

**“A STUDY ON PROBLEMS IN ROAD TRANSPORT WITH SPECIAL
REFERENCE TO BULLET LOGISTICS**

Submitted in partial fulfilment of the requirements for the award of degree in

MASTER OF BUSINESS ADMINISTRATION

By

SILVA BERLIN ANTHONY

Register No.41410296



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

MAY 2023



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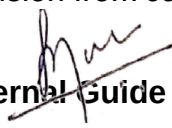
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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **SILVA BERLIN ANTHONY 41410296** who carried out the project entitled "A STUDY ON PROBLEMS IN ROAD TRANSPORT WITH SPECIAL REFERENCE TO BULLET LOGISTICS" under my supervision from January 2023 to March 2023.


Internal Guide


External Guide

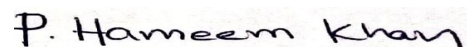
Dr. BHUVANESWARI.G
Dean – School of Management Studies

SCHOOL OF MANAGEMENT STUDIES
SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(Deemed to be University)
Jeppiaar Nagar, Rajiv Gandhi Sala
Chennai-600 119

Submitted for Viva voce Examination held on **06.05.2023**



Internal Examiner


P. Hameem Khan

External Examiner

DECLARATION

I **SILVA BERLIN ANTHONY (41410296)** hereby declare that the Project Report entitled “**A STUDY ON PROBLEMS IN ROAD TRANSPORT WITH SPECIAL REFERENCE TO BULLET LOGISTICS**” done by me under the guidance of is submitted in partial fulfillment of the requirements for the award of Master of Business Administration degree.

DATE:06.05.2023

PLACE: chennai

Silva Berlin

SILVA BERLIN ANTHONY

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SILVA BERLIN ANTHONY

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ABSTRACT

In logistics, road is the dominant mode of transport which accounts for 68% of freight movement in India. Trucks are the most widely used mode of transportation in India. At present, around 1.5 million trucks are operated on the Indian roads and the number of trucks increases around 10% per year. With the economic development of infrastructure in India, the country has progressed at a rapid pace and today there is an availability of wide variety of modes of transport by land, water and air. But, overall, Road Transport is the primary and preferred mode of transport for most of the population and India's Road Transport system is among the most heavily utilized system in the world. It plays a pivotal role in the economic development of a nation by increasing the productivity and competitiveness.

The study is being conducted for the road goods transport industry in Bangalore, to find out the problems in the road transport industry. It is required to find out the problem based on certain aspects (price, workers, fuel, Income, problem faced by the industry).

Primary objective is to study the problems in road transportation with reference to Bullet Trans Solutions Pvt Ltd. Secondary objectives are to assess the finance related problems in road transportation, analyze the manpower-based problems in road transportation, understand the legal problems in road transportation and find out and analyze various other problems in the goods transport industry in Bangalore.

Convenience sampling method has been used in the research work. Multiple choice questions have been chosen to collect the responses from 120 respondents. The data collected has been analyzed. Numerous new findings have been derived from this research has helped to provide few suggestions to resolve the problems in road transportation.

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Chapter-I

INTRODUCTION

1.1. OVERVIEW LOGISTICS INDUSTRY:

Logistics is about moving materials, information and funds from one business to another business or from a business to the consumer. Logistics is an important part of the business economic system and is a major global economic activity. It encompasses activities like freight transportation, warehousing, material handling, protective packaging, inventory control, order processing, marketing, forecasting and customer service.

Fierce competition in today's global market, the introduction of products with short life cycles, the heightened expectations of customer and the cost cutting measures have forced business enterprise to focus attention on logistics industry. Historically, the logistics sector was clearly separated and restricted mainly to transportation and warehousing. The logistics management in today's world however, covers all the aspects of value chain including an efficient integration of transportation, distribution, warehousing, reverse logistics, value added services such as payment collection, packaging, documentation, customer brokerage facilities, kitting, repair management, reconfiguration etc. The developments of state-of-the-art IT in recent years have further had remarkable implications for the logistics industry.

In logistics road is the dominant mode of transport which accounts for 68% of freight movement in India. Trucks are the most widely used mode of transportation in India. At present, around 1.5 million trucks are operated on the Indian roads and the number of trucks increases around 10% per year.

Railways are considered a relatively cheaper mode of transport and are used mainly for transporting bulk materials over long distances. About 89% of its freight traffic is contributed by major commodities such as coal, fertilizers, cement, petroleum products,

food grain, finished steel, iron ore and raw material to steel plants. The balance 11% is other commodities moving in bulk and containers.

However, when compared with developed countries, the Indian logistics industry is still considered to be underdeveloped. The major restrictions hindering the growth of logistics industry in India include the poor conditions of infrastructures and transport vehicles, complex tax laws, complexity of international trade documentation process and lack of IT infrastructure, shortage of professionally competent logisticians and insufficient technological aids and the lack of industry readiness. Due to these restrictions, the logistics costs in India are still higher than in the developed markets. It is estimated to be around 13% of GDP, against 9% of GDP in the US. (This is however lower when compared to countries like China which accounts for 20% of GDP). It is also forecasted that the potential savings for India if logistics cost decreases by 1% is about a significant amount of \$4.8 billion per year. At the other end, the average inventory level of grocery stores is recorded to be 45 days of sales in India compared 11-22 days in developed countries. Such inefficiencies indicate that there is much to be done with the current situation in order to boost the Indian logistics industry.

Overview good transport industry:

With the economic development of infrastructure in India, the country has progressed at a rapid pace and today there is an availability of wide variety of modes of transport by land, water and air. But, overall Road Transport is the primary and preferred mode of transport for most of the population and India's Road Transport system is among the most heavily utilized system in the world. It plays a pivotal role in the economic development of a nation by increasing the productivity and competitiveness.

Firstly, Road Transportation infrastructure can enter the production process as direct input and in many cases as an unpaid factor of production.

Secondly, it may make other existing, inputs more productive. For instance, a well-designed road allows the transportation of goods to market in less time and hence, reducing the transportation cost in the production process.

Thirdly, Road Transportation increases regional economic growth by attracting resources from other regions. In this vein one would recall that through-out the growth of civilization, most centers of economic activities flourished along riverbanks and coast lines where water ways the convenient prime carrier of raw materials goods and labor.

With the initiation of the economic reforms in 1993 the transport sector of the nation has shown good performance. Transport is basically a derived demand depending upon the size and structure of the economy and the demographic profile of the economy. Over the last ten years (2002-03 to 2011-12) Road Transport sector GDP grew at an annual average rate close to 10% compared to an overall annual GDP growth of 6%. Today Road Transport serving occupies an irresistible dominance within the transport sector with a share of 4.8% in GDP compared to a too little 1.0% share GDP in case of rail-ways. Also annual average growth in freight transport at 6.5% for road was much higher in comparison to rail-ways which clocked a modest annual average increase of 3.6% during the past reforms phase (1992-93 to 2011-12)

With about 3.3 million kms of roads, India has the third largest road networks in the world which is connected mainly through national highways and state highways. Other types of road network include district roads, rural roads, urban roads and special purpose roads (for military, port and etc). Road is also the dominant mode of transport which accounts for 68% of freight movement in India. Trucks are the most widely used mode of transportation in India. At present, around 1.5 million trucks are operated on the Indian roads and the number of trucks increases around 10% per year.

According to the World Bank Group, the poor condition of roads is exacerbated by an outdated freight vehicle fleet. Very limited modern multi-axle trucks are used, while the extensive overloading by rigid two-axle trucks has resulted in serious damage of road

pavement and structure. The overall poor road condition leads to low vehicle speed, and thus less coverage. To illustrate, trucks move on the national highway with an average speed of 30 to 40 km with the distance covered by only about 250 to 300 km, whereas in developed countries, the speed and distance covered is twice that of in India. The poor quality of roads further leads to increase the wear and tear of vehicles and high accident rates.

In addition, the growing freight traffic and vehicle population is not met by the slow level expansion of road length network. Hence the increasing traffic congestion, poor physical road conditions, the use of old vehicle, mixed traffic of fast and slow vehicles, highly crowded and unsafe urban crossings and frequent enforced stops at state or municipal check posts for permit inspection and tax collection in highways have led to a very low level of road transportation service in India. As a result, India is rated 56th among the 59 developing countries in terms of the competitiveness on road infrastructure.

The project BTKM (Billion Tonne Kilometers) made by the Sub Group for alternative growth scenario may accessibility, flexibility of operations, door-to-door service and reliability have earned road transport an increasingly higher share of both passenger and freight traffic vis-à-vis other transport modes. In addition to these factors, transit time, availability of capacity on alternate modes, quality and reliability of the service, associated costs like warehousing and demurrage, etc., all influence the choice of the mode of transport. The alternate modes of transport viz. Roadways, railways, waterways, airways, mass transit, etc., each contribute to the transportation requirements of the economy.

Transport sector accounts for a share of 6.4 per cent in India's Gross Domestic Product (GDP) reflecting its significance. Road transport has emerged as the dominant segment in India's transportation sector with a share of 4.7 per cent in India's GDP in comparison to railways that had a 1 per cent share of GDP in 2009-10 as per the data on National

Accounts released by the Central Statistical Organisation (CSO). There were 30,149 enterprises in the road freight industry in 2009 (the latest Annual Business Survey data

available). This was 7 per cent lower than the figure for 2008 and 20 per cent lower than the figure for 1999.

Turnover for the road freight industry was £23.9 billion in 2009, 9 per cent lower than in 2008. Gross value added was also lower in 2009 than in 2008, at £10.7 billion.

There were approximately 293,000 people employed in the industry in 2009. This was 5 per cent higher than the figure of 280,000 in 2008. Estimates from the Labor Force Survey show there were 299,000 HGV drivers in 2010, a 5 per cent increase on the 2009 figure of 285,000.

At the end of 2010 there were 389,700 goods vehicles over 3.5 tones licensed in Great Britain.

In 2010, there were 7,103 accidents involving at least one HGV, with 9,686 casualties. Of those casualties, 263 were fatalities.

1.2. INDUSTRY PROFILE

Packaging plays a pivotal role in consumers' experience with respect to the brand and the overall purchasing experience. There are four major functions of packaging—containment, protection, communication and utility—that are intended to maximise sales and profits while reducing losses and wastage; and all of them are critical for enhancing consumer experience. In a traditional brick-and-mortar commerce, packaging was used to create distinction and increase shelf presence through attractive and easy-to-spot colors, shapes and graphics. When damage is occurred in a brick-and-mortar store, it was easy for the consumer to keep the damaged product aside and pick an undamaged one placed right next to it. Loss of product was not necessarily compounded by the loss of sales or customer. In an e-commerce world, however, the effects of a damaged product are very different. A consumer makes a purchasing decision at the click of a button and to contend with a damaged product, after delivery wait time, can lead to a conclusive

decision against the online retailer. As per eMarketer, 83% consumers are unlikely to purchase from an online retailer again after a poor experience.

Having realised the impact of their packaging decisions, companies are investing to enhance e-commerce packaging to meet consumer expectations and positively impact their perceptions and purchasing decisions.

Rise of the Indian e-commerce sector

India has been witnessing a surge in its [e-commerce sector](#) over the last 5-6 years. The Indian e-commerce market is projected to grow to US\$ 200 billion by 2026 from US\$ 38.5 billion in 2017. This growth is likely to be propelled by an increase in internet and smartphone penetration and the ongoing digital transformation in the country. After India locked down in March this year, the e-commerce segment witnessed a momentary decline for a few weeks; however, re-opening of markets led to recovery and subsequently, an upsurge. Marketplaces as well as direct brand websites witnessed an overall 130% spike in online orders.

Since June, the sector has recorded massive sales events such as Myntra's End of Reason Sale, Flipkart's Independence Day Sale and Amazon's Prime Day Sales, boosting order volumes. In fact, recently, Walmart declared (in its latest earnings report) that Flipkart's GMV (Gross Merchandising Volume) has exceeded the pre-COVID 19 levels.

Another driving factor for this surge in e-commerce transactions is the emergence of first-time shoppers and the digital-first approach. Social distancing has led to significant growth of first-time online shoppers. While India's top 5 metropolitan cities continue to dominate the [e-commerce sector](#), Tier II and III cities have also joined the race with a rising share of online shoppers. Amazon and Flipkart have gone a step further in supporting this growth in smaller cities by offering their platform content in local languages.

Surge in e-commerce to continue post pandemic

The post-lockdown numbers indicate a systemic shift in consumer purchasing preferences from offline to online. Customers are increasingly getting used to the comforts of online shopping.

Local retail outlets (Kirana shops) are also digitising and starting to deliver online to keep up with changing customer preferences and not lose business to large marketplaces such as Amazon and Flipkart. This is largely adding to the convenience of customers—in having everything delivered to their doorstep and saving time.

In a post-pandemic scenario, whether consumers go back to their old ways of purchasing or will the comfort, ease and discounts of online shopping continue to lure them remains a question. Nonetheless, it can be assumed that not all consumers will switch back to in-store shopping and continue buying online in the near future.

Another point to note is the change towards hygienic living—sanitisation, personal hygiene, social distancing or using healthy products—as this is expected to have a lasting impact on consumers even after the pandemic.



Mixed impact of e-commerce on the packaging sector

Amid the e-commerce surge, the Indian packaging industry is witnessing steep growth and is one of the strongest growing segments. According to the Indian Institute of Packaging (IIP), packaging consumption in India increased 200% in the past decade, from 4.3 kgs per person per annum (pppa) to 8.6 kgs pppa.

The industry is expected to reach US\$ 204.81 billion by 2025 from US\$ 50.5 billion in 2019 at 26.7% annually. The e-commerce segment of the packaging market was estimated at US\$ 451.4 million in 2019 and is forecast to reach US\$ 975.4 million by 2025 at 13.8% annually.

The packaging sector is categorised into two major segments (by type)—rigid and flexible packaging, with rigid packaging accounting for 64% market share. In terms of packaging materials, 55% of the sector is dominated by plastics, followed by paper & cardboard (20%) and glass (10%).

[Food processing](#) is the largest consumer of packaging at 45%, followed by pharmaceuticals (25%) and personal care products (10%). Increasing demand from these end-user segments is creating a huge potential for expansion.

Amid the pandemic, the demand for packaging for groceries, healthcare products and e-commerce transportation has increased exponentially; but, at the same, the demand for industrial, luxury and sections of B2B-transport packaging has declined. Some of the key end-user segments will witness mixed impact of the pandemic owing to a sharp increase in demand for some sub-segments and dip in others. For example:

- **Food and beverages packaging:** The packaged food and beverages segment is witnessing an upsurge due to a demand spike for essential food products and shelf-stable foods. Demand from the grocery and dairy product segments has subsequently fuelled the demand for vacuum packaging, trays and protective films including PVC film and shelf life-extending modified atmospheric packaging and others. However, demand from offline food chains including cafes and restaurants, which have been either entirely closed or operating partially, is negatively impacting the market.

- **Transit and omnichannel packaging:** Demand for this type of packaging has nosedived in the past few months due to reduced industrial activity. However, some of the negative impacts have been offset by the spike in demand from other end-user segments—such as disposable takeaway packaging for food and pharmaceuticals, and corrugated packaging for e-commerce and grocery deliveries.
- **Consumer packaging:** While the demand for packaging continues to be accentuated by the sharp increase in home deliveries for grocery purchases and other home care products, the demand for non-food, premium/luxury and non-essential purchases has been hit with stores remaining closed or consumer cut backs on spending.
- **Healthcare packaging:** Demand for all types of healthcare packaging and related substrates, including flexible blister foils, pumps, closures and rigid plastics, has soared. Similarly, the demand has also spiralled for packaging used in dietary supplements such as vitamins and essential supplies needed by consumers in a pandemic situation.

Packaging: A vital bridge for adapting to change and staying relevant

Since the pandemic, companies have been tweaking their products, marketing strategies and service offerings to cater to the evolving needs of consumers – highlighting what matters most today – safety, immunity and health. Swiggy, for instance, introduced a double-layered packaging that keeps food safe and fresh. Similarly, Nature’s Basket switched from cloth bags to single-use paper bags that can be disposed of immediately after use. Packaged food product companies are focussing on packaging materials that support longer shelf-life. A few others are updating their packing designs to include communication around appropriate sanitisation. A few months back, the world was busy shunning single-use plastics; however, consumers have re-adopted it for better hygiene. Irrespective of the strategy adopted by the company or consumer, each of that strategy boils down to an impact on packaging.

Packaging is now seen as a key bridge between consumers and brands to effectively communicate that hygiene is maintained, safety is prioritised and product or service quality is not being compromised.

Packaging already had a pivotal role in consumer buying experience in the e-commerce world. And now, its impact has even grown bigger. This sector will continue to ride the e-commerce wave long into the future.

1.3. COMPANY PROFILE:

Bullet Trans Solutions Pvt Ltd. is a logistics company based in India that provides a wide range of transportation and logistics services to clients across various industries. The company was founded in the year 2010 and has since then grown to become a trusted name in the industry.

Services Offered: Bullet Trans Solutions Pvt Ltd. offers a range of services to its clients, including:

Transportation: The company provides transportation services for a variety of cargo types, including hazardous and non-hazardous materials.

Warehousing: Bullet Trans Solutions Pvt Ltd. has a network of warehouses across the country, providing safe and secure storage facilities for clients' goods.

Custom Clearance: The company offers custom clearance services, ensuring that clients' goods comply with all regulatory requirements.

Freight Forwarding: Bullet Trans Solutions Pvt Ltd. provides freight forwarding services, ensuring timely and efficient delivery of goods.

Project Logistics: The company has expertise in handling complex logistics projects, including oversized and heavy-lift cargo.

Supply Chain Management: Bullet Trans Solutions Pvt Ltd. offers supply chain management services, helping clients optimize their logistics operations.

E-commerce Logistics: The company provides specialized logistics services for e-commerce businesses, including order fulfillment and last-mile delivery.

Quality Standards: Bullet Trans Solutions Pvt Ltd. is committed to providing high-quality logistics services to its clients. The company has implemented a quality management system that complies with ISO 9001:2015 standards. It also adheres to other relevant industry standards and regulations.

Team: Bullet Trans Solutions Pvt Ltd. has a team of experienced logistics professionals who are dedicated to providing exceptional service to clients. The team is trained to handle complex logistics challenges and has the expertise to find creative solutions that meet clients' specific needs.

Clientele: Bullet Trans Solutions Pvt Ltd. has a diverse clientele that includes companies from various industries, including manufacturing, e-commerce, retail, and more. The company has established long-term relationships with its clients, thanks to its commitment to quality and customer service.

1.4. STATEMENT OF PROBLEM:

The study is being conducted for the road goods transport industry in Bangalore, to find out the problems in the road transport industry. It is required to find out the problem based on certain aspects (price, workers, fuel, Income, problem faced by the industry).

1.5. OBJECTIVES OF THE STUDY:

- **PRIMARY OBJECTIVE:**

To study the problems in road transportation with reference to Bullet Trans Solutions Pvt Ltd Pvt Ltd

- **SECONDARY LOGISTICS**

1. To assess the finance related problems in road transportation
2. To analyze the manpower based problems in road transportation

3. To understand the legal problems in road transportation
4. To find out and analyze various other problems in the goods transport industry in Bangalore.
5. To provide suitable suggestions to resolve the problems in road transportation

1.6. LIMITATIONS OF THE STUDY:

Even though an elaborate study was made on the problems in logistics, special reference to road goods transport industry in Bangalore, it was subject to the following limitations:

1. Even though an elaborate study was made on the problems in logistics due to the time constraint, it limited to road goods transport industry.
2. The study was limited to Bangalore only.
3. The study was limited to lorry service only
4. Time was a major constraint.
5. The sample was limited to only owners or managers of the road transport industry in Bangalore.
6. The findings of the study are based on the assumption that respondents have disclosed in the questionnaire.
7. For time constraint sample size took 120 respondents

1.7. SCOPE OF THE STUDY

The major scope of this study as follows:

- To find out the legal issues faced by the road transport companies and find out solution for the same.
- To find out the solutions for the manpower problems
- To find out the solutions for the financial problems

CHAPTER-2

REVIEW OF LITERATURE

2.1. REVIEW OF LITERATURE:

Davis, Beth R (2006), a study on "Logistics service driven loyalty: an exploratory study". The Journal shows that supply chain relationships can be a stable source of competitive advantage to firms in the supply chain because of their ability to create barriers to existing competition and conclude that improving logistics customer service is an ongoing focus for firms. Suppliers are trying to become more proactive with their customers and anticipate customer expectations.

Mohitayalamanchi (2009), a study on "Logistics and Customer Value", the objective of the study is about the customer value that companies have created through logistics management, in their quest for new ways to establish a competitive edge. A number of new tools and approaches have emerged as proactive elements of the logistics response to the task of creative value for the customer viz. emphasis on logistical customer service, management of the supply chain, the development of strategic alliances. It gives an explanation of various steps taken by different firms for identifying and implementing quality improvement processes in the logistics areas.

Berrada A. Chakir&Ciro Aida (2009), a study on "Bottlenecks in the Freight Forwarding sector in West-coast Africa". The objective of the study about a to identify the bottleneck/s within the freight-forwarding industry in west coast Africa. The Study revealed that the series of interesting findings First, the activity of a Freight Forwarder depends on a series of factors that do not depend on the Freight Forwarder per se. And second, Freight Forwarders in order to accomplish their tasks have access to services that are shared by all providers, and that are beyond their control. To conclude the study identifies infrastructure as a major bottleneck in the Freight Forwarding sector.

Third party logistics: a literature review and research agenda

Author(s): Konstantinos Selviaridis, (Department of Management Science, Lancaster University Management School, Lancaster, UK), Martin Spring, (Department of Management Science, Lancaster University Management School, Lancaster, UK)

Citation: Konstantinos Selviaridis, Martin Spring, (2007) "Third party logistics: a literature review and research agenda", International Journal of Logistics Management, The, Vol. 18 Iss: 1, pp.125 - 150

Keywords: freight forwarder, Third party vendor

Article type: Literature review

DOI: 10.1108/09574090710748207 (Permanent URL)

Publisher: Emerald Group Publishing Limited

Abstract:

Purpose - To provide taxonomy of third party logistics (3PL) research and, based on that, to develop a research agenda for this field of study.

Design/methodology/approach – The proposed 3PL research classification framework is based on a comprehensive literature review, which concentrates on peer-reviewed journal papers published within the period 1990-2005. A total of 114 academic sources have been retrieved and analysed in terms of research purpose and nature, method employed, theoretical approach and level of analysis.

Findings – The review reveals that 3PL research is empirical-descriptive in nature and that it generally lacks a theoretical foundation. Survey research is the dominant method employed, reflecting the positivist research tradition within logistics. It identifies certain knowledge gaps and develops five propositions for future research. It suggests that focus should be directed towards more normative, theory-driven and qualitative method-based studies. It also argues that further empirical research in relation to 3PL design/implementation and fourth party logistics services is needed.

Originality/value – This paper fulfills an identified need for a comprehensive classification framework of 3PL studies. It essentially provides both academics and practitioners with a conceptual map of existing 3PL research and also points out opportunities for future research.

Third party logistics services:

Document Information:

Title: Third party logistics services:

Author(s): Rohit Bhatnagar, (Nanyang Business School, Nanyang Technological University, Singapore,), Amrik S. Sohal, (Department of Management, Monash University, Victoria, Australia, and), Robert Millen, (College of Business Administration, Northeastern University, Boston, Massachusetts, USA)

Citation: Rohit Bhatnagar, Amrik S. Sohal, Robert Millen, (1999) "Third party logistics services: a Singapore perspective", International Journal of Physical Distribution & Logistics Management, Vol. 29 Iss: 9, pp.569 - 587

Keywords: Logistics, Outsourcing, Partnering, Supply-chain management

Article type: Research paper

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Publisher: MCB UP Ltd

Abstract: Focusses on three constructs that we believe are the primary determinants of the future usage of third party logistics services. These constructs are: extent of use of the third party logistics services; decision making process for choosing contract logistics services provider; and impact of the usage of contract logistics services on the organization. An empirical research was carried out in Singapore to study the impact of these three factors on the future usage of third party logistics services in Singapore. Results based on an analysis of data relating to 126 Singapore-based firms indicate that most users of these services are satisfied with their providers and believe that this has led to positive developments within the organization. With a high current level of satisfaction, a large number of these firms are likely to increase their usage of contract logistics services moderately or substantially. Third party logistics services: a Singapore perspective

Main Trends and Challenges in Road Transportation Electrification

Author links open overlay panel Paulo G. Pereirinha a b c, Manuela González d, Isabel Carrilero d, David Anseán d, Jorge Alonso d, Juan C. Viera d 2018

Abstract

Climate changes and pollution are putting high pressure on finding more sustainable and effective transportation means. After Kyoto Protocol in 1997, Paris Agreement at COP 21

in 2015, and posterior announcements of limitations to internal combustion engine vehicles' (ICEV) sell and circulation by several key countries and cities are clear demonstrations of this increasing will. It is quite likely that a pure ICEV produced today will not be allowed to freely circulate everywhere during all the extension of its lifetime, especially if it is a diesel car. Therefore, every major car manufacturer is announcing new electrified models for the next years and some of them are stating that all their models will be electrified in less than 5 years. As a consequence of the impressive price decrease and performance improvement of the batteries used in electric vehicles (EVs), the typical battery capacity of a regular passenger car rose from 20-24 kWh to 30-40 kWh in just 3 years without significant car price increase. The total cost of ownership (TCO) of the EVs is approaching and will be lower than that of ICEV in less than 5 years. In some cases, the TCO is already lower than that of ICEV. Autonomous cars and the shift from individual car ownership to transportation sharing poses additional challenges.

In this paper, the main trends and technical challenges related to the electrification of the road transportation are presented, as well as some defies for the transportation sector.

Urban Road Transportation in Nigeria From 1960 To 2006: Problems, Prospects And Challenges.

EF Ogunbodede

Abstract

The nature of urban road transportation problems in Nigeria as at today can best be appreciated by looking at the trend of its development since Nigeria came into existence. Thus, this paper, attempt a cursory review of urban road transportation system in Nigeria from 1960 to 2006 (a period of 46 years). The paper adopts exploratory method of research to examine and discuss relevant issues of interest in the history of Nigeria road transport system in six sections. It was discovered that urban road transport system in Nigeria is inefficient and grossly inadequate even after 46 years of becoming independent from Colonial Rule. The paper suggested the construction of more motor-able roads within cities in order to increase the network; encourage increased public and private participation in the provision of transport services within cities and inter-cities transport

system. The adoption of motorcycle as public mode of transportation in cities should be institutionalized since the users are constrained to use this means of transportation in the absence of alternative. However, policies guiding the regulations and use of this mode should be formulated and monitored so that its use would not impact negatively on the commuters' mobility rights and lives. Similarly, government should provide enabling environment that would guaranty efficient and adequate movement of vehicles in cities.

Keywords: commuting distance, Tokunbo, commuters, Kabukabu, Okada

Collaborative Logistics from the Perspective of Road Transportation Companies
Lotte Verdonck,AN Caris,Katrien Ramaekers &Gerrit K. Janssens 2013

Multiple objective optimization of the fleet sizing problem for road freight transportation
Jacek Żak, Adam Redmer, Piotr Sawicki 2011 SUMMARY

A fleet sizing problem (FSP) in a road freight transportation company with heterogeneous fleet and its own technical back-up facilities is considered in the paper. 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. Copyright © 2011 John Wiley & Sons, Ltd.

Sustainable development of road transportation sector using hydrogen energy system
Author links open overlay panelB.L. Salvi, K.A. Subramanian 2015 Abstract

This study reviews the main problems of high air pollution levels at many urban cities and sustainability of the transportation fuels, and addressing their control measures using hydrogen energy system. In the world, majority of the transportation vehicle fleets

consume the fuels derived from fossil resources. The development of economy activities indicate the increase in transportation services resulting in increased fuel consumption and high emissions, especially unregulated emission carbon dioxide, which is a greenhouse gas (GHG). Therefore, utilization of hydrogen as fuel in vehicle fleet would improve energy security and reduce the GHG emission. A feasibility of hydrogen energy system, which includes its resources, production technologies, storage, fuel transportation, dispensing and utilization, is analysed for the road transportation sector. Globalization of the automobile industry in China: dynamics and barriers in greening of the road transportation

Author links open overlay panelLin Gan 2003 Abstract

This article describes the state of the automobile industry and urban road transportation management in China. It reviews how the automobile industry is evolving to respond to challenges in economic development, environmental regulations, and technological change. The dynamics and barriers resulting from technological change of automobiles in response to reduction of exhaust emissions and energy-efficiency improvement are analyzed. It is argued that consideration of externality costs should be integrated in automobile industrial policymaking and transportation management. Efforts need to be made to use more economic incentives for emissions reduction, and to promote technological change for cleaner vehicle development. This paper questions the current government policy of encouraging private car ownership, and suggests that improvement in public transportation systems, stronger emissions control, and technology innovation on environmental friendly automobile technologies would be relevant to China's drive toward sustainable transportation development. Social inequities resulted from automobile use is also stressed in the analysis.

Multiple objective optimization of the fleet sizing problem for road freight transportation

Jacek Zak, Adam Redmer, Piotr Sawicki 2010 Abstract

A fleet sizing problem (FSP) in a road freight transportation company with heterogeneous fleet and its own technical back-up facilities is considered in the paper. The mathematical model of the decision problem is formulated in terms of multiple objective mathematical programming based on queuing theory. Technical and economical 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.

Horizontal cooperation in road transportation: a case illustrating savings in distances and greenhouse gas emissions

Elena Pérez-Bernabeu, Angel A. Juan, Javier Faulin, Barry B. Barrios 2014 Abstract

This paper discusses horizontal cooperation in road transportation and supports the relevance of this praxis as a way of reducing delivery costs and greenhouse gas emissions. In a competitive market, costs reduction due to economies of scale in short and long run constitutes a key issue for small and medium enterprises. The paper reviews the existing literature on the topic and then examines different scenarios in order to quantify the savings in route costs that can be attained throughout horizontal cooperation. This numerical analysis is based on a set of well-known benchmarks for the Multidepot Vehicle Routing Problem, which has been adapted to illustrate a realistic but seldom considered example of horizontal cooperation. An Iterated Local Search algorithm is proposed to obtain high-quality solutions for this collaborative scenario, while noncollaborative scenarios are solved using a well-tested algorithm for the Capacitated Vehicle Routing Problem. The savings in routing costs—both regarding distance-based and environmental costs—are computed taking into account different geographical distributions of customers with respect to their assigned service providers.

A review of recent research on green road freight transportation

Author links open overlay panelEmrah Demir a, Tolga Bektaş b, Gilbert Laporte c 2014

Abstract

Road freight transportation is a major contributor to carbon dioxide equivalent emissions. Reducing these emissions in transportation route planning requires an understanding of vehicle emission models and their inclusion into the existing optimization methods. This paper provides a review of recent research on green road freight transportation.

art II: Policy instruments for sustainable road transport☆

Author links open overlay panelGeorgina Santos a, Hannah Behrendt b, Alexander Teytelboym b 2010 Abstract

Without questioning the fact that to achieve efficiency emitters should pay for the true costs of their actions (a core principle of economic policies such as pollution taxes), we find sufficient evidence in the literature to demonstrate that many other policy instruments can be used in combination with taxes and permits to ensure that the transport needs of the present generation can be met without compromising the ability of future generations to meet any needs of their own.

The policies and policy aspects considered in this paper broadly fall into three categories: physical policies, soft policies, and knowledge policies. All three aim to bring about changes in consumers' and firms' behaviour, but in different ways. The first category includes policies with a physical infrastructure element: public transport, land use, walking and cycling, road construction, and freight transport. We also consider the particular challenges for mobility in developing countries, and how these may be addressed. Soft policies, on the other hand, are non-tangible aiming to bring about behavioural change by informing actors about the consequences of their transport choices, and potentially persuading them to change their behaviour. These measures include car sharing and car pooling, teleworking and teleshopping, eco-driving, as well as general information and advertising campaigns. Finally, knowledge policies emphasise the important role of investment in research and development for a sustainable model of mobility for the future.

Solving the Capacitated Vehicle Routing Problem with Environmental Criteria Based on Real Estimations in Road Transportation: A Case Study

Author links open overlay panelJavier Faulin a, Angel Juan b, Fernando Lera a, Scott Grasman c 2011 Abstract

One of the most important objectives in company logistics is the optimization of goods distribution considering the whole value chain. There are many algorithms to optimise the capacitated vehicle routing problems (CVRP) associated to problems of road transportation. The objective function of those problems usually involves distance, cost, number of vehicles, or profits, among others. In this contribution we also take into account environmental costs. Here, we want to manage environmental costs estimations based on surveys about road transportation crossing rural areas having valuable biological and natural stock. Thus, we develop some variants (AWEC) to traditional heuristic algorithms, such as those of Clarke and Wright or Mole and Jameson, in which we include environmental cost estimates in real scenarios in Spain. This raises the value of the global objective function, but permits a more realistic cost estimate that includes not only the internal costs involved in the problem but also the related externalities. Finally, we discuss several solutions to a real case in the agribusiness sector in Navarre (Spain).

In addition to this, the study highlights the technical issues and its control strategy for addressing the problems of the transportation system using the hydrogen. Moreover, hydrogen is the cleanest fuel, especially when coupled with renewable energy sources. The road transportation sector with hydrogen energy system would give the desirable results including high energy efficiency and zero carbon based emission (CO, CO₂, HC, PM) resulting in strengthening of sustainability of the system. The Governments of many countries have made ambitious policies and provide strong financial support to research organizations including universities and institutions for development of hydrogen energy system. Many companies express strong interest in the commercialization of hydrogen fuelled vehicles either internal combustion engines based, fuel cell based or hybrid technology.

A Risk Assessment for Road Transportation of Dangerous Goods: A Routing Solution☆

Improve road traffic safety is one of the most important objectives for transport policy makers in contemporary society, and represents a strategic issue for enhance life quality. Recently ISO 39001 (Road Traffic Safety Management Systems) introduced the guidelines of safety-based activities aimed to decreasing road accidents, in agreement with the Quality Management Systems (ISO 9000). Such guidelines are intended for infrastructure managers, administrators, and private entities, and defines a standard management for reduction of road risk.

In this context, the risk arising by dangerous goods transport represents a particular threat which needs strategies and tools to reduce risk rate of society, property and environment. Several decision making solutions for transport managers and public administration are defined, but two open points still exist. Firstly, there are not applications supporting for dangerous goods carriers in tactical and operational planning. The second point is related to impacts of traffic congestion on road accidents frequency: there is not a common approach for study and assessment these relationships.

The aim of this paper is to analyze the interactions between road traffic flow and frequency of accidents: the paper propose an integrated approach for the study of routing problems considering safety. The first part concerns a brief critical review on literature solutions. Following is presented a new approach to analyze a road accident involving a dangerous goods, focusing on the reason which lead to a leakage of hazardous materials. This paper presents an upgrade of a minimum cost routing problem for a road carrier considering also the risk related to dangerous goods. After a description on how computing risk concerning dangerous goods transportation in a routing choice problem, the paper describes a solution aimed at providing a tactical and operating decision-making tool.

The aim is to enable the carrier that transport dangerous goods to calculate the quantification of the risk for each specific trip in addition to operating cost for each specific transport. The added value of risk quantification could be used by transportation carrier

in ISO 39001 to numerically prove his own safety-decisions to the control authority. The analysis developed has provided good results. The approach defined, albeit simplified, is a useful tool, especially when ISO 39001 standards will strengthen road safety.

Fuel cells for road transportation purposes – yes or no?

Author links open overlay panelB.D. McNicol a, D.A.J. Rand b, K.R. Williams c 2001

Abstract

The issues surrounding the application of fuel cells for road transportation are evaluated. The advantages and disadvantages of the candidate fuel-cell systems and the various fuels are discussed, together with the issue of whether the fuel should be converted directly in the fuel cell or should be first converted to hydrogen on-board the vehicle. Developments in competing vehicles technologies, namely, internal-combustion-engined vehicles (ICEVs), pure-battery vehicles (EVs) and ICE-battery hybrid vehicles (HEVs) are reviewed. Finally, the impact of the introduction of fuel-cell vehicles (FCVs) on industry, and in particular on the oil and automotive industries, is examined. For FCVs to compete successfully with conventional ICEVs, it is concluded that direct-conversion fuel cells — using probably hydrogen, but possibly methanol — are the only realistic contenders for road transportation applications.

Road transport in drift? Applying contemporary systems thinking to road safety

Author links open overlay panelPaul M. Salmon a, Rod McClure a, Neville A. Stanton b

2012 Abstract

Despite the extent to which the proximal causes of road traffic injury are known, road trauma remains a substantial and growing component of the global health burden. Application of contemporary sociotechnical systems theory to the problem of traffic injury suggests that the lack of progress globally may be a consequence of “drift into failure”. This article considers the new systems perspective on safety, explores the utility of this approach for road safety efforts, and specifically examines the ‘drift into failure’ hypothesis. It is argued that road transport systems do currently display characteristics of complex systems in drift and that greater understanding of complexity theory-based

models will support improved road safety efforts. However, the extent to which such models can support road safety practitioners appears to be limited by the lack of practical tools for translating theory to practice. The article concludes by drawing attention to similarities between complex systems theory and the contexts in which the discipline of Human Factors has been developed, and suggests that Human Factors methodologies could be usefully used to facilitate further research in this field.

Assessing road transport sustainability by combining environmental impacts and safety concerns

Author links open overlay panelDerek D. Wang 2019 Abstract

Environment and safety are two pillars of sustainable transport. Unlike existing studies that assess environmental impacts and safety concerns separately, in this paper we intend to capture the multifaceted nature of sustainable transport by combining environmental and safety factors. We formulate a unified performance measure using data envelopment analysis (DEA), a nonparametric method for benchmarking entities with multiple inputs and multiple outputs. In this method, environmental impacts (e.g., particulate matter and carbon dioxide emissions) and safety concerns (e.g., deaths and injuries in accidents) are treated as undesirable outputs under the slacks-based measure (SBM). We apply the model to conduct a joint assessment of environmental impacts and safety concerns of road transport for a group of OECD countries over the period 2000-2014. We show that the unified measure from joint assessment can be drastically different from that of assessing environment and safety separately. Furthermore, we investigate the relationship between the assessment results and socio-economic factors, and find that disposable income, governance quality and urbanization are significantly associated with the level of transport sustainability.

Road transport and CO2 emissions: What are the challenges?

Author links open overlay panelGeorgina Santos 2017 Abstract

In order for the world to stay within the safety threshold of a 2°C increase in average temperature agreed by virtually all governments, the transport sector needs to be decarbonized. The two main obstacles that have prevented this from happening have been the absence of a global legally binding deal and the high relative cost of clean

vehicle/energy technologies. The Paris Agreement, which commits countries to reductions of GHG emissions, has virtually solved the first problem and paved the way for countries to implement environmental taxes and subsidies in order to change the relative costs of clean alternatives, which would solve the second problem. These policy actions combined with investment in clean infrastructure and regulation can decarbonize the transport sector.

Risks of road transportation in a psychological perspective

Author links open overlay panelOla Svenson 1978 Abstract

Transportation systems in the industrialized world require vast amounts of economic and human resources. Most of the risks associated with these systems are due to the frequent use of private cars. This paper gives a review of the literature and psychological facts which may explain why the individual driver and modern society seem willing to accept higher risks in road transportation than in most other activities. Risky driving behavior may depend on (a) a driver's overestimation of his driving skill in a particular situation, (b) his conscious decision to drive under high risk or (c) his failure to perceive risk in a particular situation. It is pointed out that different means must be used in order to affect a change in these factors, mainly, training programs, the spread of information to change drivers' attitudes towards traffic risks, and environmental design changes to subjective risk. In general, empirical research indicates that greater risks are accepted if some kind of control is experienced in a situation and this is especially applicable to driving. Objective and subjective estimates of the riskiness of different elements inherent in road traffic seem to coincide fairly well with regard to a road's physical characteristics. But objective risks are underestimated in relation to speed, black spots, night driving, and narrow roads. The importance of these factors, and of alcohol intoxication and imitative behaviour for risk taking, is discussed. Comparisons of the estimated risks of different transportation systems and other risk sources are discussed. The attribution of the responsibility for an accident is very important for the risks accepted by a society. If the responsibility can be attributed to individual risk takers, as in car driving, society is willing to accept higher risk levels. Finally, the prevailing within-system perspective on risks in road transportation is contrasted with the more important and difficult global perspective which puts the risks of the road transportation system in a societal context.

Development of mathematical models for the container road transportation in Korean trucking industries

Author links open overlay panelKi Ho Chung a, Chang Seong Ko b, Jae Young Shin c, Hark Hwang d, Kap Hwan Kim e 2007 Abstract

This study deals with some practical problems of the container road transportation in Korean trucking industries. We examine the workflow in container transportation and then develop mathematical models integrating the various operating and design characteristics of the containers. Several types of formulations are developed utilizing the standard formulations of well known TSP (Traveling Salesman Problem) and VRP (Vehicle Routing Problem). Heuristic algorithms are also presented to solve the models. An example problem is illustrated to explain how to apply the models to the real world through the data set collected from a container trucking company in Korea.

The effect of the asymmetry of road transportation networks on the traveling salesman problem

Author links open overlay panelAlejandro Rodríguez a, Rubén Ruiz b 2012 Abstract

The routing of vehicles on road transportation networks is an area of great importance to transportation planners within scientific literature. This field includes well known and studied problems like traveling salesman problems or TSP or the more realistic asymmetric variant or ATSP, whose applications extend to other areas of transport and operations research. This work studies the effect that the asymmetry of road transportation networks, geographical location and territory have over TSP and ATSP methods. We conduct comprehensive experiments in order to assess the effects that these factors have on some of the best known algorithms for the TSP/ATSP. We demonstrate that all these factors have a significant influence in solution time and quality. Furthermore, we show that the solutions obtained with Euclidean matrices and those obtained with real distance matrices differ significantly.

Reducing Urban Road Transportation Externalities: Road Pricing in Theory and in Practice

Alex Anas and Robin Lindsey Abstract

Urban road transportation creates several externalities, the most important of which are congestion (time delay and extra fuel consumption), accidents, pollution, and greenhouse gas emissions. Road pricing is widely promoted as a tool to reduce these externalities. Based on a review of theory as well as experience with existing schemes, this article draws four conclusions about urban road pricing: (1) the benefits of road pricing exceed the costs; (2) the benefits of congestion relief are larger than the benefits of improvements in environmental quality; (3) success depends in part, but only to a limited extent, on the presence of public transit and on how service is adjusted; and (4) the distributional effects and public acceptance of road pricing pose important challenges for policy design.

Dynamic traffic assignment: A review of the methodological advances for environmentally sustainable road transportation applications

Author links open overlay panelYi Wang a b, W.Y. Szeto b c, Ke Han d, Terry L. Friesz e
2018 Abstract

The fact that road transportation negatively affects the quality of the environment and deteriorates its bearing capacity has drawn a wide range of concerns among researchers. In order to provide more realistic traffic data for estimations of environmental impacts, dynamic traffic assignment (DTA) models have been adopted in transportation planning and traffic management models concerning environmental sustainability. This review summarizes and examines the recent methodological advances of DTA models in environmentally sustainable road transportation applications including traffic signal control concerning vehicular emissions and emission pricing. A classification of emission estimation models and their integration with DTA models are accordingly reviewed as supplementary to the existing reviews. Finally, a variety of future research prospects of DTA for environmentally sustainable road transportation research are discussed. In particular, this review also points out that at present the research about DTA models in conjunction with noise predictive models is relatively deficient.

Environmental efficiency and energy consumption of highway transportation systems in China

Author links open overlay panelMalin Song a, Wanping Zheng a, Zeya Wang b 2016
Abstract

With the rapid development of the Chinese economy and urbanization process, an increasingly large urban transport system has led to increasingly serious resource and environmental problems in China. We combined the super-efficiency slack-based measure model, including undesirable outputs, with the window data envelopment analysis model, which managed panel data, to calculate the environmental efficiencies of highway transportation systems in regions of China. This measured the level of sustainable development in China's highway transportation systems. Furthermore, we calculated the consumption redundancy of gasoline and diesel, and the excess emissions of nitrogen oxides and particulate matter. We analyzed the correlativity among environmental efficiency, nitrogen oxide efficiency, and particulate matter efficiency to research the state of energy consumption and atmospheric pollution on the highway transportation systems in China. The results showed that the overall level of environmental efficiency of highway transportation systems in China was not optimal, with great differences between regions. Most regions had problems with excessive energy consumption and motor vehicle pollution. The Chinese government needs to control both energy consumption and pollutant emissions to manage the environmental problem of atmospheric pollution.

Critical features of autonomous road transport from the perspective of technological regulation and law

Author links open overlay panelCesare Bartolini a, Tamás Tettamanti b, István Varga b 2017 Abstract

Autonomous vehicular technology significantly stresses the issue of safety. Although the use of driverless cars raises considerable expectations of a general improvement in safety, new challenges concerning the safety aspects stem from the changing context. On the one hand, the paper addresses regulatory issues raised by the impact of technological changes, particularly standardization problems. On the other hand, the issue of liability questions is investigated as it might cause today's main legal obstacle for the wide spreading of autonomous cars, especially as autonomous cars might jeopardize

the existing approaches to vehicular liability. The aim of this paper is to scrutinize the basic problems in both fields. We provide what, at the current state-of-the-art, appear to be reasonable recommendations from the perspective of technological regulation and law, in order to deal with the main problems that might hamper the development of autonomous transport technology.

Ethanol as a Fuel for Road Transportation Abstract

Bioethanol as a motor fuel in the transportation sector, mainly for road transportation, has been subject to many studies and much discussion. Furthermore, the topic involves not only the application and engine technical aspects, but also the understanding of the entire life cycle of the fuel, well-to-wheels, including economical, environmental, and social aspects. It is not, however, the aim of this report to assess every single one of these aspects. The present report aims to address the technical potential and problems as well as the central issues related to the general application of bioethanol as an energy carrier in the near future. A suitable place to start studying a fuel is at the production stage, and bioethanol has been found to have a potential to mitigate greenhouse gases, depending on the production method. This and a potential for replacing fossil fuel-based oil (and being renewable) are the main reasons why ethanol is considered and implemented. Therefore, we must focus on two central questions related to ethanol implementation: how much carbon dioxide (CO₂) can be mitigated and how much fossil fuel can be replaced? A number of life cycle assessments have been performed in order to provide estimates. These assessments have

Authors:

Larsen, U; Johansen, T; Schramm, J

Publication Date: May 15, 2009

Part I: Externalities and economic policies in road transport☆

Author links open overlay panel Georgina Santos a, Hannah Behrendt b, Laura Maconi c, Tara Shirvani c, Alexander Teytelboym b 2010 Abstract

Road transport imposes negative externalities on society. These externalities include environmental and road damage, accidents, congestion, and oil dependence. The cost of

these externalities to society is in general not reflected in the current market prices in the road transport sector.

An efficient mobility model for the future must take into account the true costs of transport and its regulatory framework will need to create incentives for people to make sustainable transport choices. This paper discusses the use of economic instruments to correct road transport externalities, but gives relatively more weight to the problem of carbon emissions from road transport, as this is particularly challenging, given its global and long-term nature.

Economics offers two types of instruments for addressing the problem of transport externalities: command-and-control and incentive-based policies.

Command-and-control policies are government regulations which force consumers and producers to change their behaviour. They are the most widely used policy instruments. Examples include vehicle emission and fuel standards in the US as well as driving or parking restrictions in Singapore. The implementation cost of these instruments to the government is small. Although from an economic perspective these policies often fail to achieve an efficient market outcome, the presence of political constraints often make them the preferred option, in terms of feasibility and effectiveness.

Economic theory shows how policies, which affect consumption and production incentives, can be used to achieve the optimal outcome in the presence of externalities. Incentive-based policies function within a new or an altered market. We first examine incentive-based policies, which cap the aggregate amount of the externality, such as carbon emissions, by allocating permits or rights to the emitters. The emitters are then free to trade their permits amongst them. The permit allocation mechanism is important-although market efficiency would be satisfied by an auction, political influences usually favour a proportional allocation based on historic emissions. We discuss EU ETS as an example of a cap-and-trade system, however, no such policy for CO₂ emissions in road transport has been implemented anywhere in the world to date.

Fiscal instruments are, like command-and-control, widely used in road transport, because they are relatively cheap and simple to implement. They include the use of taxes and charges in order to bridge the gap between private and the social costs and, in principle, can lead to an efficient market solution. Registration, ownership, fuel, emissions, usage taxes, and parking and congestion charges have been implemented in many countries around the world. On the other side of the spectrum, subsidies can be given to those scrapping old cars and buying fuel-efficient vehicles. Some cities, such as London, have implemented congestion charges and many states in the United States have introduced high occupancy lanes. Other interesting possibilities include pay-as-you-drive insurance and other usage charges. However, the size and scope of taxes and subsidies are determined by governments, and because of their imperfect knowledge of the market the outcome is still likely to be inefficient.

Governments have many effective economic instruments to create a sustainable road transport model. These instruments can be used separately or together, but their implementation will be necessary in the nearest future.

Hinterland transportation in Europe: Combined transport versus road transport

Author links open overlay panelAntoine Frémont, Pierre Franc 2010 Abstract

The dominance of road for hinterland services could be challenged by using rail-road or waterway-road transport because of costs, congestion and growing environmental constraints. A common dynamic that is very favorable to the development of combined transport is shared among the actors of the transport chain but with different starting positions considering the ports of the Northern Range.

But combined transport must still demonstrate that it can compete with road transport. Road transport and combined transport are not directly comparable because they do not offer the same physical transport service. The organizational patterns of road and combined transport are investigated. The example of hinterland services to and from the port of Le Havre to the Paris region is a particularly interesting case because of the very

short distance. It is shown that the competitiveness of combined transport in terms of price varies greatly according to the way road transport it competes with is organized and that the commercial policy of combined transport operators plays a key role for explaining this competitiveness. Additional services such as additional dwelling times and specific custom advantages are paramount of importance to encourage the shift from road transport to combined transport.

Tradeable Permits: Their Potential in the Regulation of Road Transport Externalities

E Verhoef everhoef@econ.vu.nl, P Nijkamp prietveld@econ.vu.nl, and P Rietveld pnijkamp@econ.vu.nl 1997 Abstract

In this paper the possibilities of using tradeable permits in the regulation of road transport externalities are explored. After discussing the theory of tradeable permits and some practical applications, we will identify a number of potentially promising applications of their usage for coping with road transport externalities. These include applications on the demand side (user oriented) and on the supply side (automobile and fuel industry).

Coordination of Cooperative Autonomous Vehicles: Toward safer and more efficient road transportation Robert Hult; Gabriel R. Campos; Erik Steinmetz; Lars Hammarstrand; Paolo Falcone; Henk Wymeers 2016 Abstract:

While intelligent transportation systems come in many shapes and sizes, arguably the most transformational realization will be the autonomous vehicle. As such vehicles become commercially available in the coming years, first on dedicated roads and under specific conditions, and later on all public roads at all times, a phase transition will occur. Once a sufficient number of autonomous vehicles is deployed, the opportunity for explicit coordination appears. This article treats this challenging network control problem, which lies at the intersection of control theory, signal processing, and wireless communication. We provide an overview of the state of the art, while at the same time highlighting key research directions for the coming decades.

Road Transportation and Traffic Law Enforcement in Nigeria: A case study of the Federal Road Safety Corps (FRSC)

A J Gana

J A Emmanuel

Keywords: Road Transportation, Traffic Law Enforcement, Challenges, Federal Road Safety Corps

Abstract

Road Transportation and Traffic Law Enforcement in Nigeria was established in order to reduce the increasing road crashes and fatalities as well as making road users comply with traffic Laws and regulations as a counter measure, which remain as a great challenge in Nigeria. This paper discussed the roles of the Federal Road Safety Corps (FRSC) in the enforcement of Road Traffic Laws. The methodology used for this paper was the collections of data. The finding from the study revealed that there is dearth of operational equipments in FRSC thus hampering its performance. It further observed that Road traffic laws are strong and adequate, but lack effective enforcement, which is responsible for non-compliance. The study also revealed that FRSC has done very well in its performance especially in Educating motorists through various public enlightenment campaigns. The study shows that there are bad roads with narrow lanes and potholes resulting to traffic congestions and crashes. Having identified these challenges, the study recommended among others, adequate funding of the corps, effective enforcement of existing road traffic laws by all the relevant law enforcement agencies, training of the law enforcement personnel and construction of befitting roads. 2014

Comparative evaluation of existing and innovative rail-road freight transport terminals

Author links open overlay panelAthanasios Ballis, John Golias 2002 Abstract

The paper evaluates technical and logistics developments that could lead to increased economic and technical efficiency of rail-road transport terminals. The main design parameters are identified (length and utilisation of transshipment tracks, train and truck arrival behaviour/patterns, type and number of handling equipment, mean stacking height in the storage area, terminal access system and procedures) and analysed. A comparative evaluation of selected conventional and advanced technologies is performed by use of an analysis tool that was developed on purpose. This tool consists of three modules (an expert system, a simulation model and a cost calculation module). The

overall outcome of the analysis is a number of cost-versus-volume curves for various terminal configurations. The paper concludes with two groups of results: (a) a comparative evaluation of conventional and advanced technologies that reveals similarities in terms of track numbers and the associated area requirements as well as differences in terms of layout flexibility, number of equipment, stacking policies and personnel requirements. Each design is proved effective for a certain cargo volume range. (b) A critical assessment of terminal capacity issues. It is identified that the capacity limitations are imposed mainly by the sidings/transshipment track sub-system rather than by the handling equipment.

Traffic Flow Prediction for Road Transportation Networks With Limited Traffic Data Afshin Abadi; Tooraj Rajabioun; Petros A. Ioannou Abstract:

Obtaining accurate information about current and near-term future traffic flows of all links in a traffic network has a wide range of applications, including traffic forecasting, vehicle navigation devices, vehicle routing, and congestion management. A major problem in getting traffic flow information in real time is that the vast majority of links is not equipped with traffic sensors. Another problem is that factors affecting traffic flows, such as accidents, public events, and road closures, are often unforeseen, suggesting that traffic flow forecasting is a challenging task. In this paper, we first use a dynamic traffic simulator to generate flows in all links using available traffic information, estimated demand, and historical traffic data available from links equipped with sensors. We implement an optimization methodology to adjust the origin-to-destination matrices driving the simulator. We then use the real-time and estimated traffic data to predict the traffic flows on each link up to 30 min ahead. The prediction algorithm is based on an autoregressive model that adapts itself to unpredictable events. As a case study, we predict the flows of a traffic network in San Francisco, CA, USA, using a macroscopic traffic flow simulator. We use Monte Carlo simulations to evaluate our methodology. Our simulations demonstrate the accuracy of the proposed approach. The traffic flow prediction errors vary from an average of 2% for 5-min prediction windows to 12% for 30-min windows even in the presence of unpredictable events. 2015

The Impact of Road Transportation Infrastructure on Economic Growth in Nigeria

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SIYAN PETER,

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EREMIONKHALE RITA, 3MAKWE EDITH

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Prof.,

1,2 Department of Economics, University of Abuja, Abuja 2015 Abstract: This paper examined the impact of road transportation on economic growth in Nigeria. Both primary and secondary data were used as sources of data. Probit model was used to analyze the primary data while multivariate model was used for analyzing the secondary data to determine the long run relationship between growth and road transportation in Nigeria. The result shows that the transport sector positive impact on the economic growth in Nigeria. Based on the findings, it was suggested that the government should come up with sustainable and implementable road development and maintenance policies that will ensure good access and flow in Nigeria. Also, economic growth in Nigeria depended on the level of good and accessible road transportation and facilitates business activities.

Analysis of road transportation energy consumption demand in China

Author links open overlay panelJian Chai a b c d, Quan-Ying Lu a b, Shou-Yang Wang d, Kin Keung Lai a b e 2016 Abstract

In this paper, we first analyze the historical trends in road transportation energy consumption and GDP in developed economies to find out the development characteristics of road energy consumption. The two indexes present obvious 'S' type patterns. Then, in order to explore the current status and future trend of road energy transportation in China, we employ path analysis to analyze the impact mechanism of the

factors related to road transportation energy consumption. Next, we adopt the BMA model to select the core factors related to road transportation energy consumption in China, and on the basis of the model selection as well as univariate (ETS & ARIMA models) and multivariate (multiple regression) models, the road transportation energy consumption is analyzed and forecast. The results showed that the road transportation energy consumption rises by 0.33 percent for every percent increase in GDP and by 1.26 percentage points for every percent increase in urbanization. The road transportation energy consumption in China is expected to reach around 226181.1 ktoe by the end of 2015, and about 347,363 ktoe by 2020.

External effects and social costs of road transport

Author links open overlay panelErik Verhoef 1994 Abstract

The article contains a welfare economic analysis of road transport's external effects. First, we discuss the definition of external effects. Applying this definition, it is concluded that road transport activities give rise to a wide range of external costs. However, there are no external benefits associated with individual road transport activities which might compensate for such effects. Therefore, road transport volumes will in general be beyond the optimal levels. Second, we describe a conceptual framework for the analysis of environmental external costs. It is explicitly recognized that not only the externality as such, but also the induced outlays on defensive and abatement activities should play an important role in welfare economic analyses of external effects. Then, this framework is used for the evaluation of the existing empirical work on road transport's environmental external costs (i.e., noise and air pollution). It is concluded that most of the studies carried out in that field will provide an underestimation of road transport's external costs by definition. Finally, some attention is paid to empirical estimates of road transport's accident costs.

Environmental awareness and pro-environmental behavior within China's road freight transportation industry: Moderating role of perceived policy effectiveness

Author links open overlay panelLiping Fu a b, Zhaohui Sun a b, Lajia Zha a b, Feng Liu a b, Lanping He a b, Xuesong Sun a, Xiaoli Jing c 2020 Abstract

Road freight transportation (RFT) has received significant attention from the government, industry, and academia because of its high energy consumption and carbon emissions. To reduce the negative effects of the accelerating use of RFT, China has recently been committed to promote green RFT. Efforts made in this direction have mainly focused on supply-side policy and technical measures, while neglecting the importance of demand-side psychological and behavioral strategies. Recent research suggests that drivers play a fundamental role in generating environmental impacts during transport. Thus, the success of green RFT should also be based on a thorough understanding of the drivers' environmental awareness and pro-environmental behavior. In this study, we investigate the current levels of environmental awareness and pro-environmental behavior among China's RFT drivers, and explore the role of environmental awareness as defined by four main components—environmental concern, environmental attitude, environmental knowledge, and behavioral intention—in motivating pro-environmental RFT behavior. We also test the moderating effect of perceived policy effectiveness on the awareness-behavior relationship. Hypotheses are examined using a sample of 243 truck drivers with structural equation modeling and hierarchical regression analysis. The results indicate the existence of an environmental awareness-behavior gap. We determine that the awareness score (3.2) is higher than the behavior score (3.1) because barriers to pro-environmental behavior are stronger than motivators. We also find that environmental concern, attitude, and knowledge indirectly affect pro-environmental behavior via behavioral intention. Moreover, a high level of perceived policy effectiveness facilitates the transformation of awareness into behavior, bridging the awareness-behavior gap. Our study confirms the importance of environmental awareness and effective incentive policies in encouraging pro-environmental RFT behavior. The conclusions will aid researchers' understanding of drivers' environmental awareness and pro-environmental behavior in China's RFT, and compel transport policy makers and managers to implement more effective measures that promote environmentally sustainable RFT.

Applications of GPS technology in the land transportation system

Author links open overlay panelG Mintsis, S Basbas, P Papaioannou, C Taxiltaris, I.N Tziavos 2004 Abstract

The global positioning system (GPS) allows the accurate positioning of an object using satellite signals. There are a lot of applications of this technology in many scientific fields all over the world. In recent years, the rapid increase in the development of the geographic information system technology (GIS) has led to the development of GPS/GIS applications. Therefore, the geometric and geographic information obtained by the use of GPS can be introduced to GIS database and thus thematic maps can be produced. In the framework of this paper, a short overview of applications in the area of transportation in Greece and abroad is presented. Emphasis is placed on an ongoing application in railway mapping, through the presentation of its pilot phase in Greece. The use of modern technologies, the problems identified and the results produced are presented and discussed.

CO2 efficiency in road freight transportation: Status quo, measures and potential

Author links open overlay panel Jacques Léonardi, Michael Baumgartner 2004 Abstract

Road freight transport continues to grow in Germany and generates 6% of the country's CO2 emissions. In logistics, many decisions influence the energy efficiency of trucks, but causalities are not well understood. Little work has been done on quantifying the potential for further CO2 reduction and the effect of specific activities, such as introducing computer assisted scheduling systems to trucking firms. A survey was survey out and linked fuel consumption to transport performance parameters in 50 German haulage companies during 2003. Emission efficiency ranged from 0.8 tonne-km to 26 tonne-km for 1 kg CO2 emissions. The results show potential for improvements given a low level of vehicle usage and load factor levels, scarce use of lightweight vehicle design, poorly selected vehicles and a high proportion of empty runs. IT-based scheduling systems with telematic application for data communication, positioning and navigation show positive effects on efficiency. Fuel use and transport performance was measured before and after the introduction of these systems.

Lean road transportation – a systematic method for the improvement of road transport operations

Bernardo Villarreal, Jose Arturo Garza-Reyes 2016 Abstract

Road transportation has become an important factor in international trade and the management of supply chains. However, this form of product logistics has generally been considered inefficient. Traditionally, practical inefficiencies of road transportation have been addressed through mathematical modelling, operations research-based methods and simulation. This paper presents an alternative systematic approach to improve road transport operations based on lean thinking and the reduction of the seven transportation extended wastes. To do this, the paper reviews the extant literature in the area of lean road transportation, providing a structured research definition of the application of lean thinking in road transport operations and hence guidance on the limited research conducted in this field. The systematic lean transportation method is then presented and empirically tested through a case study in a Mexican firm. The results obtained from the case study indicate that the proposed systematic lean method is an effective alternative for the improvement of road transport operations, with the number of distribution routes and distance travelled being reduced by 27 and 32%, respectively. The proposed method can be used by organisations as a guide to help them improve their road transport operations. In addition, the paper's aim is to contribute by stimulating scholars to further study the application of lean thinking and waste reduction in road transport operations.

Collaborative Logistics from the Perspective of Road Transportation Companies

Lotte Verdonck, AN Caris, Katrien Ramaekers & Gerrit K. Janssens 2013 ABSTRACT

To survive under the ever increasing competitive and global pressures to operate more efficiently, transportation companies are obliged to adopt a collaborative focus. Various types of cooperative supply chain relationships have been discussed in both professional and academic literature over the last decades. However, research on horizontal cooperation in logistics remains scarce and scattered across various research domains. Companies operating at the same level of the supply chain and performing comparable logistics functions may cooperate horizontally to increase their productivity, improve their service level and enhance their market position. In this paper, the focus is on the operational planning of horizontal cooperations between road transportation carriers. Following a scientific literature review, a distinction may be made between two operational approaches to horizontal logistics collaboration: order sharing and capacity sharing. For

both research streams, a detailed overview of solution techniques proposed in literature is presented. Moreover, some interesting opportunities for future research are identified.

Solving the Capacitated Vehicle Routing Problem with Environmental Criteria Based on Real Estimations in Road Transportation: A Case Study

Author links open overlay panelJavier Faulin a, Angel Juan b, Fernando Lera a, Scott Grasman c 2011 Abstract

One of the most important objectives in company logistics is the optimization of goods distribution considering the whole value chain. There are many algorithms to optimise the capacitated vehicle routing problems (CVRP) associated to problems of road transportation. The objective function of those problems usually involves distance, cost, number of vehicles, or profits, among others. In this contribution we also take into account environmental costs. Here, we want to manage environmental costs estimations based on surveys about road transportation crossing rural areas having valuable biological and natural stock. Thus, we develop some variants (AWEC) to traditional heuristic algorithms, such as those of Clarke and Wright or Mole and Jameson, in which we include environmental cost estimates in real scenarios in Spain. This raises the value of the global objective function, but permits a more realistic cost estimate that includes not only the internal costs involved in the problem but also the related externalities. Finally, we discuss several solutions to a real case in the agribusiness sector in Navarre (Spain).

Trends in transportation and logistics

Author links open overlay panelM. Grazia Speranza 2018 Abstract

Problems in transportation and logistics had to be tackled long before computers and Operational Research (OR) became available to support decision making. After the first optimization models were developed, OR has substantially contributed in making transportation systems efficient and companies with complex transportation and logistics problems competitive. Over the years, technology has evolved and the same has done OR. In this paper, the history of problems and OR contributions in transportation and logistics will be shortly reviewed together with the evolution of technology. Then, the future trends in this area will be discussed together with potential OR contributions.

Studying logistics by road in India is important for several reasons:

Importance of road transport: Road transport is the most dominant mode of transportation in India, accounting for over 60% of the freight movement. Given the vast geographical spread of the country, road transport plays a critical role in ensuring the smooth movement of goods across different regions.

Growth potential: The logistics sector in India is growing rapidly, and the road transport segment is expected to continue to grow in the coming years. As per industry estimates, the road transport segment is expected to grow at a CAGR of 15-18% in the next five years, driven by factors such as rising e-commerce, increasing manufacturing activities, and government initiatives such as the National Logistics Policy.

Challenges and opportunities: The road logistics sector in India faces several challenges such as inadequate infrastructure, high transit times, and lack of standardization. By studying logistics by road in India, one can understand these challenges and explore opportunities to address them through innovative solutions such as digitalization, automation, and process improvements.

Career opportunities: Studying logistics by road in India can provide a foundation for a career in the logistics industry. With the growth of the sector, there is a growing demand for skilled professionals who can manage the complexities of logistics operations. Studying logistics by road can provide a comprehensive understanding of the sector and prepare individuals for careers in areas such as supply chain management, operations management, and transportation management.

Overall, studying logistics by road in India is essential to understand the nuances of the sector, address the challenges, and leverage the opportunities presented by the growing logistics market.

CHAPTER-3

RESEARCH METHODOLOGY

3.1. METHODOLOGY:

Research methodology refer to various sequential steps adopted by researches and in studying the problem with certain objective in mind

3.2. SAMPLING DESIGN

3.2.1. Sources of data:

The entire project work is based on

- i. Interview method
- ii. Primary data
- iii. Secondary data

i. Interview method:

With reference to the objectives of the present study, the preliminary interview schedule was prepared after taking into account the views of the experts and owners in the road transport industry. The interview schedule was divided into two section function of road goods transport industry and problems in road goods transport industry.

ii. Primary data:

Primary data are collected for the first time and this happens to the original in character. In this study, data are collected directly from the transport owners or managers by using the questionnaire method.

iii. Secondary data:

The secondary data, which have been already, collected data. It included internal sources like company profile and external sources like books, journals, magazines, newsletters and internet.

3.3. Tools:

The tool used for collecting data is through questionnaire method.

3.4. Sample size:

The sample size taken for the study at road transport industry in Bangalore owners or area managers is 120.

3.5. Sampling techniques:

The sampling technique adopted for this study is convenience sampling.

3.6. Area of sampling:

The area covered in this project is Bangalore.

3.7. Tools used for analysis:

Cross inference method.

3.8. Chapter Scheme:

The report contains of five chapters. The first chapter is the introduction of topic and industry. The second chapter describes methodology of study which includes statement of problem, objectives, limitation, sample design and tools use for analyses. Third chapter

describe industrial profile and various company profile. Fourth chapter deals with data analyses by using cross inference method and interpretation. Suggestion, findings and conclusion have been provide in the fourth chapter.

Analytical tools

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. The Pearson product-moment correlation coefficient is a measure of the strength and direction of association that exists between two variables measured on at least an interval scale. It is denoted by the symbol r .

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

CHI- SQUARE TEST I – (χ^2)

A chi-squared test, also referred to as chi-square test or χ^2 test, is any statistical hypothesis test in which the sampling distribution of the test statistic is a chi-squared distribution when the null hypothesis is true, or any in which this is asymptotically true, meaning that the sampling distribution (if the null hypothesis is true) can be made to approximate a chi- squared distribution as closely as desired by making the sample size large enough.

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

It is calculated using:

$$\chi^2 = \sum [(O_i - E_i)^2 / E_i] \text{ with } (n - 1) \text{ degrees of freedom.}$$

Where, O_i refers to the observed frequency & E_i to the expected frequencies. χ^2 was used as a test of independence and goodness of fit.

ONE WAY ANOVA

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

PERCENTAGES

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

$$\text{Percentage} = (\text{no of employees} / \text{total no of employees}) \times 100$$

CHARTS:

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

BAR CHARTS:

The bar chart is commonly used for presentation of qualitative data. The data can be continuous or discrete data, which are plotted against discrete data intervals. The vertical bar diagram, also called bar chart where the length or height of bars represent

the numerical value of the event or measurement. Width or gap between the bars is of no significance to the bar chart data, but they are uniform in a diagram.

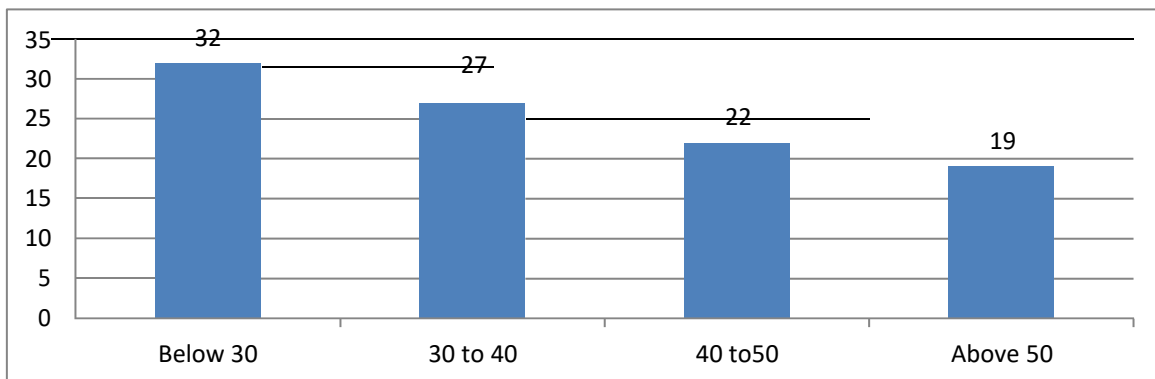
CHAPTER-4

4.1. DATA ANALYSIS AND INTERPRETATION

TABLE: 1 AGE

PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
Below 30	38	32
30 to 40	32	27
40 to50	27	22
Above 50	23	19
Total	120	100

CHART: 1



INTERPRETATION:

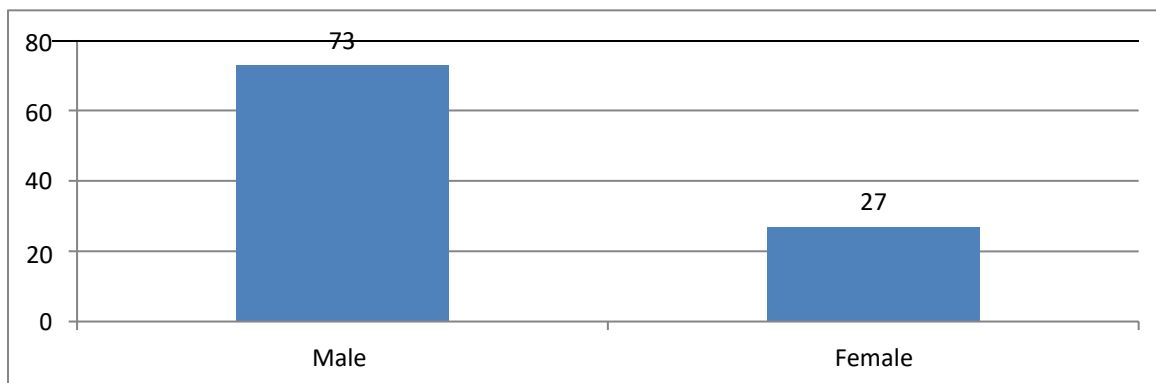
From the above table it can be interpreted that 32% of the respondents are belonging to the age below 30 and 27% of the respondents are belonging to the age group between 30-40 years.

INFERENCE

Most of the respondents are belonging to the age below 30.

TABLE: 2 GENDER

PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
Male	88	73
Female	32	27
Total	120	100

CHART: 2**INTERPRETATION:**

From the above table it can be interpreted that 73% of the respondents are male and 27% of the respondents are female.

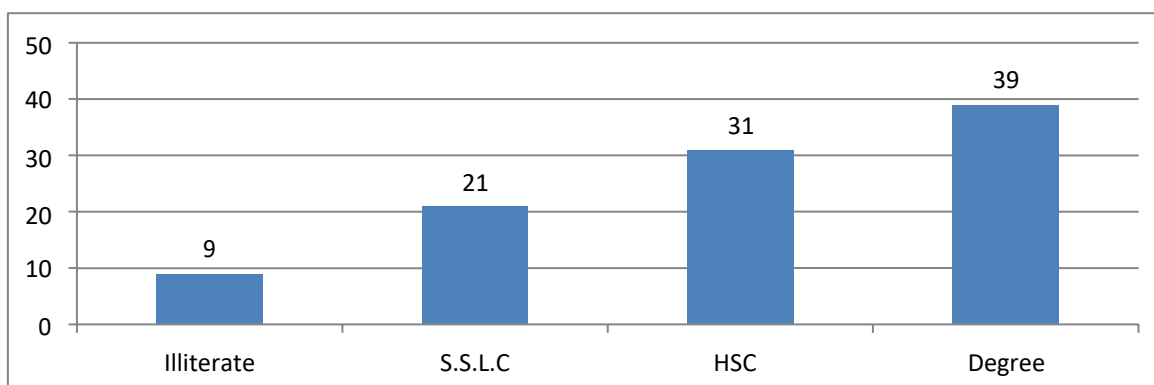
INFERENCE

Most of the respondents are male.

TABLE: 3 EDUCATION

PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
Illiterate	11	9
S.S.L.C	25	21
HSC	38	31
Degree	46	39
Total	120	100

CHART: 3



INTERPRETATION:

From the above table it can be interpreted that 39% of the respondents are completed degree and 31% of the respondents are completed HSC.

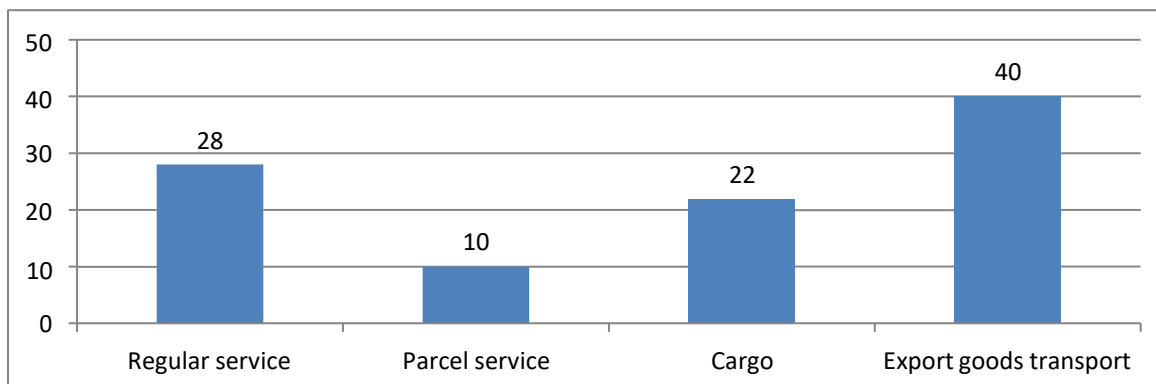
INFERENCE

Most of the respondents are completed degree.

TABLE: 4 NATURE OF BUSINESS

PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
Regular service	34	28
Parcel service	12	10
Cargo	26	22
Export goods transport	48	40
Total	120	100

CHART: 4



INTERPRETATION:

From the above table it can be interpreted that 40% of the respondents are doing export goods transport business and 28% of the respondents are doing regular service business.

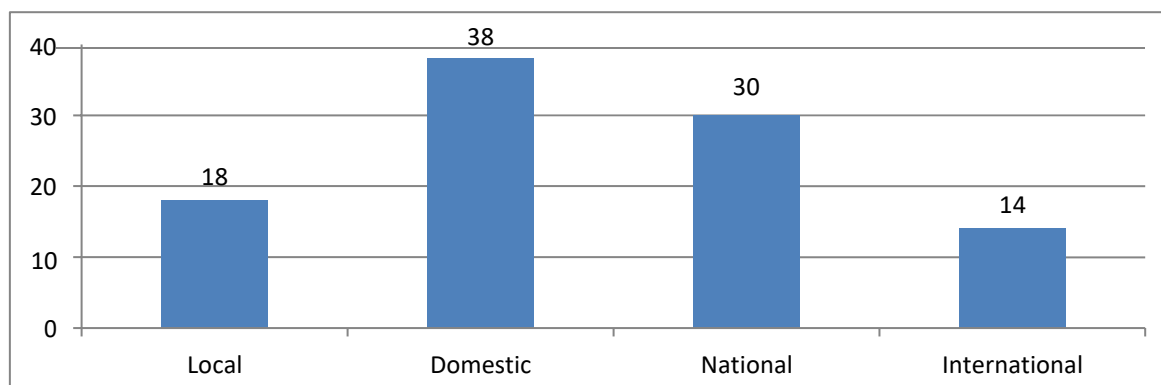
INFERENCE

Most of the respondents are doing export goods transport business.

TABLE: 5 AREA OF BUSINESS COVERAGE

PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
Local	22	18
Domestic	45	38
National	26	30
International	17	14
Total	120	100

CHART: 5



INTERPRETATION:

From the above table it can be interpreted that 38% of the respondents are doing business in domestic area and 30% of the respondents are doing business in national area.

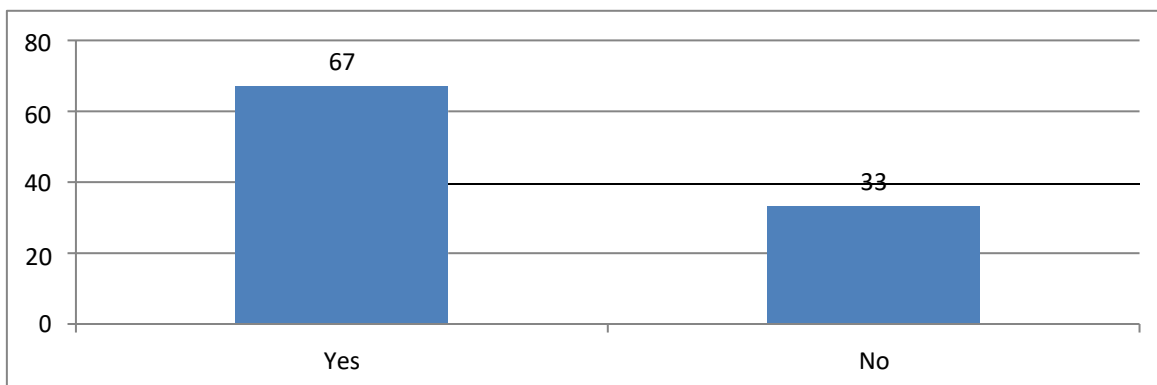
INFERENCE

Most of the respondents are doing business in domestic area.

TABLE: 6 HAVE OWN LORRY

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

CHART: 6



INTERPRETATION:

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

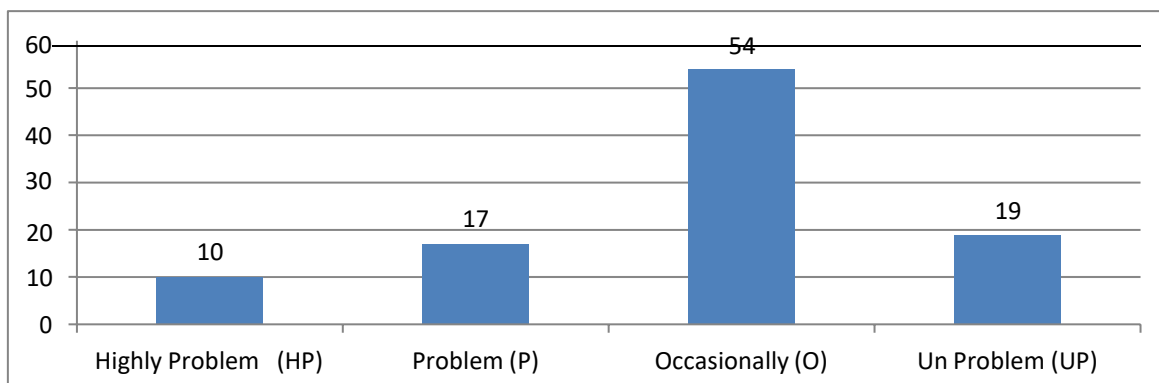
INFERENCE

Most of the respondents are having own lorry.

TABLE: 7 HIRE A LORRY

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

CHART: 7



INTERPRETATION:

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

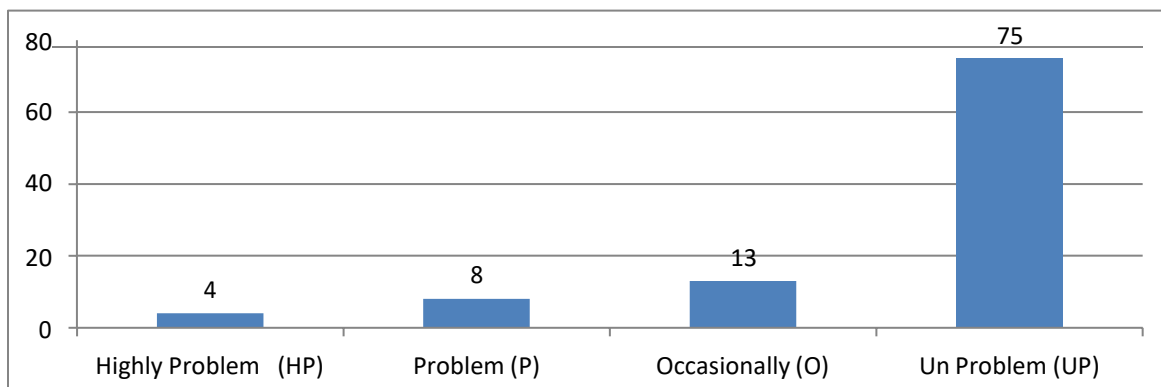
INFERENCE

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

TABLE: 8 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: 8



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.

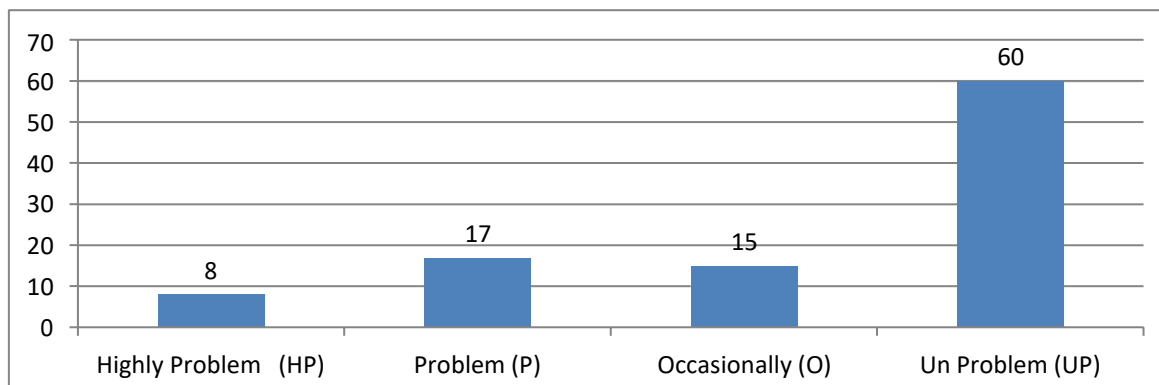
INFERENCE

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

TABLE: 9 PAY ROAD TAX EVERY YEAR

PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
Highly Problem (HP)	10	8
Problem (P)	20	17
Occasionally (O)	18	15
Un Problem (UP)	72	60
Total	120	100

CHART: 9



INTERPRETATION:

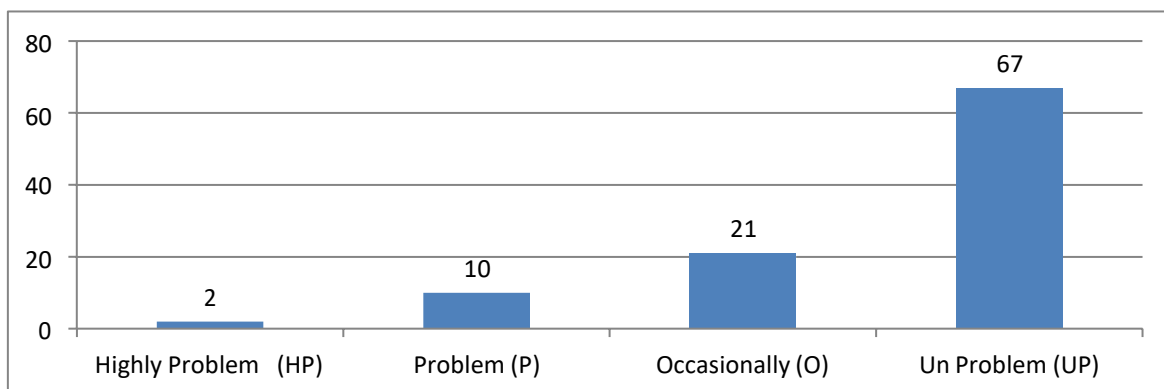
From the above table it can be interpreted that 60% of the respondents are not facing problem while paying road tax every year and 17% of the respondents are facing problem while paying road tax every year.

INFERENCE

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

TABLE: 10 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: 10

INTERPRETATION:

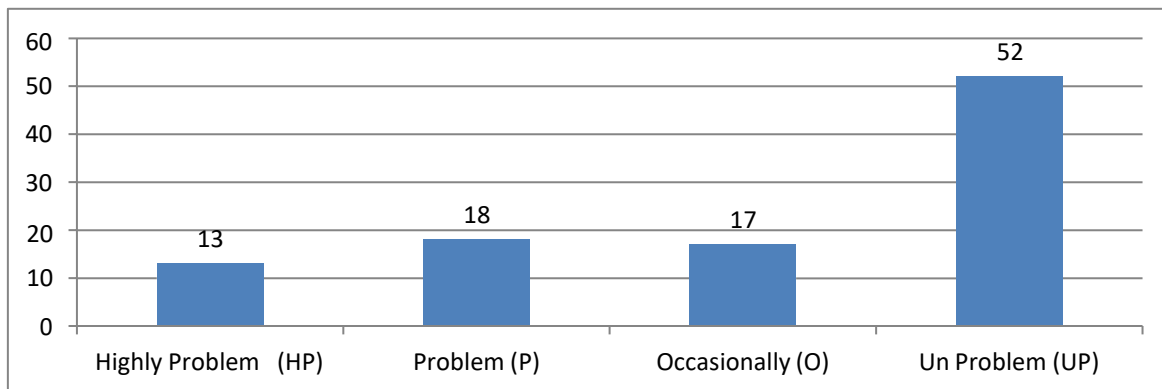
From the above table it can be interpreted that 67% of the respondents are not facing problem while paying income tax every year and 22% of the respondents are facing problem occasionally while paying income tax every year.

INFERENCE

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

TABLE: 11 PAY QUIETLY TAX EVERY YEAR

PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
Highly Problem (HP)	15	13
Problem (P)	22	18
Occasionally (O)	21	17
Un Problem (UP)	62	52
Total	120	100

CHART: 11**INTERPRETATION:**

From the above table it can be interpreted that 52% of the respondents are not facing problem while paying quietly tax every year and 18% of the respondents are facing problem while paying quietly tax every year.

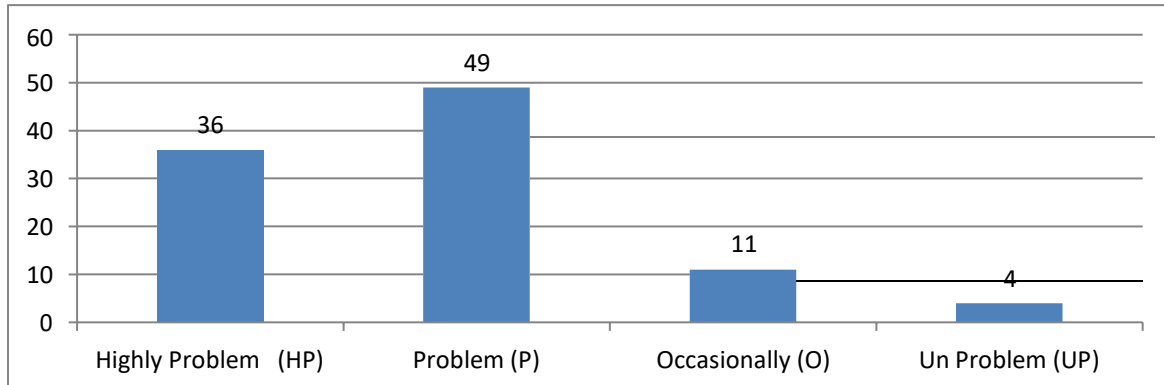
INFERENCE

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

TABLE: 12 WHEN DAILY WORKERS ARE NOT AVAILABLE

PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
Highly Problem (HP)	43	36
Problem (P)	59	49
Occasionally (O)	14	11
Un Problem (UP)	4	4
Total	120	100

CHART: 12



INTERPRETATION:

From the above table it can be interpreted that 49% of the respondents are facing problem when daily workers are not available and 36% of the respondents are facing highly problem when daily workers are not available.

INFERENCE

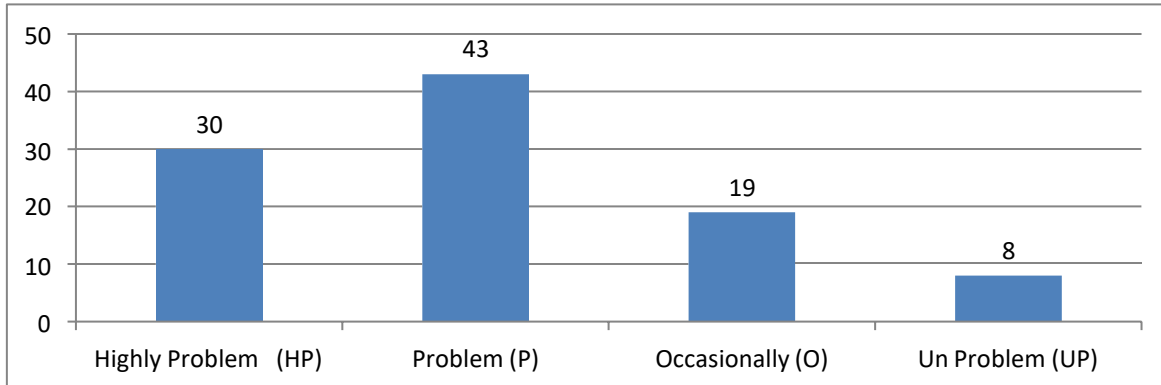
Most of the respondents are facing problem when daily workers are not available.

TABLE: 13 WHEN DRIVER DOES UNETHICAL PRACTICE

PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
Highly Problem (HP)	36	30
Problem (P)	52	43
Occasionally (O)	23	19
Un Problem (UP)	9	8

Total	120	100
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CHART: 13



INTERPRETATION:

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

INFERENCE

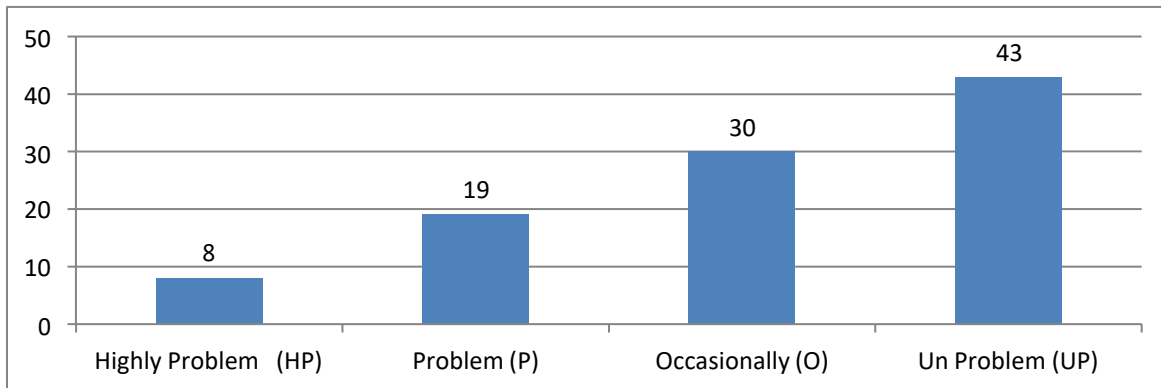
Most of the respondents are facing problem when driver does unethical practice.

TABLE: 14 DUE TO THE OFFICE WORKER

PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
Highly Problem (HP)	6	8
Problem (P)	18	19
Occasionally (O)	37	30

Un Problem (UP)	59	43
Total	120	100

CHART: 14



INTERPRETATION:

From the above table it can be interpreted that 43% of the respondents are not facing problem due to the office worker and 30% of the respondents are facing problem occasionally due to the office worker.

INFERENCE

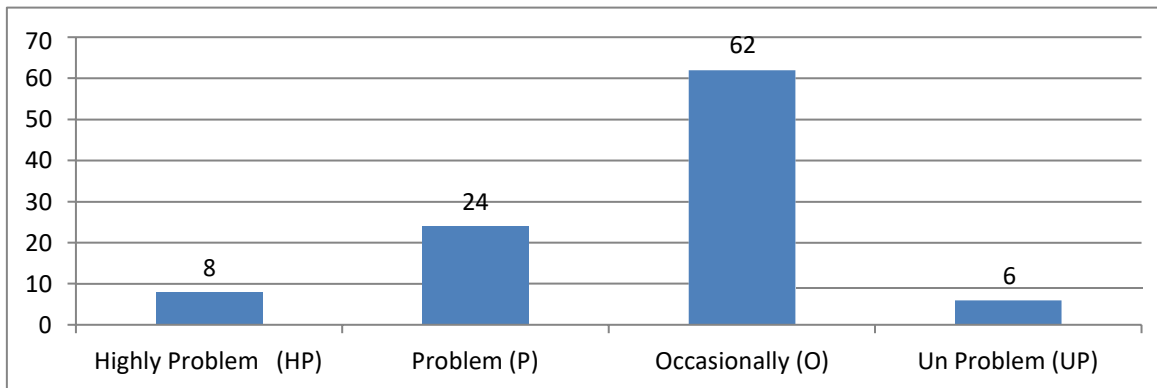
Most of the respondents are not facing problem due to the office worker.

TABLE: 15 COMPETITIONS

PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
Highly Problem (HP)	10	8
Problem (P)	29	24
Occasionally (O)	74	62

Un Problem (UP)	7	6
Total	120	100

CHART: 15 COMPETITIONS



INTERPRETATION:

From the above table it can be interpreted that 62% of the respondents are facing problem occasionally due to the competition and 24% of the respondents are facing problem due to the competition.

INFERENCE

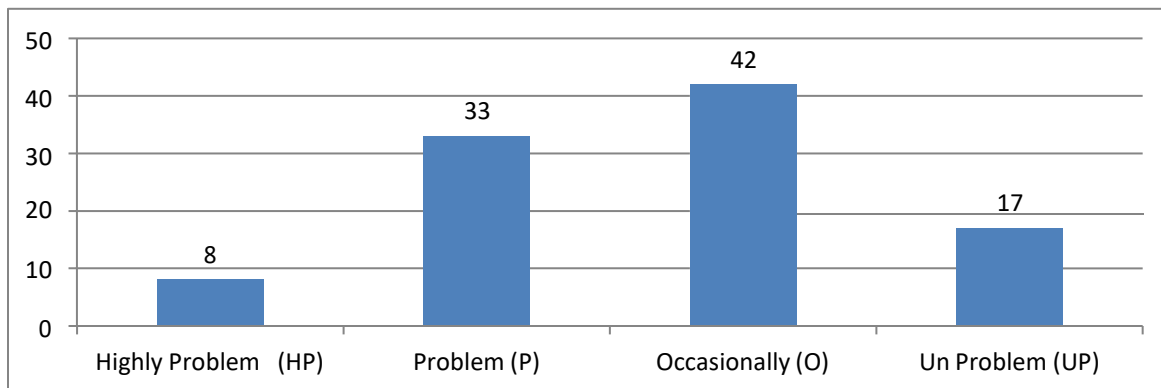
Most of the respondents are facing problem occasionally due to the competition.

TABLE: 16 FACE TOLL GATE

PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
Highly Problem (HP)	10	8
Problem (P)	40	33

Occasionally (O)	50	42
Un Problem (UP)	20	17
Total	120	100

CHART: 16 FACE TOLL GATE



INTERPRETATION:

From the above table it can be interpreted that 42% of the respondents are having problem occasionally when they face toll gate and 33% of the respondents are having problem when they face toll gate.

INFERENCE

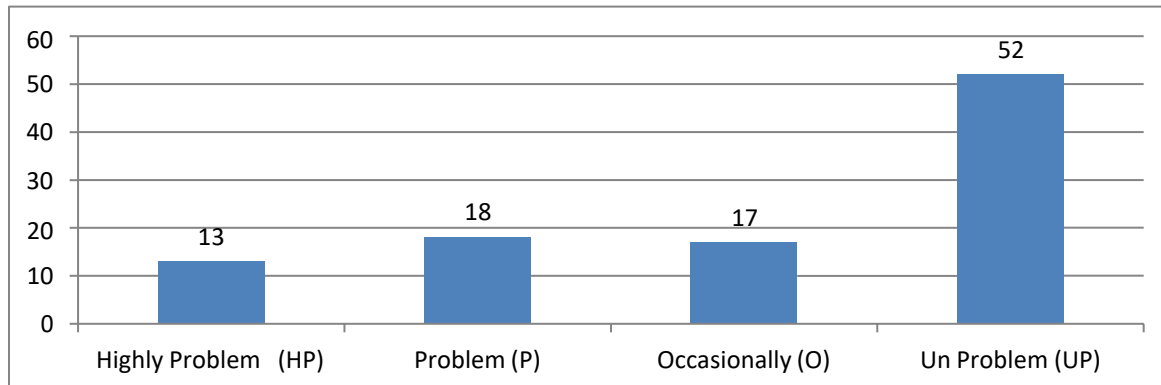
Most of the respondents are having problem occasionally when they face toll gate.

TABLE: 17 FACE SALES TAX

PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
Highly Problem (HP)	15	13

Problem (P)	22	18
Occasionally (O)	21	17
Un Problem (UP)	62	52
Total	120	100

CHART: 17



INTERPRETATION:

From the above table it can be interpreted that 52% of the respondents are not having problem when they face sales tax and 18% of the respondents are having problem when they face sales tax.

INFERENCE

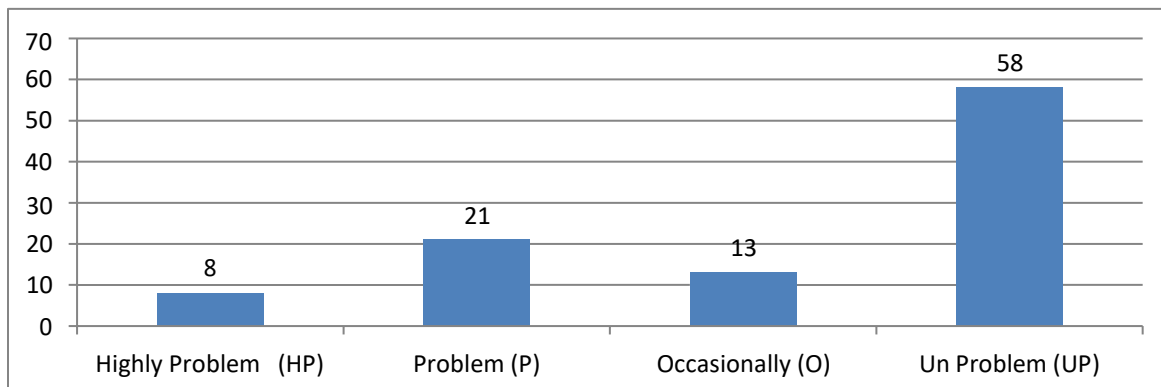
Most of the respondents are not having problem when they face sales tax.

TABLE: 18 FACE RTO

PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
-------------	--------------------	------------

Highly Problem (HP)	10	8
Problem (P)	25	21
Occasionally (O)	15	13
Un Problem (UP)	70	58
Total	120	100

CHART: 18



INTERPRETATION:

From the above table it can be interpreted that 58% of the respondents are not having problem when they facing the RTO and 21% of the respondents are having problem when they facing the RTO.

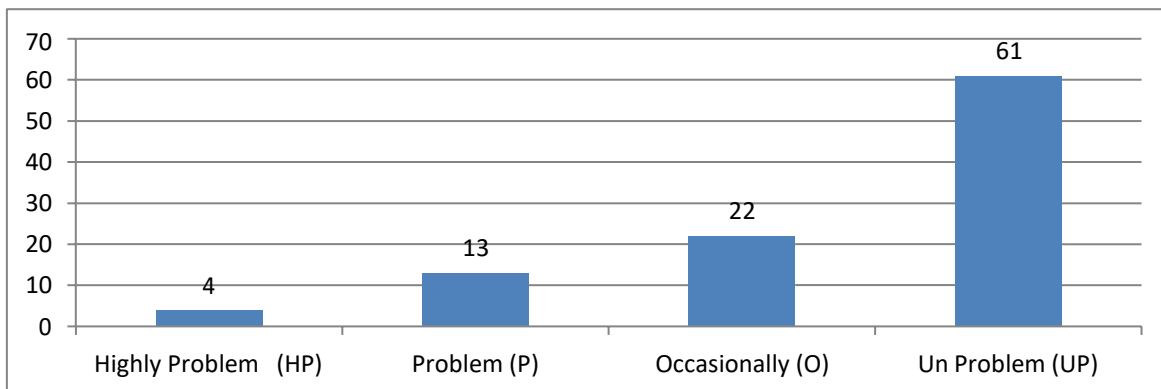
INFERENCE

Most of the respondents are not having problem when they facing the RTO.

TABLE: 19 CUSTOMERS CREATES

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

CHART: 19



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.

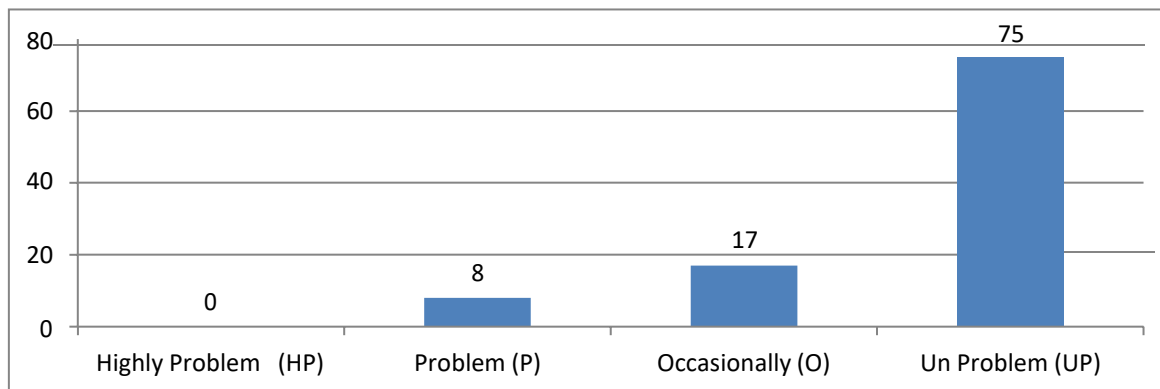
INFERENCE

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

TABLE: 20 LORRIES ENTERS THE CITY TIME

PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
Highly Problem (HP)	0	0
Problem (P)	10	8
Occasionally (O)	20	17
Un Problem (UP)	90	75
Total	120	100

CHART: 20



INTERPRETATION:

From the above table it can be interpreted that 75% of the respondents say they are not having problem when the Lorries enter the city time and 17% of the respondents say they are having problem occasionally when the Lorries enter the city time.

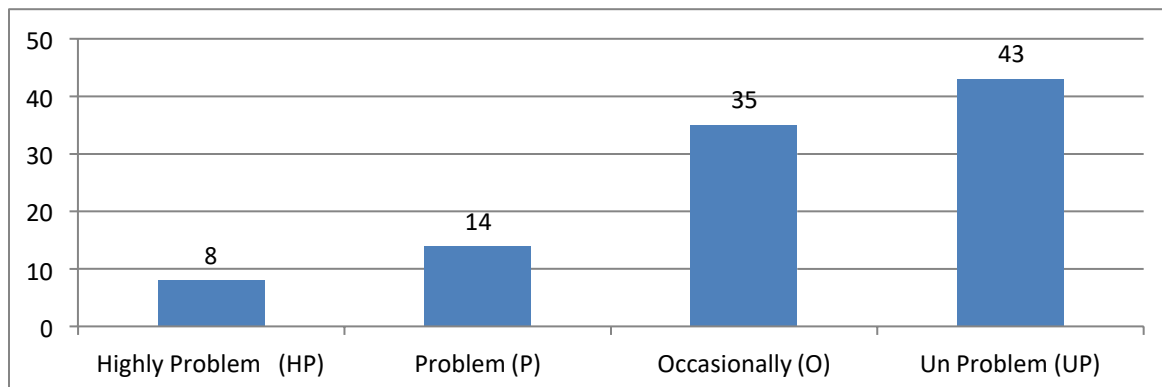
INFERENCE

Most of the respondents say they are not having problem when the Lorries enter the city time.

TABLE: 21 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: 21



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.

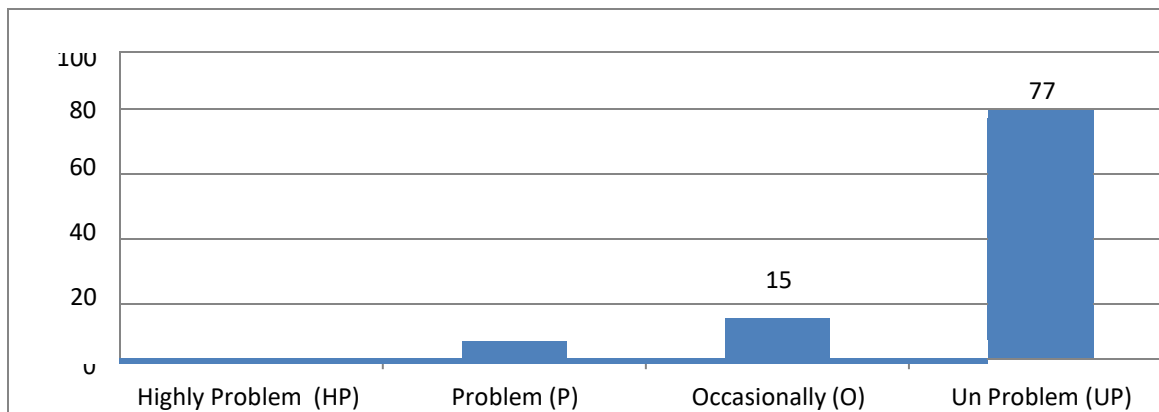
INFERENCE

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

TABLE: 22 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: 22



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.

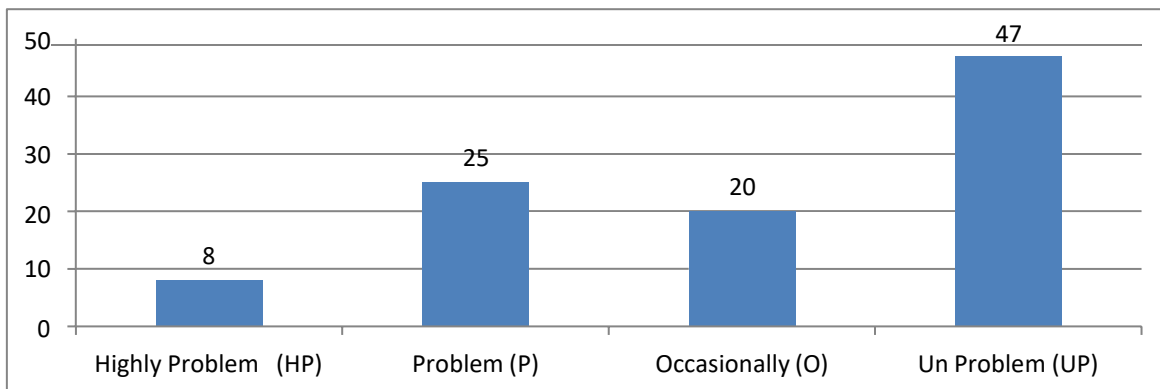
INFERENCE

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

TABLE: 23 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: 23



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.

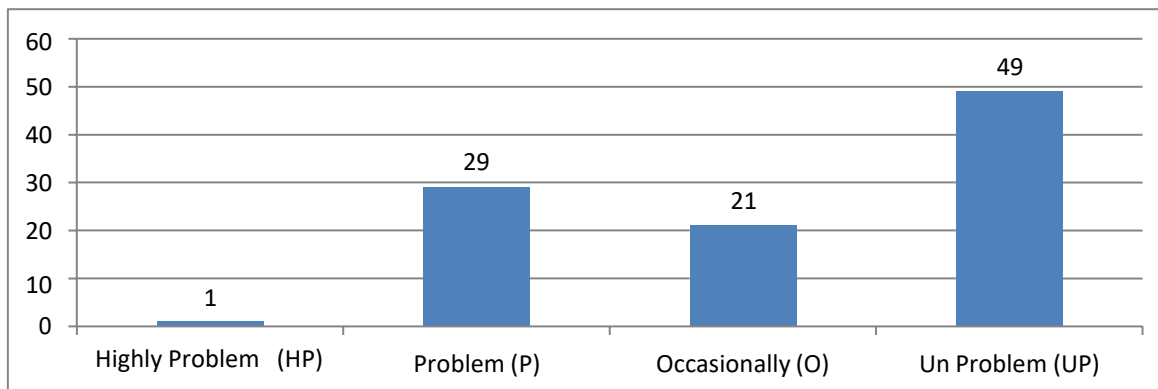
INFERENCE

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

TABLE: 24 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: 24



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.

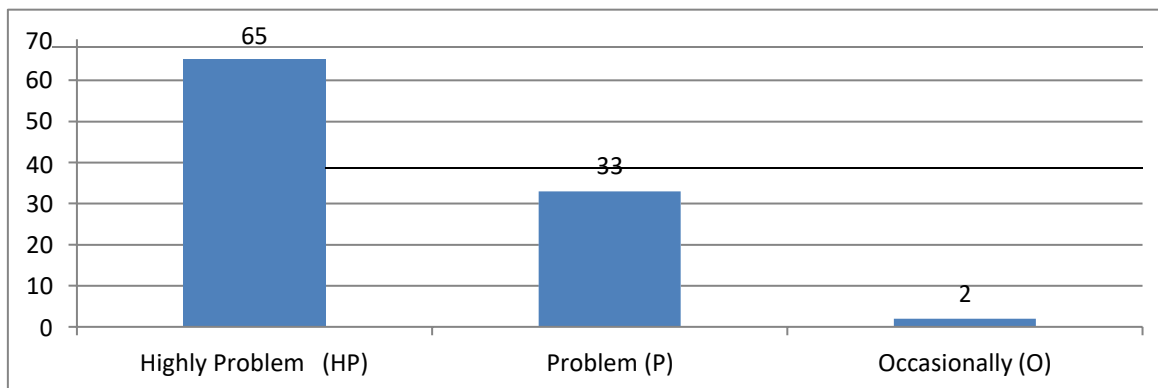
INFERENCE

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

TABLE: 25 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: 25



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.

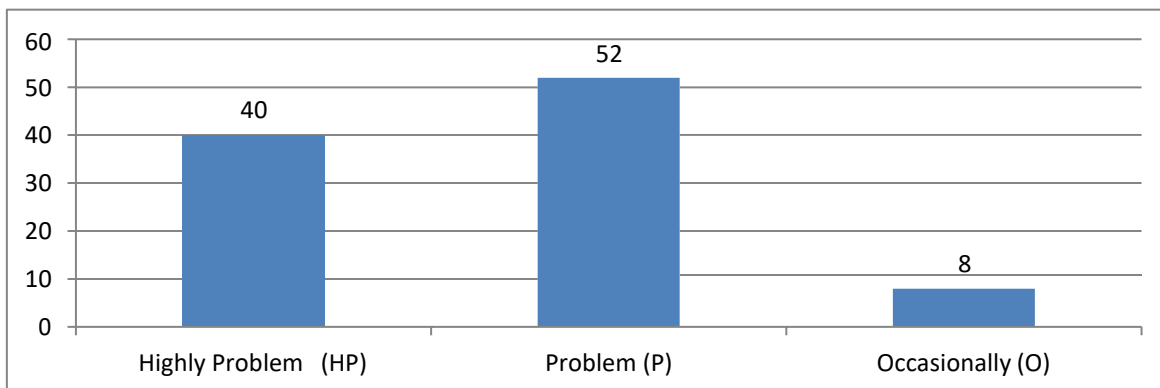
INFERENCE

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

TABLE: 26 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: 26



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.

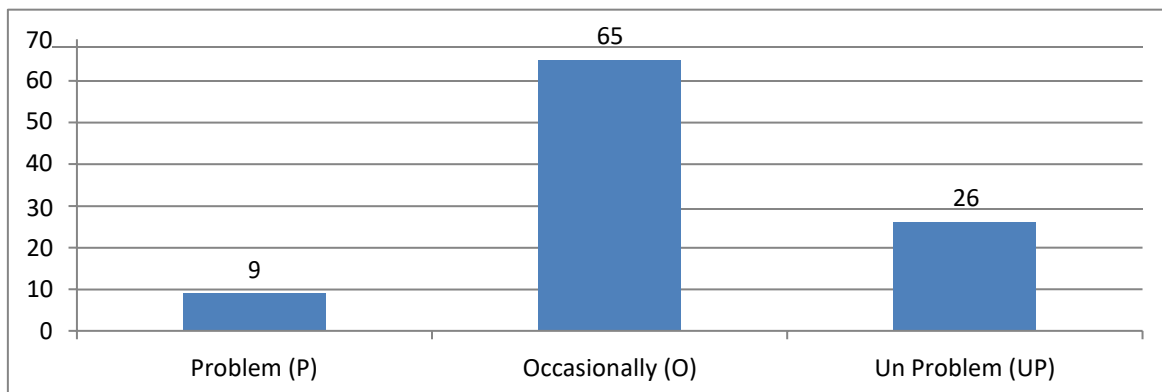
INFERENCE

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

TABLE: 27 BREAK DOWN

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

CHART: 27



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.

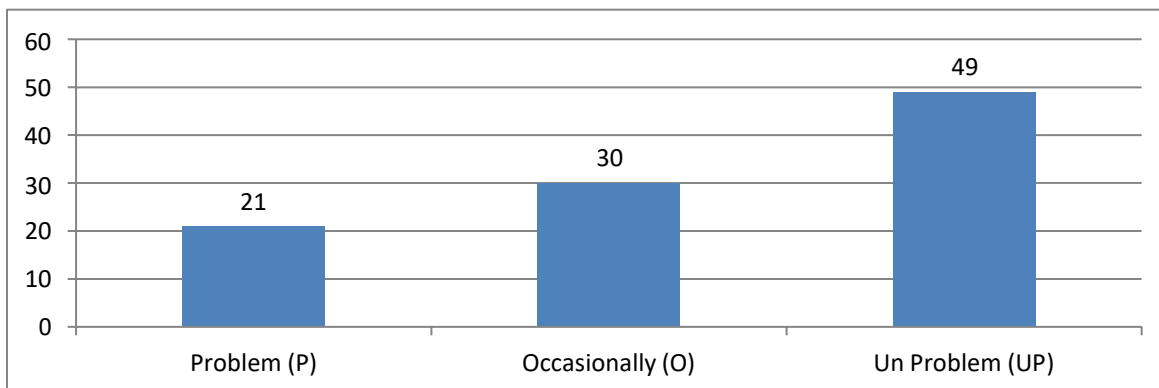
INFERENCE

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

TABLE: 28 DELIVERY SCHEDULE

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

CHART: 28



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.

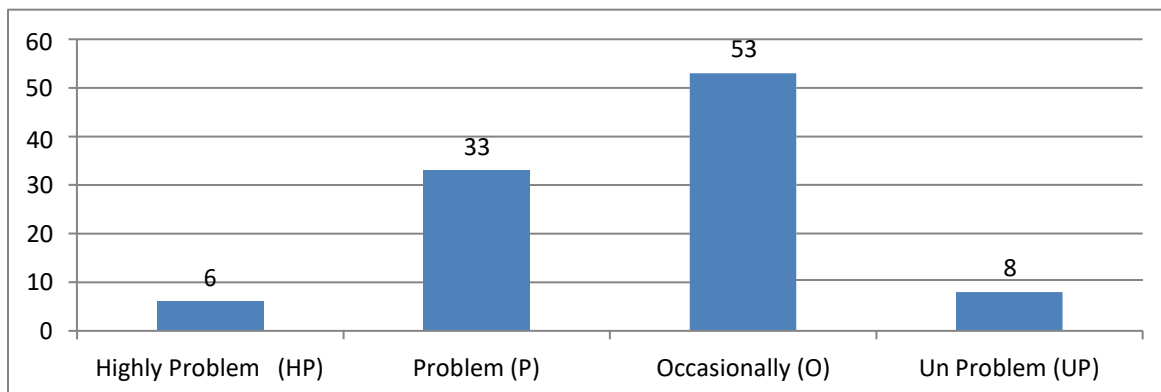
INFERENCE

Most of the respondents are not having problem with delivery.

TABLE: 29 INFRASTRUCTURE OF ROAD

PARTICULARS	NO. OF RESPONDENTS	PERCENTAGE
Highly Problem (HP)	7	6
Problem (P)	40	33
Occasionally (O)	63	53
Un Problem (UP)	10	8
Total	120	100

CHART: 29



INTERPRETATION:

From the above table it can be interpreted that 53% of the respondents are having problem occasionally with road infrastructure and 33% of the respondents are having problem with road infrastructure.

INFERENCE

Most of the respondents are having problem occasionally with road infrastructure.

4.2. STATISTICAL TOOLS AND ANALYSIS

CHI- SQUARE TEST I – (ψ^2)

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

Null hypothesis (H_0):

There is no relationship between age and education.

Alternate hypothesis (H_1):

There is relationship between age and education.

Case Processing Summary

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

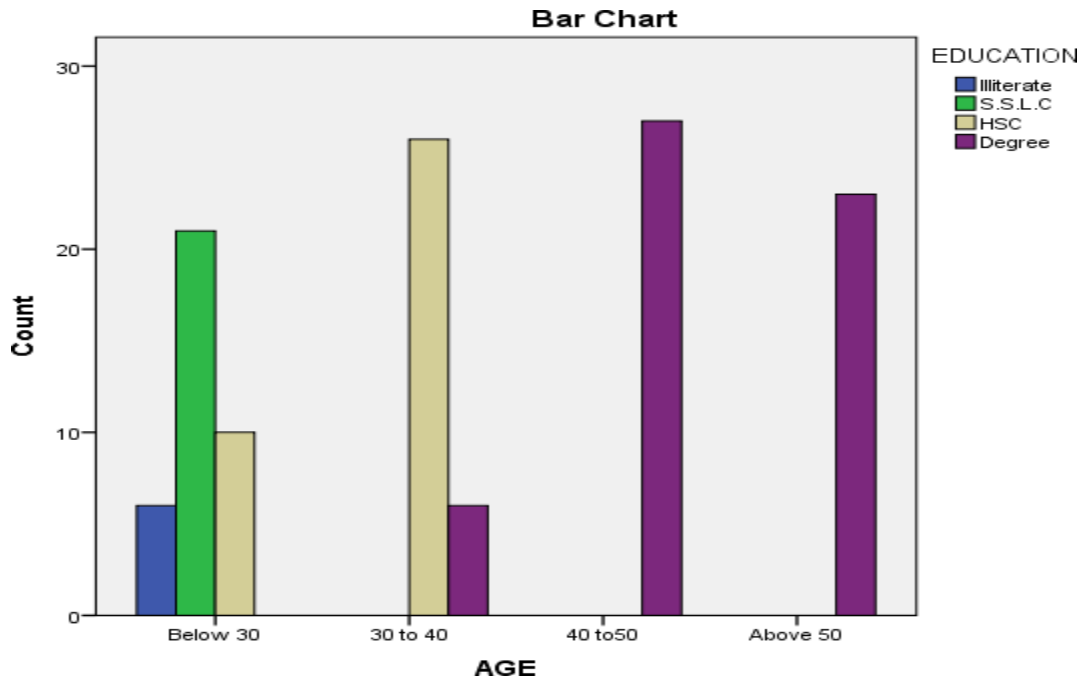
AGE * EDUCATION Crosstabulation

		EDUCATION				Total
		Illiterate	S.S.L.C	HSC	Degree	
AGE	Count	6	21	10	0	37
	Below 30 % 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%
	Count	0	0	26	6	32
	30 to 40 % 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%
	Count	0	0	0	27	27
	40 to50 % 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%
	Count	0	0	0	23	23
	Above 50 % 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%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	155.242 ^a	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.



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.

ONE-WAY ANOVA CLASSIFICATION

Null hypothesis (Ho):

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

Alternate hypothesis (H1):

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

Descriptives

HAVE OWN LORRY

	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

Test of Homogeneity of Variances

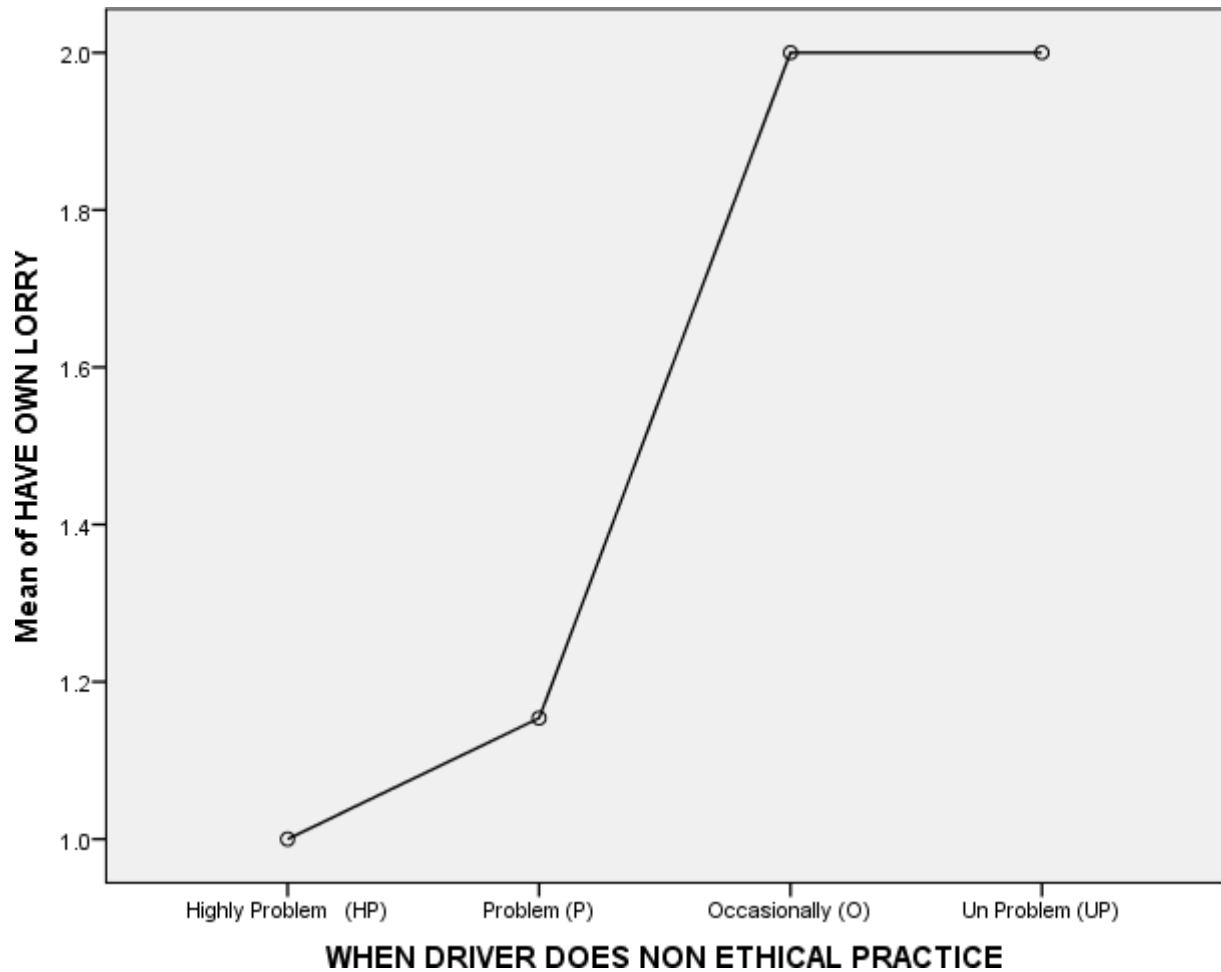
HAVE OWN LORRY

Levene Statistic	df1	df2	Sig.
23.448	3	115	.000

ANOVA

HAVE OWN LORRY

	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			



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 lorry and when driver does unethical practice.

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.

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

5.1 FINDINGS:

- Most of the respondents are belonging to the age below 30.
- Most of the respondents are male.
- Most of the respondents are completed degree.
- Most of the respondents are doing export goods transport business.
- Most of the respondents are doing business in domestic area.
- Most of the respondents are having own lorry.
- Most of the respondents are facing problem occasionally while hiring a lorry.
- Most of the respondents are not facing problem while paying insurance every year. Most of the respondents are not facing problem while paying road tax every year.
- Most of the respondents are not facing problem while paying income tax every year.
- Most of the respondents are not facing problem while paying quietly tax every year.
- Most of the respondents are facing problem when daily workers are not available.
- Most of the respondents are facing problem when driver does unethical practice.
- Most of the respondents are not facing problem due to the office worker.
- Most of the respondents are facing problem occasionally due to the competition.
- Most of the respondents are having problem occasionally when they face toll gate.
- Most of the respondents are not having problem when they face sales tax.
- Most of the respondents are not having problem when they facing the RTO.
- Most of the respondents say that the customer doesn't create the problem.
- Most of the respondents say they are not having problem when the Lorries enter the city time.
- 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 with strike.
- 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 are having problem occasionally with road infrastructure.

5.2 SUGGESTIONS

- The government should improve in the aspect of Infrastructure.
- Bank must provide more loans and reduce delay in sanctioning of loans.
- Organizations give more compensation to driver.
- Government must reduce the rate of insurance, road tax, quarterly tax and income tax.
- Humli paid to load man may be framed fixed.
- In this field competition is high, so the organizations go for innovative idea and adopt new technology like e-booking.
- Single window checking and certifying may reduce the time in every checking stations.

5.3 CONCLUSION

The purpose of the project was to find the problem in road goods transport industry in Bangalore.

In the recent years, the road transport sector is witnessing a strong and vigorous growth despite it facing momentous barriers to inter-state freight movement. This is particular to this segment when compared to inland waterways, air and railways that does not have much checks and barriers enroute. Also the global competition is putting in the pressure to have an efficient transport that is free from all impediments that affects the efficiency of freight road transport.

Finally the researcher find in Bangalore road goods transport industry are face huge problem in various way like Infrastructure, driver, insurance, road tax, quarterly tax, income tax, police. So this industry must improve in research study area.

APPENDIX

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TRANSPORT RESEARCH WING, NEW DELHI, August 2012
- ❖ Competition Issues in the Road Goods Transport Industry in India with special reference to The Mumbai Metropolitan Region
- ❖ Competition Issues in the Road Goods Transport Industry in India
- ❖ Truck operators in India bear the brunt of slowing economy
- ❖ Transport in India ,From Wikipedia
- ❖ Road_freight_transport_statistics

QUESTIONNAIRE

Part A: Demographic profile/ Basic information

1. COMPANY NAME: _____

2. CONTACT NAME: _____

3. AGE: () Below 30 () 30 to 40 () 40 to 50 () Above 50

4. GENDER: () Male () Female

5. Education: () ILLITERATE () S.S.L.C () HSC () DEGREE

Part B: opinion

6. Nature of business

() Regular service () Parcel service

() Cargo () Export goods transport

7. Area of business coverage

() Local () Domestic () National () International

8. Do you have own lorry () Yes () No

What is your opinion on problems Companies regarding the given variables?

Kindly Rate the given variables in 4 point scale (HP - Highly Problem, P- Problem, O- Occasionally, UP- UN Problem,)

VARIABLES	Highly Problem (HP)	Problem (P)	Occasiona lly (O)	Un Problem (UP)
-----------	---------------------------	----------------	----------------------	-----------------------

Finance problem

9. To hire a lorry () () () ()
10. Pay Insurance every year () () ()
()
11. Pay road tax every year () () ()
()
12. Pay income tax every year () () () ()
13. You pay quietly tax () () () ()

Manpower problem

14. If daily workers is not available
You will suffer () () () ()
15. If driver do unethical practice
You will suffer () () () ()
16. Due to the office worker () () ()
()
17. Competition () () () ()

Variables	Highly Problem (HP)	Problem (P)	Occasional ly (O)	Un Problem (UP)
-----------	------------------------	----------------	----------------------	-----------------------

Legal problem

18. You face toll gate () () ()
()
-

19. You face sales tax ()	()	()	()
20. You face RTO ()	()	()	()
Other problem			
21. Customer creates ()	()	()	()
22. Lorry enters the city time ()	()	()	()
23. Brokering process ()	()	()	()
24. Unload the good ()	()	()	()
25. Theft creates ()	()	()	()
26. Spare parts & accessory price of ()	()	()	()
27. Diesel price ()	()	()	()
28. Strike is ()	()	()	()
29. Break down ()	()	()	()
30. Delivery schedule ()	()	()	()
31. Infrastructure (road) ()	()	()	()