  |

**Table 4.5.2: Age \* Education Crosstabulation**

|       |          |                    | EDUCATION  |         |        |        | Total  |
|-------|----------|--------------------|------------|---------|--------|--------|--------|
|       |          |                    | Illiterate | S.S.L.C | HSC    | Degree |        |
| AGE   | Below 30 | Count              | 6          | 21      | 10     | 0      | 37     |
|       |          | % within Age       | 16.2%      | 56.8%   | 27.0%  | 0.0%   | 100.0% |
|       |          | % within Education | 100.0%     | 100.0%  | 27.8%  | 0.0%   | 31.1%  |
|       |          | % of Total         | 5.0%       | 17.6%   | 8.4%   | 0.0%   | 31.1%  |
|       | 30 to 40 | Count              | 0          | 0       | 26     | 6      | 32     |
|       |          | % within Age       | 0.0%       | 0.0%    | 81.2%  | 18.8%  | 100.0% |
|       |          | % within Education | 0.0%       | 0.0%    | 72.2%  | 10.7%  | 26.9%  |
|       |          | % of Total         | 0.0%       | 0.0%    | 21.8%  | 5.0%   | 26.9%  |
|       | 40 to50  | Count              | 0          | 0       | 0      | 27     | 27     |
|       |          | % within Age       | 0.0%       | 0.0%    | 0.0%   | 100.0% | 100.0% |
|       |          | % within Education | 0.0%       | 0.0%    | 0.0%   | 48.2%  | 22.7%  |
|       |          | % of Total         | 0.0%       | 0.0%    | 0.0%   | 22.7%  | 22.7%  |
|       | Above 50 | Count              | 0          | 0       | 0      | 23     | 23     |
|       |          | % within Age       | 0.0%       | 0.0%    | 0.0%   | 100.0% | 100.0% |
|       |          | % within Education | 0.0%       | 0.0%    | 0.0%   | 41.1%  | 19.3%  |
|       |          | % of Total         | 0.0%       | 0.0%    | 0.0%   | 19.3%  | 19.3%  |
| Total |          | Count              | 6          | 21      | 36     | 56     | 119    |
|       |          | % within Age       | 5.0%       | 17.6%   | 30.3%  | 47.1%  | 100.0% |
|       |          | % within Education | 100.0%     | 100.0%  | 100.0% | 100.0% | 100.0% |
|       |          | % of Total         | 5.0%       | 17.6%   | 30.3%  | 47.1%  | 100.0% |

**Table 4.5.3: Chi-Square Tests**

|                                                                                         | Value                | df | Asymp. Sig. (2-sided) |
|-----------------------------------------------------------------------------------------|----------------------|----|-----------------------|
| Pearson Chi-Square                                                                      | 155.242 <sup>a</sup> | 9  | .000                  |
| Likelihood Ratio                                                                        | 176.537              | 9  | .000                  |
| Linear-by-Linear Association                                                            | 82.614               | 1  | .000                  |
| N of Valid Cases                                                                        | 119                  |    |                       |
| a. 6 cells (37.5%) have expected count less than 5. The minimum expected count is 1.16. |                      |    |                       |



**Chart 4.5.1: Chi-Square Tests**

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

=  $3*3= 09$

Calculated value = 155.242

Tabulated value = 16.919

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

$$Z = 155.242 > 16.919$$

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 age and education.

## **4.6 ONE-WAY ANOVA CLASSIFICATION**

### ***Null hypothesis (Ho)***

There is a significance difference between have own transportation fleet and when fleet driver does unethical practice.

### ***Alternate hypothesis (H1)***

There is no significance difference between have own transportation fleet and when fleet driver does unethical practice.

**Table 4.6.1: Have Own Transportation Fleet (Descriptives)**

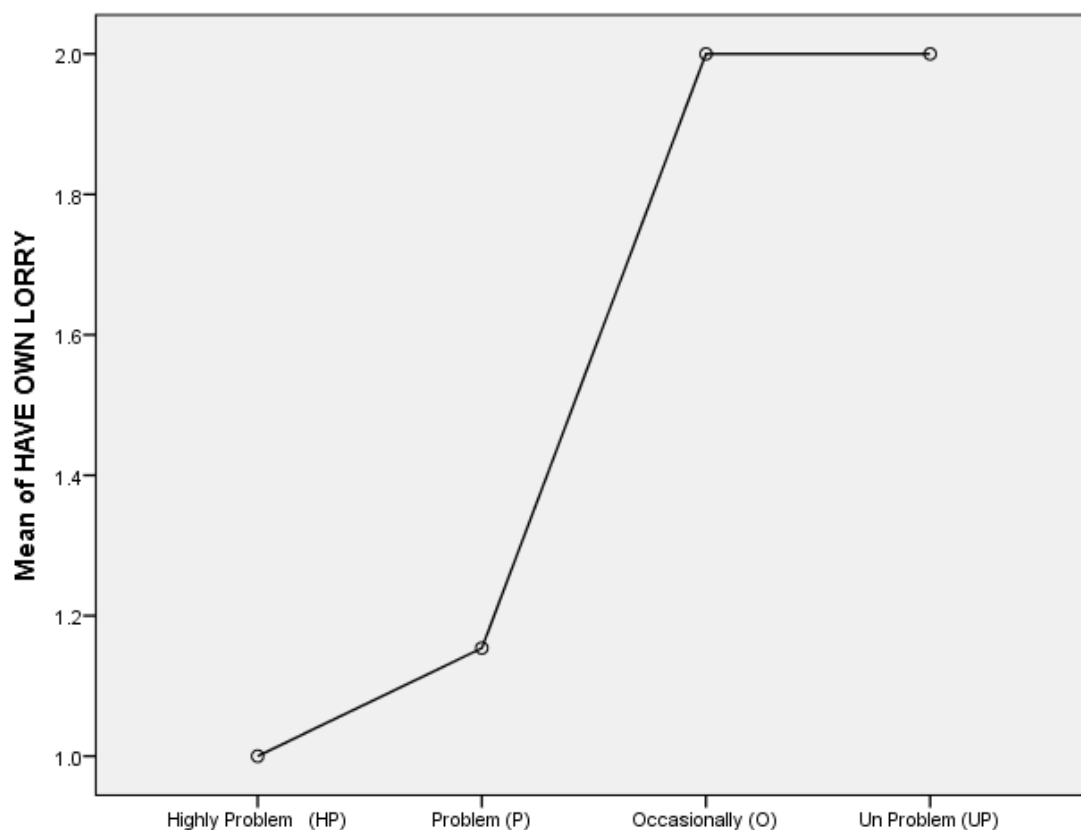
|                     | N   | Mean | Std. Deviation | Std. Error | 95% Confidence Interval for Mean |             | Minimum | Maximum |
|---------------------|-----|------|----------------|------------|----------------------------------|-------------|---------|---------|
|                     |     |      |                |            | Lower Bound                      | Upper Bound |         |         |
| Highly Problem (HP) | 35  | 1.00 | .000           | .000       | 1.00                             | 1.00        | 1       | 1       |
| Problem (P)         | 52  | 1.15 | .364           | .051       | 1.05                             | 1.26        | 1       | 2       |
| Occasionally (O)    | 23  | 2.00 | .000           | .000       | 2.00                             | 2.00        | 2       | 2       |
| Un Problem (UP)     | 9   | 2.00 | .000           | .000       | 2.00                             | 2.00        | 2       | 2       |
| Total               | 119 | 1.34 | .474           | .043       | 1.25                             | 1.42        | 1       | 2       |

**Table 4.6.2: Test of Homogeneity of Variances**

| HAVE OWN TRANSPORTATION FLEET |     |     |      |
|-------------------------------|-----|-----|------|
| Levene Statistic              | df1 | df2 | Sig. |
| 23.448                        | 3   | 115 | .000 |

**Table 4.6.3: ANOVA**

| HAVE OWN TRANSPORTATION FLEET |                |     |             |         |      |
|-------------------------------|----------------|-----|-------------|---------|------|
|                               | Sum of Squares | df  | Mean Square | F       | Sig. |
| Between Groups                | 19.785         | 3   | 6.595       | 112.042 | .000 |
| Within Groups                 | 6.769          | 115 | .059        |         |      |
| Total                         | 26.555         | 118 |             |         |      |



**Chart 4.6.1: When Driver does Non Ethical Practice**

Tabulated value = 2.70

Calculated value = 174.666

$F = F_{cal} > F_{tab}$   $F = 112.042 > 2.70$

Hence, the null 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 have own transportation fleet and when fleet driver does unethical practice.

## **4.7 ANALYSIS USING 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 price of diesel and strikes.

### ***Alternate hypothesis (H1)***

There is negative relationship between price of diesel and strikes.

**Table 4.7.1: Correlations**

|                                                              |                     | PRICE OF DIESEL | STRIKES |
|--------------------------------------------------------------|---------------------|-----------------|---------|
| PRICE OF DIESEL                                              | Pearson Correlation | 1               | .676**  |
|                                                              | Sig. (2-tailed)     |                 | .000    |
|                                                              | N                   | 119             | 119     |
| STRIKES                                                      | Pearson Correlation | .676**          | 1       |
|                                                              | Sig. (2-tailed)     | .000            |         |
|                                                              | N                   | 119             | 119     |
| **. Correlation is significant at the 0.01 level (2-tailed). |                     |                 |         |

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

$$r = .676$$

### ***Inference***

Since  $r$  is positive, there is positive relationship between price of diesel and strikes.

## **CHAPTER 5**

### **FINDINGS, SUGGESTIONS AND CONCLUSION**

#### **5.1 FINDINGS**

- The company handles 61% export shipments and 39% of import shipments.
- Around 63% of the shipments are handled by sea only, rest through air.
- 73% of the shipments are loaded by LCL and 27% by FCL containers.
- The cargo handled are 28% of garments and electronics each, 17% chemicals, 15% perishables and 12% other type of cargo.
- 38% of the shipments are more than 400 kgs of weight, 27% of cargo are 100-200kgs, 20% are 0-100kgs, 8% are 200-300kgs and 7% are 300-400 kgs of cargo
- It is found that 40% of shipments are packed in carton, 24% in pallet, 20% in bag, 13% in drum and 3% of shipments are packed by other modes.
- For the carriage of cargo, 55% of shipments are carried through 20ft container, 22% through 40ft, 12% through refrigerator, 7% through cubes and 4% through open top containers are used.
- The equipment used to handle cargo is 53% by mobile crane, 29% by fork lift, 15% by RTG and 3% by other modes of equipment.

- A highly satisfied percentage of about 89% of the shipments are handled with good equipment and 11% with less efficient equipment.
- 61% of shipments require less than 2 persons, 32% requires 2-4 persons and 7% requires more than 4 persons for handling cargo.
- Most of the shipments are accepted without any damage, moreover 98% of shipments.
- It is found that 28% strongly agree, 39% agree, 16% neither agree nor disagree, 13% disagree and 4% strongly disagree to the containers condition about the fitness for usage.
- 28% strongly agree, 33% agree, 23% neither agree nor disagree, 10% disagree and 6% strongly disagree that the shipments are using appropriate packages.
- The identification numbers on the cargo are marked without any mistakes which contributes 95%.
- 60% of the shipments are transported through company and 40% through the client itself to the final destination.
- 31% strongly agree, 41% agree, 17% neither agree nor disagree, 7% disagree and 4% strongly disagree that the shipments are handled through good equipment.
- 32% strongly agree, 47% agree, 14% neither agree nor disagree, 4% disagree and 3% strongly disagree that transportation occurs without any damage.
- A high percentage of about 83% of shipments arrive to port on correct time, while rest arrives late.
- A signalman is employed while handling cargo for about 73% of shipments.

- The safety measures are taken on dangerous goods- the condition is accepted alike 20% strongly agree, 30% agree, 35% neither agree nor disagree, 10% disagree and 5% strongly disagree
- It is found that 76% of shipments are surveyed and 24% of the shipments are not surveyed by the surveyors.
- From the chi – square test it is found that there is no significant association between the weight of the cargo and the equipment used to handle it.
- From the one way ANOVA test it is confirmed that there is no significant association transportation arrangement by company and damage occurrence of cargo.
- From the coefficient of correlation it is confirmed that there is a strong relationship between the type of the container used and type of the package of the cargo handled.
- From the coefficient of correlation it is confirmed that there is strong positive correlation between equipment used and safety measures taken on the cargo.
- Most of the respondents are having own transportation fleet.
- Most of the respondents are facing problem occasionally while hiring a transportation fleet.
- Most of the respondents are not facing problem while paying insurance every year. Most of the respondents say that the customer doesn't create the problem.
- Most of the respondents say they are not having problem with the brokering process.

- Most of the respondents say that they are not having problem to unload the goods.
- Most of the respondents say that they are not having problem with thefts creates.
- Most of the respondents say that they are not having problem with price of the spare parts & accessory.
- Most of the respondents say that they are having highly problem with the price of diesel.
- Most of the respondents say that they are having problem occasionally with break down.
- Most of the respondents are not having problem with delivery.
- Most of the respondents say that they are having problem with strike.
- Most of the respondents are facing problem when fleet driver does unethical practice.

## **5.2 SUGGESTIONS**

- More import shipments can be taken because import can give more profit than export.
- Machinery parts can be taken for export/import which gives maximum profit than any other goods.
- The signalman should be employed at all the necessary places for safer movement of cargo.
- Effective lifting equipment should be used properly.
- The package of the cargo should be made appropriately.

- Special care should be taken on dangerous goods.
- Single window checking and certifying may reduce the time in every checking stations for fleet transportation
- Government must reduce the rate of insurance, road tax, quarterly tax and income tax for fleet transportation
- In this field competition is high, so the organizations go for innovative idea and adopt new technology like e-booking.
- Care has to be taken during fleet transportation. Safety precautions should be followed.

### **5.3 LIMITATIONS OF THE STUDY**

- There are some limitations in completing this research,
- Time limit for collecting data was less so sufficient number of data cannot be collected.
- Sample size has been limited to 120 respondents.
- Unwillingness & Bias from the part of respondents limits the coverage of the study.

### **5.4 CONCLUSION**

Technology has driven material and cargo management to a high level. Many lifting equipment are used in handling cargo now a days made easier handling of cargo. The purpose of the project was to find the problem in transportation fleet process of Picastra Logistics Private Limited

Majority of the shipments are handled properly without any inefficient procedures. Only some of the shipments require special attention. All the variables of the transportation fleet and cargo managements are carried out smoothly except

some. But that is normal, because mistakes occur accidentally. So, on the handling process equipment usage, signalman, containers, weight of the cargo, content of the cargo should be carefully watched and act accordingly. This will ensure effective transportation fleet and cargo managements of the company.

This study has been undertaken to understand the overall effectiveness of the transportation fleet and cargo management process of Picastra Logistics Private Limited. For this purpose, responses from the employees have been collected and analyzed. Based upon the findings out of the research, few valuable suggestions have been given to the management of Picastra Logistics Private Limited to improve the overall effectiveness of the transportation fleet and cargo management.

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## APPENDIX

### QUESTIONNAIRE

1. Number of transportation fleet available :
2. Type of shipment handled
  - a) Export
  - b) Import
3. Mode of the shipment :
  - a) Air freight
  - b) Sea freight
4. Container load of the shipment :
  - a) LCL
  - b) FCL
5. Which type of the cargo is handled?
  - a) Garments
  - b) Electronics
  - c) Chemicals
  - d) Perishable
  - e) Others
6. What is the weight of the cargo?
  - a) 0-100kgs
  - b) 100-200kgs
  - c) 200-300kgs
  - d) 300-400kgs
  - e) More than 400kgs
7. What type of Package is used for the cargo?
  - a) Carton
  - b) Pallet
  - c) Drum
  - d) Bags
  - e) Others
8. What type of container is used for the cargo?
  - a) 20Ft
  - b) 40ft
  - c) cubes
  - d) Refrigerator
  - e) Open top

9. What type of equipment is used to handle cargo?  
a) Fork-lift                      b) RTG crane  
c) Mobile crane                d) Others
10. Whether equipment used is good enough?  
a) Yes                              b) No
11. How many persons are required to handle the cargo?  
a) 0-2                      b) 2-4                      c) More than 4
12. Whether cargo accepted in damaged Package?  
a) Yes                              b) No
13. Are the container used is fit for use?  
a) Strongly agree                      b) Agree  
c) Neither agree/nor disagree                      d) Disagree  
e) Strongly disagree
14. Whether appropriate package assigned to cargo?  
a) Strongly agree                      b) Agree  
c) Neither agree/nor disagree                      d) Disagree  
e) Strongly disagree
15. Whether display of identification numbers are correctly made on cargo?  
a) Yes                              b) No
16. Whether transportation is arranged by company?  
a) Yes                              b) No
17. Are the equipment used to load cargo is good?  
a) Strongly agree                      b) Agree  
c) Neither agree/nor disagree                      d) Disagree  
e) Strongly disagree
18. Does the transportation occur without any damage?  
a) Strongly agree                      b) Agree  
c) Neither agree/nor disagree                      d) Disagree  
e) Strongly disagree

19. Whether cargo arrived at correct time to port?  
a) Yes                                      b) No
20. Whether signalman employed during loading of cargo in container:  
a) Yes                                      b) No
21. Are the safety measures on dangerous goods are taken?  
a) Strongly agree                                      b) Agree  
c) Neither agree/nor disagree                                      d) Disagree  
e) Strongly disagree
22. Finance problem in Transportation Fleet
- |                                   |     |     |     |     |
|-----------------------------------|-----|-----|-----|-----|
| a. To hire a Transportation Fleet | ( ) | ( ) | ( ) | ( ) |
| b. Pay Insurance every year       | ( ) | ( ) | ( ) | ( ) |
| c. Pay income tax every year      | ( ) | ( ) | ( ) | ( ) |
23. **Other Transportation Fleet problem**
- |                                        |     |     |     |     |
|----------------------------------------|-----|-----|-----|-----|
| a. Customer creates                    | ( ) | ( ) | ( ) | ( ) |
| b. Brokering process                   | ( ) | ( ) | ( ) | ( ) |
| c. Unload the good                     | ( ) | ( ) | ( ) | ( ) |
| d. Theft creates                       | ( ) | ( ) | ( ) | ( ) |
| e. Spare parts & accessory price of    | ( ) | ( ) | ( ) | ( ) |
| f. Diesel price                        | ( ) | ( ) | ( ) | ( ) |
| g. Break down                          | ( ) | ( ) | ( ) | ( ) |
| h. Delivery schedule                   | ( ) | ( ) | ( ) | ( ) |
| i. Strikes                             | ( ) | ( ) | ( ) | ( ) |
| j. Fleet drivers do unethical practice | ( ) | ( ) | ( ) | ( ) |
24. Any suggestions to improve the Transportation Fleet and cargo management at Picastra Logistics Pvt Ltd?
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