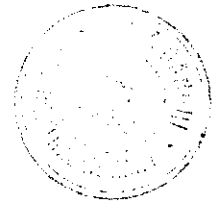# A STUDY ON CONSUMER PERCEPTION AND MARKET POTENTIAL FOR COMMON RAIL INJECTION SYSTEM IN COIMBATORE CITY

By

SRIDHAR P

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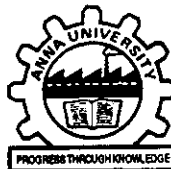Reg. No. 6830925001**9**

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Submitted to the

FACULTY OF MANAGEMENT SCIENCES

In partial fulfillment for the award of the degree

of

MASTER OF BUSINESS ADMINISTRATION
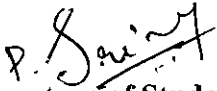
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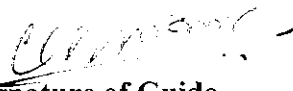## CHENNAI 600 025

August 2011

BONAFIDE CERTIFICATE

Certified that the Project report titled **A STUDY ON CUSTOMER PERCEPTION AND MARKET POTENTIAL FOR COMMON RAIL INJECTION SYSTEM IN COIMBATORE CITY** is the bonafide work of **Mr. SRIDHAR.P** who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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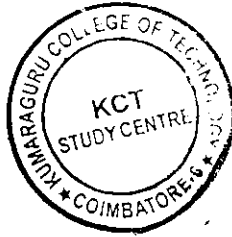
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ABSTRACT

Fuel plays a crucial role to provide energy in automotive technology, controlling the energy demand and greenhouse gas emissions from personal vehicles has become a major challenge. Reducing the consumption of fuel, low noise and emissions from diesel engines are the major expectations of diesel vehicle customers and emission legislators around the world. The study had been conducted among 150 respondents from various places in Coimbatore city. Most of the consumers are not aware of the effects of the common rail direct injection and they are unable to differentiate their current diesel engine performance from the CRDI technology-equipped cars. In developing countries like India, investment cost is one of the main reasons, which hinder the technological advancement. So, in this situation, the survey conduced in Coimbatore to record people's perception of common rail injection system technology. Also, an analysis is done on the buying capacity of the people to put in extra initial investment in common rail injection system, for a better performance and long-term fuel savings and eco-friendly. Advertisements about the various new engine technologies, creating more awareness on fuel consumption and environmental pollution while purchasing a car should be created to consumers. which will help them in improving the performance of their vehicle as well as reduce the global warming.

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LIST OF ABBREVIATIONS

ABBREVIATIONS	EXPANSION
CRIS	Common Rail Injection System
GHG	Green House Gas
MPV	Multi Purpose Vehicle
DI	Direct Injection
CRDI	Common Rail Diesel Injection
IDI	Direct Injection
HSDI	High Speed Direct Injection

CHAPTER-1

INTRODUCTION

1.1 INTRODUCTION TO FUEL EFFICIENCY AND MOTOR VEHICLE EMISSION STANDARDS:

Global oil demand has steadily increasing, largely due to rapid motorization that are taking place in developing countries, in particular in countries with rapidly growing economies, such as Brazil, China, India and others. Oil demand growth is primarily driven by growth in the vehicle population, especially private passenger vehicles, as well as total vehicle distance traveled.

Controlling the energy demand and greenhouse gas (GHG) emissions from personal vehicles has become a major challenge. Curbing vehicle population growth, reducing travel demand and improving vehicle fuel efficiency are three key elements to reducing overall oil demand. A wide variety of approaches to address these three areas have been introduced in different parts of the world.

Most industrialized countries have established programs to address transportation related GHG emissions. Fuel economy programs and GHG emission targets, either mandatory or voluntary; have proven to be among the most cost-effective tools in controlling oil demand and GHG emissions from motor vehicles.

The relationship between GHG emissions and fuel consumption is important because CO_2 is the dominant source of GHG emissions from an automobile. The level of CO_2 emissions from automobiles is directly linked to vehicle fuel consumption. California's proposed rule would regulate all GHG emissions in terms of CO_2 - equivalent emissions and the EU regulates CO_2 emissions only. As the vast majority of automobiles consume petroleum-based fuels such as gasoline and diesel, the conversion factors from CO_2 to gasoline and diesel fuels were treated in this analysis as constants among most countries and regions, even though small variations exist due to differences in fuel quality and

additives. However, these differences are likely to remain relatively minor unless the use of alternative fuels that are not petroleum-based becomes widespread.

Fuel economy programs include both numeric standards and fiscal incentives to improve the energy efficiency of individual vehicles per unit of distance traveled. In today's technology-driven world, new technologies offer great promise to drastically improve vehicle fuel economy. Realizing such technological promise is contingent on strong policy.

Technology development also responds to price. Relatively high oil prices, for example, have provided an incentive for manufactures and consumers to build and buy smaller and more fuel-efficient cars.

To achieve these nearly every new passenger-car diesel engine around the world is now equipped with a Common Rail injection System (CRS). At the same time, the technology should considerably reduce fuel consumption, noise, and emissions from diesel engines.

Since the new diesel technology vehicle engine emits just one-fifth the particulate matter (Carbon soot) and one-fourth the hydro-carbon of natural gas engines. The new engine also results in lower greenhouse gas emissions due to its greater fuel mileage (diesel engines use between 40 and 60 percent less fuel per mile than natural gas engines) and its lack of methane emissions during refueling.

1.2 BACKGROUND OF THE STUDY

1.2.1 Trends in annual sales of passenger vehicles in India:

Trends in the sales of passenger vehicles in India are shown in Fig. 1. During the 2001-02 to 2007-08, the car sales have seen an annual growth of nearly 16 %. In the fiscal year 2007-08, the domestic sale of passenger vehicles that included passenger cars, utility vehicles and multi-purpose vehicles (MPV) stood at 1.548 million units. This combined with a high growth in the sales of motorcycles during the same period, resulted in increase of gasoline (petrol) consumption from 6.61 million tones in 2000-01 to 10.33 million tones in 2007-08.
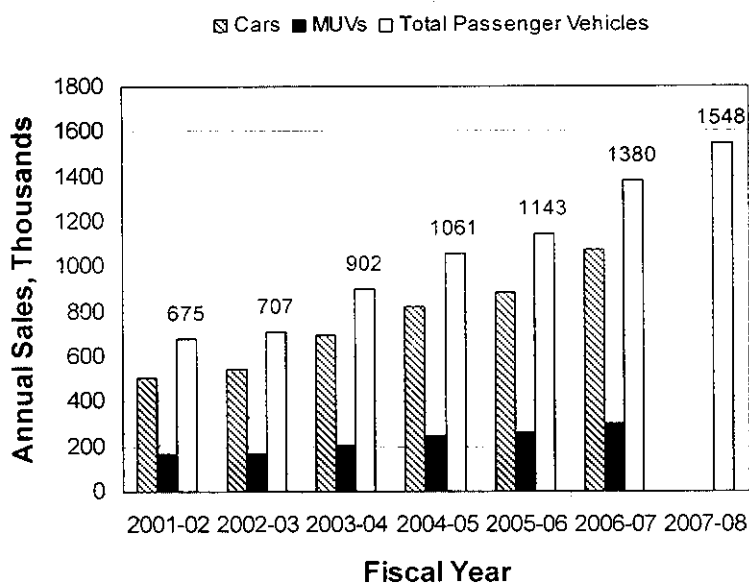
Figure1- Trends in annual sales of passenger vehicles in India

1.2.2 Trends in fuel consumption in India:

The trends in gasoline and diesel consumption in our country are shown in Fig. 2. It must be noted that only about 57% of the total diesel fuel is consumed in road transport sector. A significant fraction of diesel demand is from railways, agricultural sector and for captive power generation.
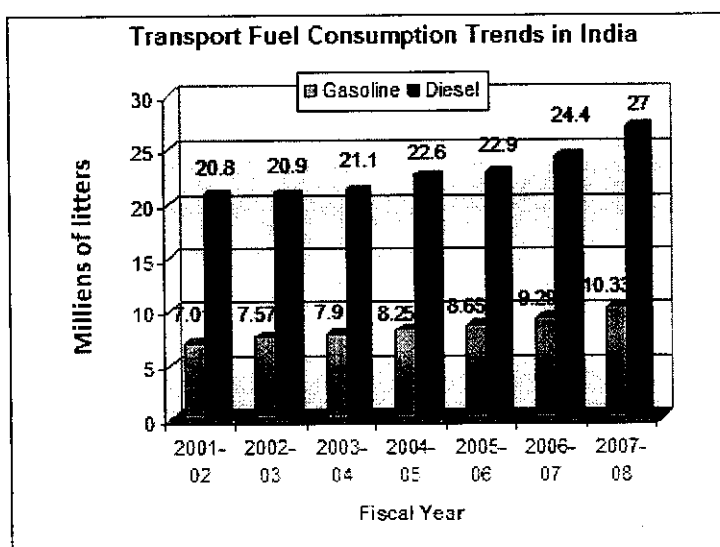
Figure 2- Annual consumption of gasoline and diesel fuels in India.

A study of technology used in the current production Indian passenger vehicles shows that the following information:

1. Out of the total passenger vehicle sales in India. the diesel vehicles constitute about 30%.
2. A large percentage of diesel passenger vehicles (51%) are still powered by the IDI diesel engines.
3. Nearly 50% of diesel vehicles do not use turbo charging.
4. Only about 30% of diesel engines use 4-valves/cylinder.
5. Common rail fuel injection system is employed in only 21 % of diesel passenger vehicles.

1.2.3 DI versus IDI Engines

The high-speed direct injection (HSDI) diesel engines are 10 to 15 % more fuel efficient than the IDI engines (Fig. 3). The IDI engines almost completely occupied the production diesel car market until 1990. However, due to development of HSDI technology of which injection system was the key component, now HSDI engine has almost fully wiped out the IDI diesel engine from the European production cars. In India, a number of models of diesel passenger cars and SUV category vehicles still use IDI engines.
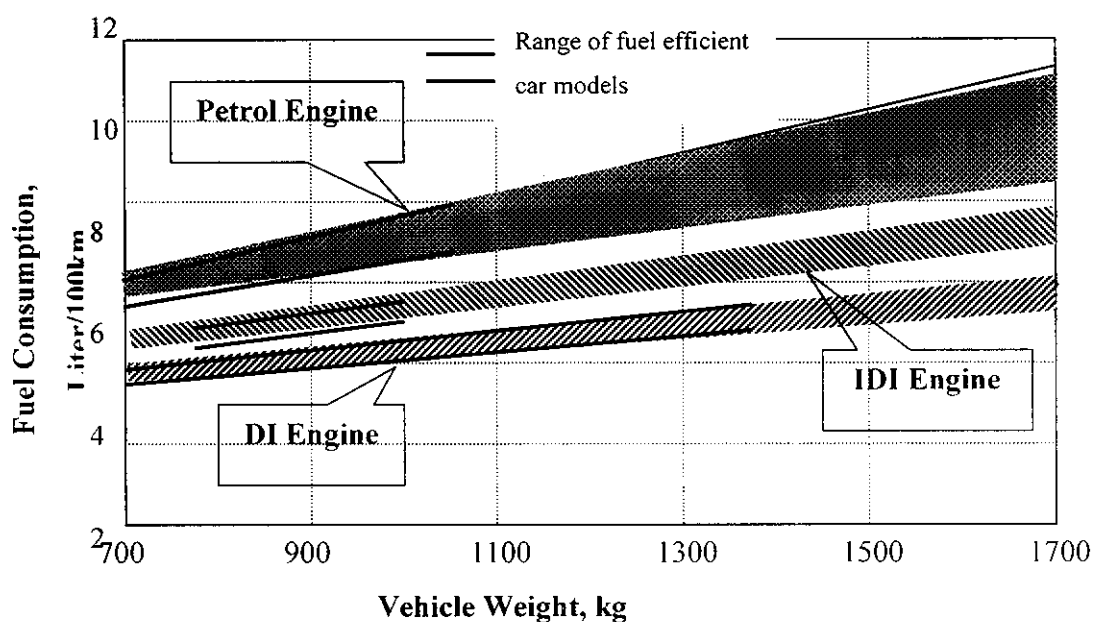
Figure 3- Comparison of fuel consumption of gasoline, IDI diesel and DI diesel engine European cars.

1.2.4 Injection Pressure and Common Rail Diesel Injection (CRDI) System

Modern diesel engines employ high injection pressures ranging from 1600- 2000 bars compared to 600 to 800 bars used earlier. Smaller nozzle holes combined with high injection pressures give better fuel atomization resulting in finer fuel droplets, high injection velocity, shorter injection duration, good spray penetration etc.

It results in faster fuel evaporation and mixture formation leading to shorter combustion duration and improvements in combustion efficiency. Common rail diesel injection technology with electronic control of injection timing and quantity is now used by more and more high speed diesel engines. With CRDI technology 1600 bars or higher injection pressures can be obtained at nearly all engine speeds unlike the in-line pump-injection systems, distributor type injection systems or electronic unit injectors. In the in-line pump-injection or distributor type injection systems the injection pressure at lower engine speeds is quite low and it increases with increase engine speed. As the engine is tuned for rated engine speed, it results in poor performance and high fuel consumption in the low engine speed range. Injection system of diesel engines need significant power to drive them which increases with increase in injection pressure. Another advantage of CRDI systems is that the injection system driving power is only about 50% of that required by a distributor injection system and just 20% of that needed by an in-line pump-nozzle system. HSDI engines using 4-valve technology with CRDI have given FE improvements of 5% or better.

1.2.5 FUEL ECONOMY NORMS FOR INDIAN VEHICLES

Now a days our nation emissions standards very strict to avoid Bharat Stage emissions standards are emissions standards instituted by the Government of the Republic of India (ARAI) (Bharat) that regulate the output of air pollutants (such as nitrogen oxides (NOx), carbon monoxide (CO), hydrocarbons (HC), particulate matter (PM), soot, and, where applicable, sulfur oxides (SOx)) by internal combustion engine powered equipment, including motor vehicles, or other air polluting facilities or equipment. In many cases they are similar to European emissions standards.

The main objective of this study is to provide an updated customer perception on recent worldwide trends in vehicle fuel economy technology (specially in CRDI), identify the market potential, and make recommendations for future policy making to ensure realistic, enforceable and agreeable mitigation strategies to reduce transportation energy use and associated GHG emissions in a cost effective way.

1.3 PROBLEM IDENTIFIED

Reducing the consumption of fuel, increased power, low noise and emissions from diesel engines are the major expectations of diesel car customers and emission legislators around the world. Common Rail injection System is one of best technologies to satisfy these issues. But CRS also increases the vehicle cost. In developing countries like India, investment cost is one of the main reasons, which hinder technological advancement. So, in this situation, a survey has been taken in Coimbatore to record people's perception of CRS automotive technology. Also, it has been analyzed the buying capacity of the people to put in extra initial investment in CRS, for a better performance and long-term fuel savings and eco-friendly.

1.4 NEED FOR THE STUDY

In this present scenario, fuel prices are rising day by day and laws of regulating the emission of greenhouse gases are becoming strict. So the market needs to survive with the help of new technologies. At the same time, the technology should considerably reduce fuel consumption, noise, and emissions from diesel engines. To achieve these nearly every new passenger-car diesel engine around the world is now equipped with a Common Rail injection System.

1.5 OBJECTIVES OF THE STUDY

1.5.1 PRIMARY OBJECTIVE

➢ To analyze the consumer's perception of the Common Rail Injection System (CRIS).

➢ To identify the market potential of the common rail injection system technology equipments.

1.5.2 SECONDARY OBJECTIVE

> ➤ To identify the different kinds of advantages experienced by the customers.
>
> ➤ To examine customer acceptability of CRIS.
>
> ➤ To identify strategies to promote acceptance of CRIS.

1.6 SCOPE OF THE STUDY

Consumer must be aware of the Common Rail Direct Injection Technology (quality of the medicines they are advised to consume). This project aims at studying the consumer's perception, market potential and awareness level about CRDI.

> ➤ It is now necessary to get perception from customer's side and as there is an increase in demand for this common rail injection system technology.
>
> ➤ It may also be necessary to get market potential information from customers, who have been affected without this technology and their buying capacity.

1.7 DELIVERABLES

The deliverables of this study are,

> ➤ To create awareness of the zero wastage of fuel in the diesel engine, this has high fuel economy
>
> ➤ The customer expectations from the CRDI technology.
>
> ➤ Minimizing environmental degradation and support to high emission control in Indian market.

CHAPTER-2

LITERATURE SURVEY

2.1 REVIEW OF LITERATURE

As noted by **NMCC** (2006), competitiveness of manufacturing sector is a very broad multi-dimensional concept that embraces numerous aspects such as price, quality, productivity, efficiency and macro-economic environment. The OECD definition of competitiveness, which is most widely quoted, also considers employment and sustainability, while being exposed to international competition, as features pertaining to competitiveness.

There are numerous studies on auto industry in India, published by industry associations, consultancy organizations, research bodies and peer-reviewed journals. In this section, various studies on the Indian auto industry are reviewed, under different heads pertaining to competitiveness, namely, global comparisons, policy environment and evolution of the Indian auto industry, productivity, aspects related to supply-chain and industrial structure and technology and other aspects.

The Investment Information and Credit Rating Agency of India (ICRA, 2003) studies the competitiveness of the Indian auto industry, by global comparisons of macro environment, policies and cost structure. This has a detailed account on the evolution of the global auto industry.

ICRA(2004a) analyses the implications of the India-ASEANs Free Trade Agreements for the Indian automotive industry. ASEAN economies are globally more integrated than India. The labor cost is low in India but the stringent labor regulations erode this advantage. The level of infrastructure is better in India than Indonesia and the Philippines but worse than that in other ASEAN countries.

The study notes that there is a huge excess capacity in ASEAN countries, in comparison with that in India, which will help them to tackle the excess demand that may arise in future. The study finds a 20-30 per cent cost disadvantage for Indian companies on account of taxation and infrastructure and 5-20 per cent labour cost advantage over comparable ASEAN-member-based companies.

ASEAN-member-based companies. Similar findings are noted in a study by the Automotive Component Manufacturers Association of India (ACMA, 2004), particularly in comparison with Thailand.

ICRA (2004) analyses the impact of Preferential Trade Agreement (PTA) with MERCOSUR6 on the automobile sector in India. This study finds a significant threat of imports in sub-compact and compact cars and certain auto-components. There is huge excess capacity and intense competition in MERCOSUR countries, propelling them to look for export opportunities. This is true especially of Brazil, which has a well-developed auto-component sector with huge economies of scale. Further, weak currency in all MERCOSUR countries provides a natural tariff barrier.

Pingle (2000) reviews the policy framework of India's automobile industry and its impact on its growth. While the ties between bureaucrats and the managers of state-owned enterprises played a positive role especially since the late 1980s, ties between politicians and industrialists and between politicians and labour leaders have impeded the growth.

The first phase of 1940s and 1950s was characterised by socialist ideology and vested interests, resulting in protection to the domestic auto industry and entry barriers for foreign firms. There was a good relationship between politicians and industrialists in this phase, but bureaucrats played little role. Development of ancillaries segment as recommended by the L.K. Jha Committee report in 1960 was a major event that took place towards the end of this phase.

During the second phase of rules, regulations and politics, many political developments and economic problems affected the auto industry, especially passenger cars segment, in the 1960s and 1970s. Though politicians picked winners and losers mainly by licensing production, this situation changed with oil crises and other related political and macro-economic constraints.

Piplai (2001) examines the effects of liberalization on the Indian vehicle industry, in terms of production, marketing, export, technology tie-up, product up gradation and profitability. Till the 1940s, the Indian auto industry was non-existent, since automobile were imported from General Motors and Ford. In early 1940s, Hindustan Motors and Premier Auto started, by importing know-how from General Motors and Fiat respectively.

Since the 1950s, a few other companies entered the market for two-wheelers and commercial vehicles. However, most of them either imported or indigenously produced auto-components, till the mid-1950s, when India had launched import substitution programme, thereby resulting in a distinctly separate auto-component sector.

Due to the high degree of regulation and protection in the 1970s and 1980s, the reforms in the early 1990s had led to a boom in the auto industry till 1996, but the response of the industry in terms of massive expansion of capacities and entry of multinationals led to an acute over-capacity. Intense competition had led to price wars and aggressive cost-cutting measures including layoffs and large-scale retrenchment.

While Indian companies started focusing on the price-sensitive commercially used vehicles, foreign companies continued utilizing their expertise on technology-intensive vehicles for individual and corporate uses. Thus, Piplai concludes that vehicle industry has not gained much from the reforms, other than being thrusted upon a high degree of unsustainable competition.

In August 2006, a **Draft of Automotive Mission Plan** Statement prepared in consultation with the industry was released by the Ministry of Heavy Industries and Public Enterprises. This was finally released as a report in December 2006. This document draws an action plan to take the turnover of the automotive industry in India to US$145 billion by 2016, accounting for more than 10 per cent of the GDP and providing additional employment to 25 million people, by 2016. A special emphasis is laid on small cars, MUVs, two-wheelers and auto-components.

Measures suggested include setting up of a National Auto Institute, streamlining government/educational/research institutions to the needs of the auto industry, upgrading infrastructure, considering changes in duty structure and fiscal incentives for R&D. Similarly, NMCC (2006), which lays down a national strategy for manufacturing, recognizes the importance of the Indian automobile and auto-component industry, particularly the latter, as a competitive knowledge-based industry with immense employment generation potential.

ACMA (2006) notes that India's joining the WP (Working Party) 29: 1998 Agreement for global harmonisation of automotive standards, coupled with the funding of National Automotive Testing and Research Infrastructure Project (NATRIP) by the Government of India, has increased prospects of the Indian auto industry rising up to global standards in the near future, in all aspects.

Sharma (2006) analyses the performance of the Indian auto industry with respect to the productivity growth. Partial and total factor productivity of the Indian automobile industry have been calculated for the period from 1990-91 to 2003-04, using the Divisia-Tornquist index for the estimation of the total factor productivity growth. The author finds that the domestic auto industry has registered a negative and insignificant productivity growth during the last one and a half decade.

Consumer Preference is a business term which is used to capture the idea of measuring how satisfied an enterprise's customers are with the organization Efforts in a market place. Every organization has customers of some kind. The organization provides products (goods and services) of some kind to its customers through the mechanism of a marketplace. The products the organization provides are subject to competition whether by similar products or by substitution products. The reasons on organization is interested in the satisfaction of its customers is because customers purchase the organization's products. The organization is interested in retaining its existing customers and increasing the number of its customers.

By **Fareena sultan**: Examines consumer preferences for forthcoming technological innovations. Studies consumer response to different levels of technology over time, Looks at preferences for existing and intermediate technologies when future ones are expected. Focuses on technological consumer durables that are expected to evolve over time. The primary contributions of this research are: an understanding of how consumer preferences for a technology are affected by the time of adoption; an understanding of the value to consumers of obtaining different levels of a technology. at different points in time; and the utilization of parsimonious indices to assess consumer response to different levels of technology over time.

Kathuria (1996) analyses the Commercial Vehicles (CV) industry in India in a detailed manner, dwelling on the concepts of vertical integration and subcontracting, production technology and technological change. After an overview of the global auto industry, Kathuria traces the developments in the Indian auto industry from the 1950s to 1991.

To evaluate the competitiveness of Indian commercial vehicles manufacturers in the domestic market. growth trends. structural trends. market shares. profitability. productivity ratios. prices, quality, dealer network and performance are analysed. Macro and micro performance of India's vehicle exports with major markets and Indian vehicle characteristics have been outlined. along with an analysis of global demand patterns

Domestic resource costs and global comparison of prices, credit and service are the other international trade-related aspects analysed in this study. On vertical integration, the analysis leads to the conclusion that the Indian CV industry needs to learn from the international experience to get into subcontracting and buying-in. Lack of scales and high inventories had impeded the competitiveness of Indian CV firms in the 1980s.

2.2 RESEARCH GAP

The studies conducted by others in this domain concentrated on the fuel economy of Indian passenger vehicles compared to other countries. The previous studies also concentrated on the potential fuel efficiency improvements for Indian vehicles.

But this study focuses on people's willingness to accept the vehicles with the fuel-efficient technology and advanced features. This study also analysis the impact of the diesel injection technology in fuel economy and the environmental protection.

CHAPTER 3

3. METHODOLOGY

3.1 RESEARCH METHODOLOGY:

Research Methodology is a way of systematically solving the research problem. Research methodology deals with the research design used and methods used to present the study. Method is a simple and systematic planned way of doing things to achieve the desired results. The research methodology helps the researcher in framing the research objectives, design and also in what way data can be collected and tools that can be used for interpretation. The research methodology is very important for every researcher as it is the root for doing the project.

3.1.1 RESEARCH DESIGN:

A research design is a detailed blue print used to guide a research study toward its objective. The process of designing a research study involves many interrelated decisions. The most significant decision is the choice of research research approach, because it determines how the information will be obtained. The choice of the research approach depends on the nature of the research that one wants to do.

3.1.2 TYPE OF RESEARCH PROJECT:

The research design used in this study is Descriptive Research Design. Descriptive Research Design is a scientific method which involves observing and describing the behavior of a subject without influencing it in any way.

The results from a descriptive do not give research can no way be used as a definitive answer to specific issues or to disprove cryptic hypothesis. If the limitations are understood, they can still be a useful tool in many areas of decision making.

3.2 SAMPLING TECHNIQUES:

Sampling is the act, process, or technique of selecting a suitable sample, or a representative part of a population for the purpose of determining parameters or characteristics of the whole population.

The various steps involved in sampling process are:

- Identifying target population
- Determining sample frame
- Selecting sampling procedure
- Determine sample size
- Execute sampling
- Obtaining information from respondents
- Analyzing and Generating information for decision making

3.2.1 SAMPLING METHOD/PROCEDURE:

Sampling method/ procedure is about how respondents should be selected. The sampling method adopted is Non probability sampling method which states that each unit of the population has no definite chance of being included in the sample. The sampling procedure used is "Convenience Sampling".

A convenience sample results when the more convenient elementary units are chosen from a population for observation. "In statistics, a sampling technique in which a sample is selected on the basis of convenience and ease is referred as convenience sampling"

(http://www.yourdictionary.com/business/convenience-sampling)

3.2.2 SAMPLE SIZE:

Sample size is about how many people to be surveyed. As the population is an infinite. the sample size selected for this study is 150 and the researchers believed 150 is a sufficient to judge the perception of the customers.

3.2.3 SAMPLING UNIT:

Sampling unit is that who is to be surveyed, simply called target group. The survey is restricted to only those who have diesel engine cars with the ECU in the Coimbatore city.

3.3 DATA COLLECTION METHODS:

Data can be classified as either primary or secondary.

3.3.1. PRIMARY DATA

Primary data mean original data that have been collected specially for the purpose in mind. Research where one gathers this kind of data is referred to as field research. Primary data is collected through structured questionnaire.

3.3.2. SECONDARY DATA

Secondary data are data that have been collected for another purpose and where we will use Statistical Method with the Primary Data. It means that after performing statistical operations on Primary Data the results become known as Secondary Data. Secondary data is collected from Internet and books.

3.4. RESEARCH INSTRUMENT

A questionnaire is a research instrument consisting of a series of questions and other prompts for the purpose of gathering information from respondents. Although they are often designed for statistical analysis of the responses, this is not always the case. Questionnaires have advantages over some other types of surveys in that they are cheap, do not require as much effort as verbal or telephone surveys, and often have standardized answers that make it simple to compile data.

3.5 TOOLS FOR ANALYSIS

A multitude of different statistical tools are available, some of them simple, some complicated, and often very specific for certain purposes. In analytical work, the most important common operation is the comparison of data, or sets of data, to quantify accuracy (bias) and precision. Fortunately, with a few simple convenient statistical tools most of the information needed in regular laboratory work can be obtained.

Clearly, statistics is a tool, not an end itself. Simple inspection of data, without statistical treatment, by an experienced and dedicated analyst may be just as useful as statistical figures on the desk of the disinterested. The value of statistics lies with organizing and simplifying data, to permit some objective estimate showing that an analysis is under control or that a change has occurred. Equally important is that the results of these statistical procedures are recorded and can be retrieved.

3.5.1 PERCENTAGE ANALYSIS:

When there are more series of data the percentage method is used to compare the relationship. Percentage Method refers to a series to a special kind of ration. Percentages are used in comparison between two or more series and also to describe the relationship. Percentage reduces everything to a common base and thereby allowing meaningful comparison to be made.

$$\text{Percentage of respondents} = \frac{\text{Number of respondents}}{\text{Total number of respondents}} \times 100$$

3.6 LIMITATIONS:

- Data collection is limited to geographic factors, the study is conducted in Coimbatore only
- The study is limited to the data collected by structured questionnaire.
- The study mainly conducted only those who have diesel engine cars with the ECU (Electronic Controlled Unit)
- The study conducted mainly with middle and upper middle class people inside Coimbatore city
- The limitations of statistical tools also apply

CHAPTER 4

4. DATA ANALYSIS AND INTERPRETATION

4.1:PERCENTAGE ANALYSIS

TABLE 4.1: GENDER OF THE RESPONDENTS

Particulars	No. of Respondents	Percentage
Male	107	71.33
Female	43	28.67
Total	150	100

FIGURE 4.1: GENDER OF THE RESPONDENTS
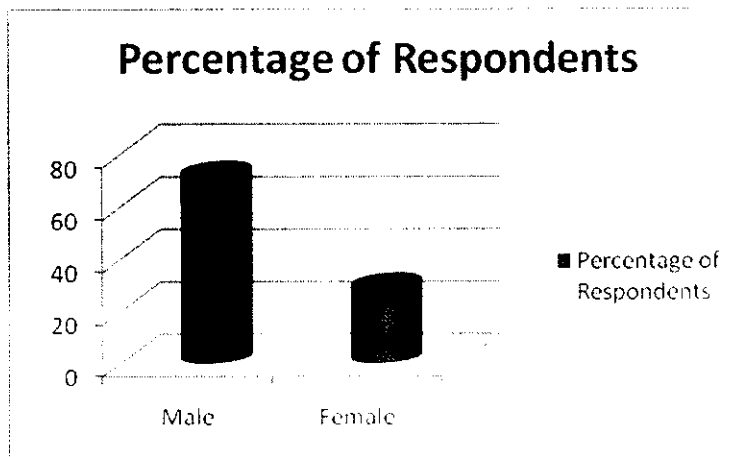
INFERENCE:

The above table 4.1, gender of the respondents, infers that 71.33% of the respondents

4.2: AGE PROFILE OF RESPONDERS

TABLE 4.2: AGE PROFILE OF RESPONDERS

Age Group	No. of Respondents	Percentage
20-30	52	34.67
31-40	55	36.67
41-50	32	21. 63
51 and Above	11	7.33
TOTAL	150	100

FIGURE 4.2: AGE PROFILE OF RESPONDERS
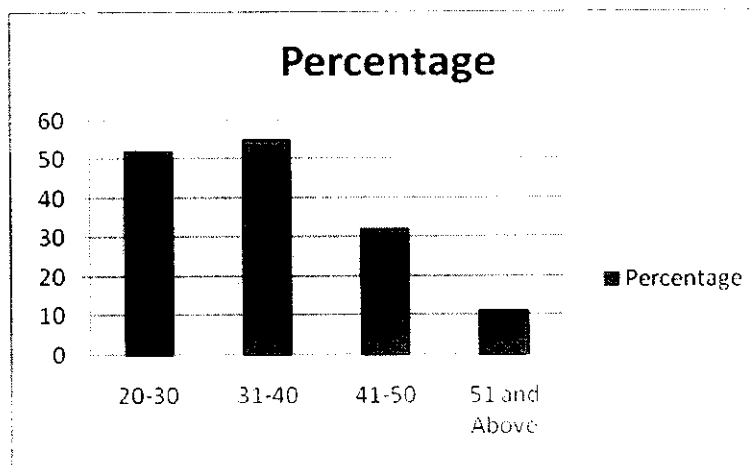
INFERENCE:

It is inferred that 37% of the respondents fall under the age group 31-40.

4.3: AWARENESS OF THE CRDI TECHNOLOGY:

TABLE 4.3: AWARENESS OF THE CRDI TECHNOLOGY:

Options	No. of Respondents	Percentage
Yes	53	35.33
No	97	64.67
TOTAL	150	100

FIGURE 4.3: AWARENESS OF THE CRDI TECHNOLOGY:
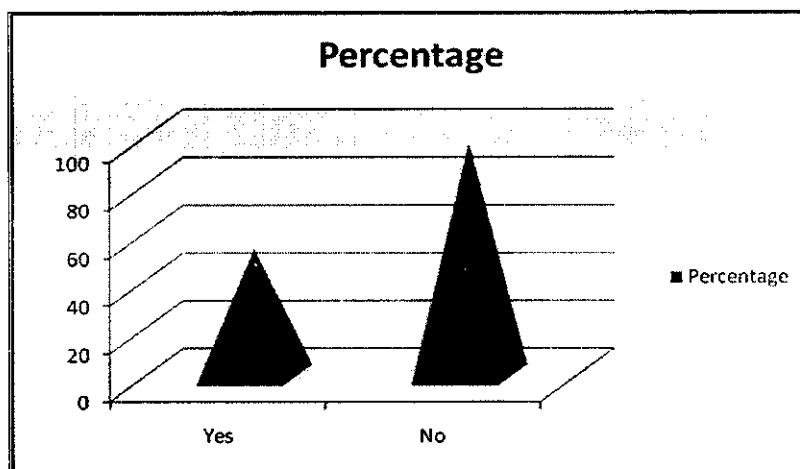
INFERENCE:

It is inferred that 64.67% of the respondents not aware of the CRDI technology.

4.4: NO OF RESPONDERS HAVING CAR:

TABLE 4.4: NO OF RESPONDERS HAVING CAR:

Options	No. of Respondents	Percentage
Yes	58	38.67
No	92	61.33
TOTAL	150	100

FIGURE 4.4: NO OF RESPONDERS HAVING CAR:
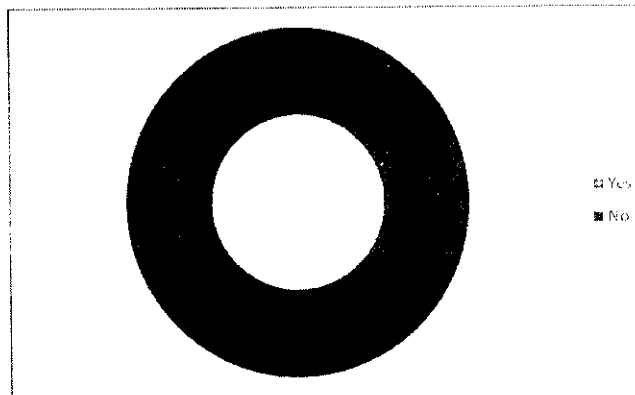
INFERENCE:

It is inferred that 61.33% of the people are not having the diesel car.

4.5: THE GOVERMENT LAWS OF EMISSION REGULATIONS IN INDIA:

TABLE 4.5: THE GOVERMENT LAWS OF EMISSION REGULATIONS IN INDIA:

Options	No. of Respondents	Percentage
Very Stringent	14	24.13
Stringent	24	41.38
Normal	12	20.68
Liberal	8	13.79
TOTAL	58	100

FIGURE 4.5: THE GOVERMENT LAWS OF EMISSION REGULATIONS IN INDIA

LAWS OF EMISSION
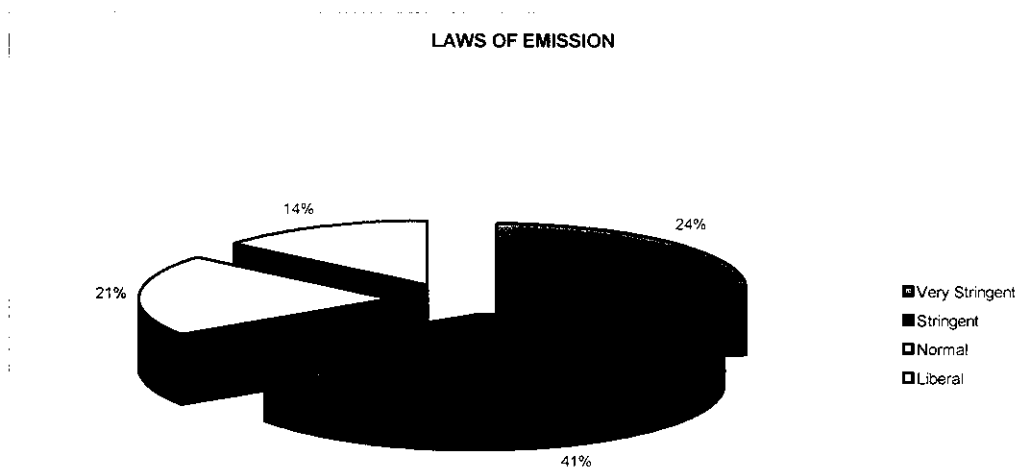
INFERENCE:

It is inferred that 41.38% of the respondents that the Indian government regulation

4.6: MAINTENANCE OF THE DIESEL CAR IN INDIA:

TABLE 4.6: MAINTENANCE OF THE DIESEL CAR IN INDIA:

Options	No. of Respondents	Percentage
Very Costly	8	13.79
Costly	36	62.07
Medium Cost	10	17.24
Less Cost	4	6.90
Least COST	0	0.00
TOTAL	58	100

FIGURE 4.6: MAINTENANCE OF THE DIESEL CAR IN INDIA
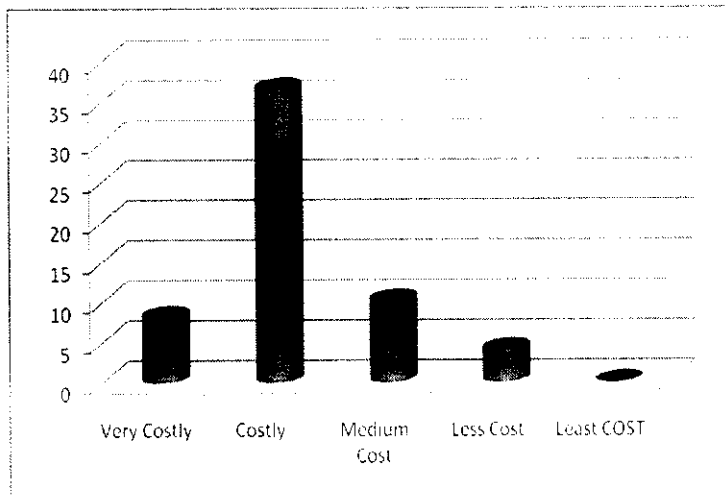
INFERENCE:

It is inferred that 62% of the responders had chosen maintenance of the diesel car
is costly.

4.7: NO OF RESPONDENTS'ARE NOT USED CRDI CAR

TABLE 4.7: NO OF RESPONDENTS'ARE NOT USED CRDI CAR

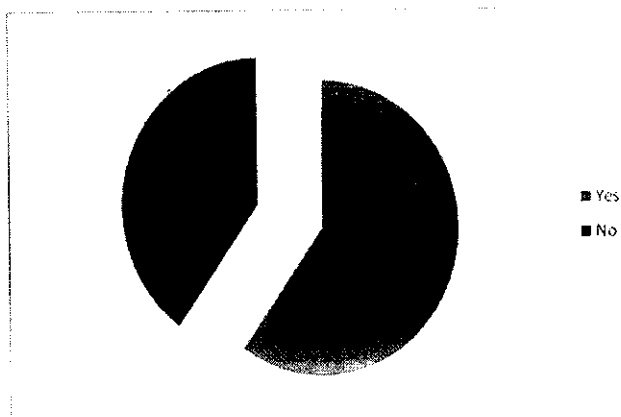| Options	No. of Respondents	Percentage
Yes	36	62.07
No	22	37.93
TOTAL	58	100

FIGURE 4.7: NO OF RESPONDENTS'ARE NOT USED CRDI CAR

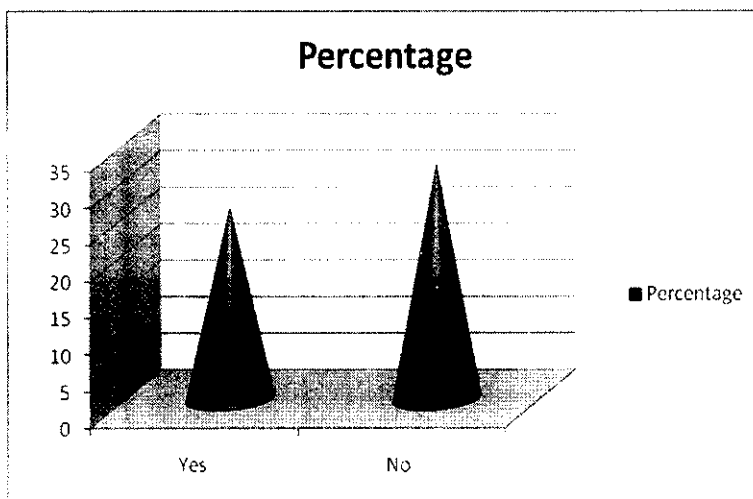**INFERENCE**:

4.8: NO OF RESPONDENTS'ARE NOT OWENED CRDI CAR

TABLE 4.8: NO OF RESPONDENTS'ARE NOT OWENED CRDI CAR

OPTIONS	RESPONSE	PERCENTAGE
Yes	26	44.82
No	32	55.18
TOTAL	58	100

FIGURE 4.8: NO OF RESPONDENTS'ARE NOT OWENED CRDI CAR

INFERENCE:

It is inferred that 55% of the people are not having CRDI car.

4.9: COMPATIVE ANALYSIS OF CRDI VS NON-CRDI VEHICLE:

TABLE 4.9: COMPATIVE ANALYSIS OF CRDI VS NON-CRDI VEHICLE:

Percentage of response compare CRDI Vs DI vehicle	Low fuel consumption	Increased power	Low noise	Low emissions
Yes	96.87	84.64	87.24	94.64
No/No response	3.13	15.36	12.76	5.36

FIGURE 4.9: COMPATIVE ANALYSIS OF CRDI VS NON-CRDI VEHICLE:

Percentage of response CRDI vs Non-CRDI vehicle

☒ Yes   ■ No/No response
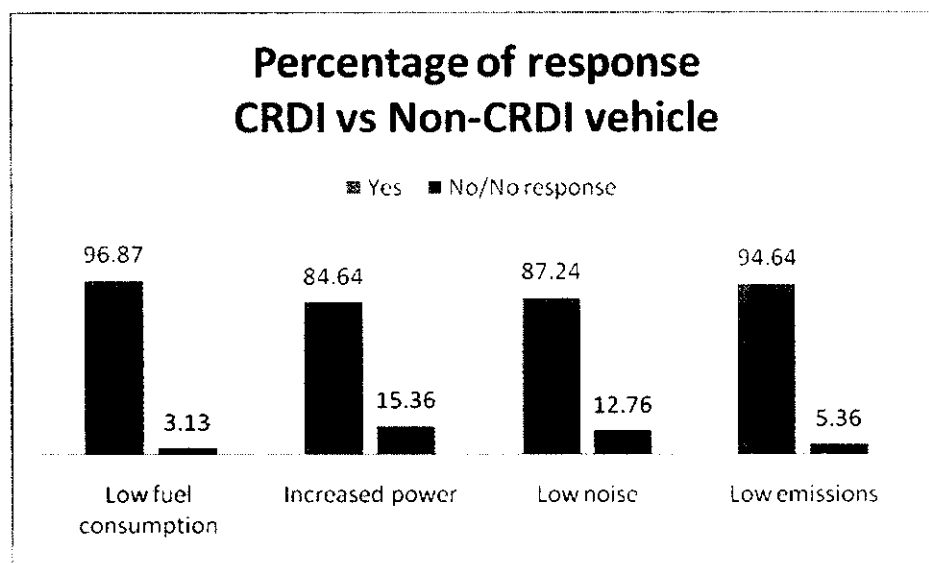
INFERENCE:

It is inferred that 96.87% of the people satisfied the fuel consumption and 84.64% of the people satisfied the low emission of the technology.

4.10: THE ORDER OF SATISFACTION LEVEL OF THE VEHICLE:

TABLE 4.10: THE ORDER OF SATISFACTION LEVEL OF THE VEHICLE:

Basic characteristics	Rank the performance	Percentage
Reducing the consumption of fuel	19	32.75
Increased power	10	17.24
Low noise	11	18.96
Low emissions	18	31.03
Total	58	100

FIGURE 4.10: THE ORDER OF SATISFACTION LEVEL OF THE VEHICLE:

Order the satisfying level of CRDI

Low emissions 31%

Reducing the consumption of fuel 33%

Low noise 19%

Increased power 17%
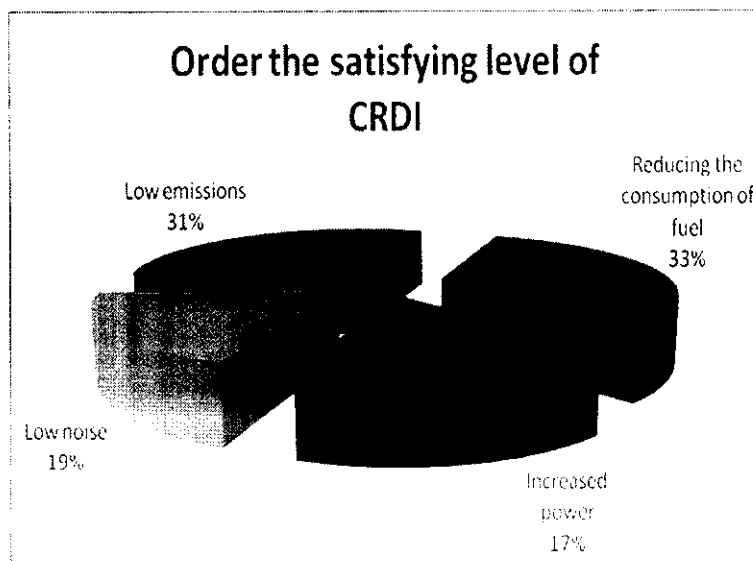
INFERENCE:

It is inferred that majority of the people satisfied the fuel consumption (33%)

4.11: THE RESPONDENTS' MAXIMUM EXPECTATION TO BUY A CAR

TABLE 4.11: THE RESPONDENTS' MAXIMUM EXPECTATION TO BUY A CAR

Options	No. of Respondents	Percentage
<2 years	40	43.48
2-5 years	34	36.96
>5 years	18	19.56
TOTAL	92	100

FIGURE 4.11: THE RESPONDENTS' MAXIMUM EXPECTATION TO BUY A CAR
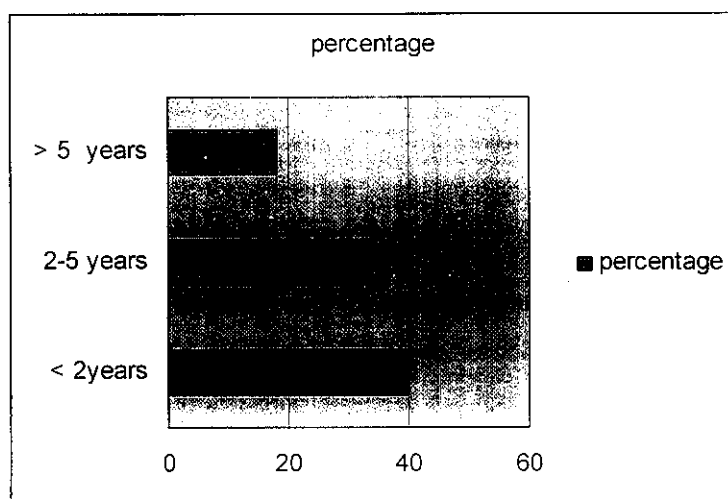
INFERENCE:

It is inferred that 44% of the respondents are interested to buy a car within a year.

4.12: THE RESPONDENTS' BUDGET FOR THE CAR

TABLE 4.12: THE RESPONDENTS' BUDGET FOR THE CAR:

Options	No. of Respondents	Percentage
<3 lakhs	24	26.09
3-6 lakhs	43	46.74
6-12 lakhs	21	22.83
>12 lakhs	4	04.35
TOTAL	92	100

FIGURE 4.12: THE RESPONDENTS' BUDGET FOR THE CAR:
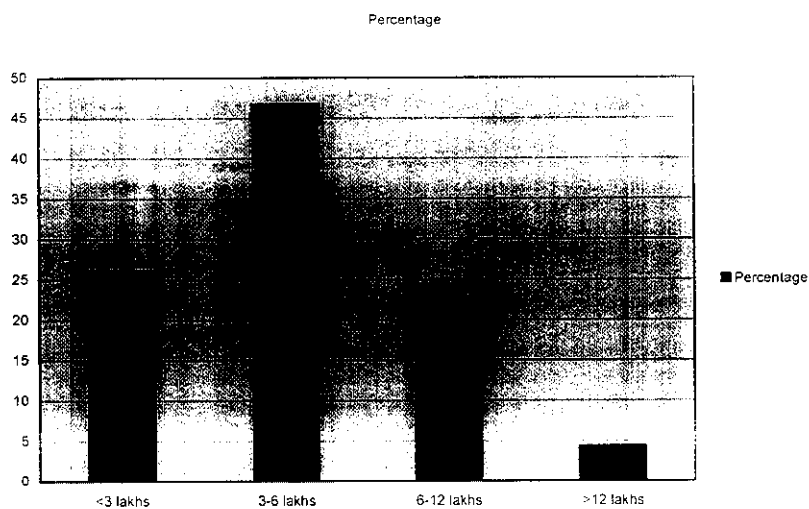
INFERENCE:

It is inferred that 46.74% of the respondents are having choice of buying the car in the range of 3-6 lakhs.

TABLE 4.13: THE RESPONDENTS' PREFERENCE OF OEM:

Options	No. of Respondents	Percentage
TATA	14	15.22
MARUTI	27	29.35
HYUNDAI	5	5.43
HONDA	8	8.70
FORD	12	13.04
FIAT	8	8.70
VW	7	7.61
TOYOTA	7	7.61
Any other	4	4.35
TOTAL	92	100

FIGURE 4.13: THE RESPONDENTS' PREFERENCE OF OEM:
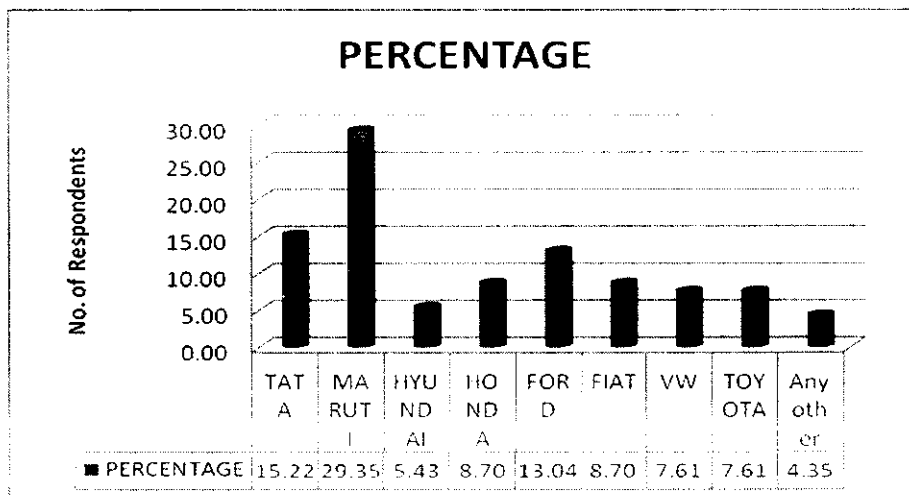
INFERENCE:

It is inferred that 30% of the respondents are like MARUTI, 15% of the respondents are like TATA, 13% of the respondents are like FORD. This is because of their excellence in small cars and better performance.

TABLE 4.14: THE RESPONDENTS'REASON BEHIND THAT PARTICULAR EOM:

Options	No. of Respondents	Percentage
Best Service facilities	4	4.35
Best Performance	40	43.48
Cost of the car	36	39.13
Maintenance	12	13.04
TOTAL	92	100

FIGURE 4.14: THE RESPONDENTS'REASON BEHIND THAT PARTICULAR EOM:

RESPONSE

▨ Best Service facilities ▪ Best Performance

Cost of the car ▪ Maintenance

4%
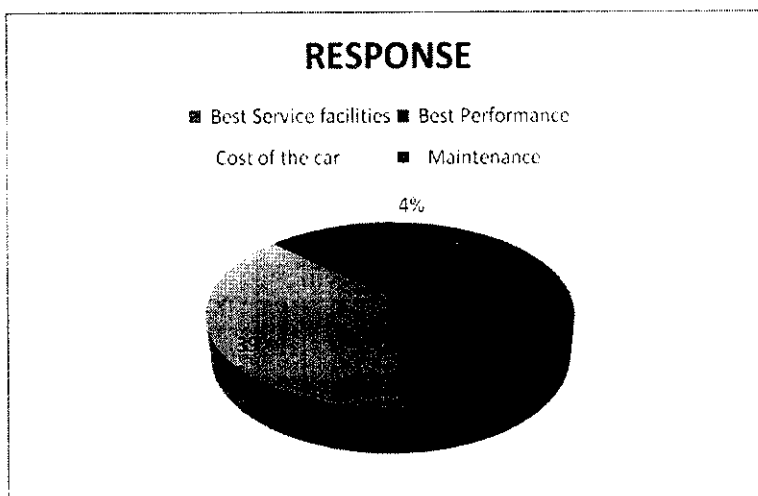
INFERENCE:

It is inferred that 43.48% of the respondents are like best Performance of the car.

TABLE 4.15: THE RESPONDENTS'INCOME PROFILE:

Options	No. of Respondents	Percentage
Less than 3.5 lakhs	11	11.96
3.5-5 lakhs	26	28.26
5-7 lakhs	38	41.30
7-10 lakhs	12	13.04
Above 10 lakhs	5	5.43
TOTAL	92	100

FIGURE 4.15: THE RESPONDENTS'INCOME PROFILE:

RESPONSE

■ Less than 3.5 lakhs ■ 3.5-5 lakhs ░ 5-7 lakhs

■ 7-10 lakhs ▨ Above 10 lakhs

41%
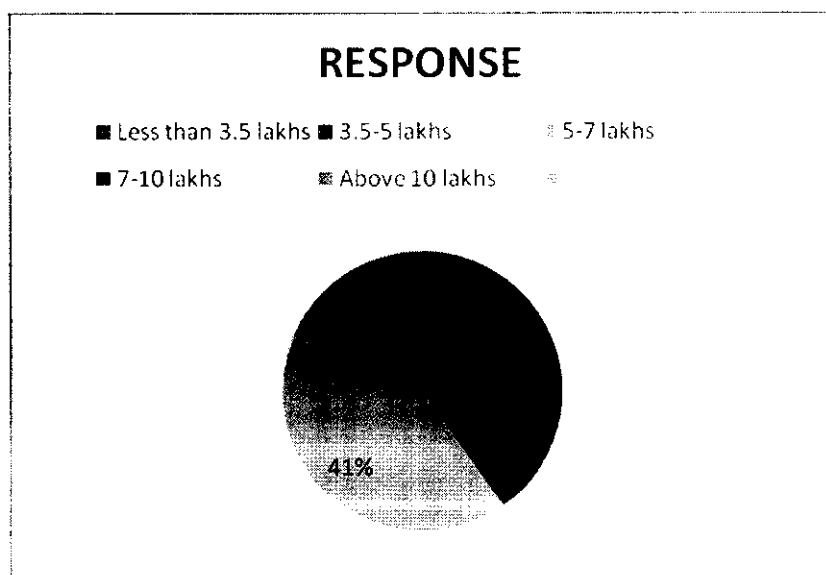
INFERENCE:

It is inferred that 41.30% of the respondents income profile is 5-7 lakhs.

TABLE 4.16: THE RESPONDENTS' PLAN TO CHANGE THE CAR:

OPTIONS	RESPONSE	PERCENTAGE
Yes	78	84.78
No	14	15.21
TOTAL	58	100

FIGURE 4.16: THE RESPONDENTS' PLAN TO CHANGE THE CAR:
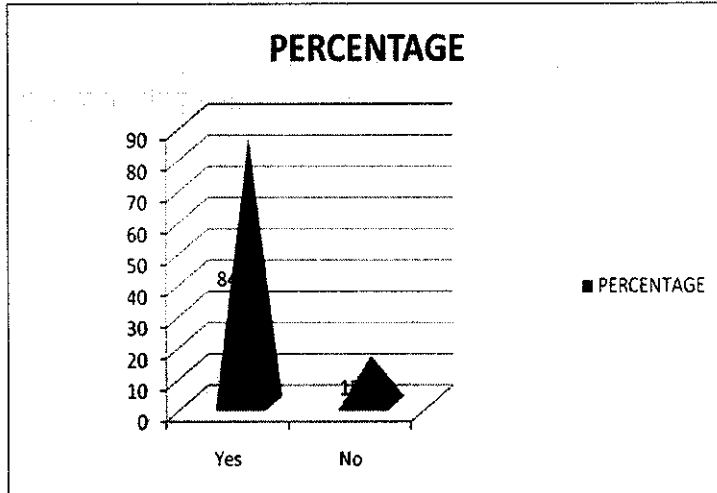
INFERENCE:

It is inferred that 84.78% of the respondents attracted towards the new technology. It shows the market potential of this new technology.

TABLE4.17: THE RESPONDENTS' INFORMATION SOURECE TO CHANGE/BUY A CAR:

Information source	No. of Respondents	Percentage
Car magazines	18	31.33
TV programmer	2	3.44
Friends, relatives, colleagues	4	6.89
News paper articles	2	3.44
Internet/world wide web	12	20.68
Dealer sales staff	4	6.89
Motor shows, exhibitions	16	27.58
Total	58	100

FIGURE 4.17: THE RESPONDENTS' INFORMATION SOURECE TO CHANGE/BUY A CAR:
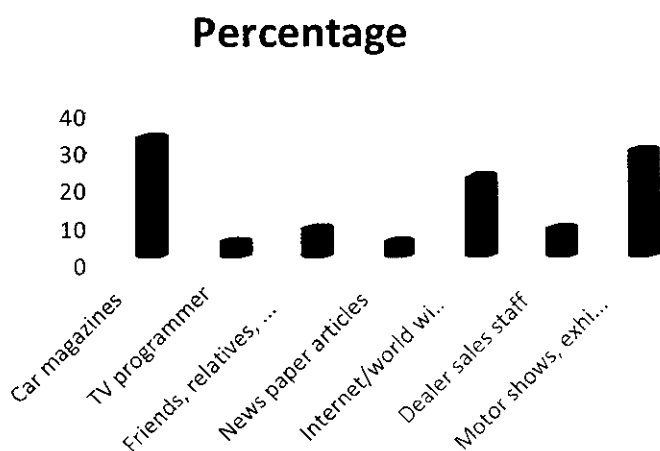
INFERENCE:

It is inferred that majority of the respondents information source's are like Car

CHAPTER – 5

5. CONCLUSIONS

5.1 FINDINGS OF THE STUDY:

- Among the respondents, male respondents (71%)are more than female respondents
- Respondents belong to age group 31-40 (37%) are more than other age group respondents
- Among the respondents majority of the responders (65%) are not aware of the CRDI technology.
- Among the respondents majority of the respondents (61%) are not having diesel engine cars.
- Among the respondents majority of the respondents (41%) feel that the Indian government regulation laws belongs to the category stringent
- Among the respondents majority of them respondents (62%) that the maintenance of the diesel cars are costly.
- Among the respondents majority of the respondents (62%) are not used the CRDI car.
- Among the respondents majority of the respondents (55%) have not having the CRDI car.
- Among the respondents majority of the respondents satisfaction level when compare to CRDI and DI technology belongs to the group fuel consumption (97%) and the low emission (95%).
- Among the respondents majority of the respondents (44%) are interested to buy a car within a year.
- Among the respondents majority of the respondents (47%) choice of buying the car in the range of 3-6 lakhs rupees.
- Among the respondents majority of the respondents are like MARUTI (30%).

TATA (15%), FORD (13%). This is because of their excellence in small cars and better performance.

- Majority of the respondents (44%) reason behind to choose a particular OEM is because of better performance.

- Among the respondents majority of the respondents (31%) belong to the income group level 5-7 lakhs rupees.

- Majority of the respondents (85%) are attracted towards the new technology. It shows the market potential of this new technology.

- Among the respondents majority of the respondents information source's are like Car magazines (31%), Internet/Web (20%) and the Motor shows exhibition (28%).

5.2 SUGGESTIONS:

- Government should come up with more advertisements regarding this CRDI technology to create more awareness among the people.

- Government should give subsidies to promote the people to buy the advanced technology equipped cars to improve the fuel efficiency.

- Consumers should have the knowledge on Indian vehicle emission regulations norms while they are purchasing the vehicle.

- Consumers should consider the vehicle performance and other major important factors while they are purchasing it since the initial investment cost is little more but in the long run the CRDI technology vehicles result in lesser maintenance cost and give better performance.

5.3 CONCLUSION:

The study reveals the fact that majority of the consumers are not aware of the common rail direct injection system. The present status shows that the advanced vehicle technologies are being used and developed to improve fuel economy of the road vehicles in Coimbatore. The CRDI vehicle consumers are very much satisfied with the technology and they are willing to suggest others to buy the same. The study reported that the demand for the CRDI technology is high in the market, at the same time the frequent fuel price hike in India also hindered the car consumer's focus towards the diesel engine technological vehicles. It is concluded that the demand for the common rail injection system technology and the potential interest to buy the technology-equipped vehicles are high in Indian market.

5.4 DIRECTIONS FOR FUTURE RESEARCH

Some of the points listed below are some directions for future research in this study.

1. This research is conducted in specific to the Coimbatore region. It could also be expanded to cover other geo graphical areas too.
2. The survey is limited to passenger cars. It can be extended to commercial vehicle to get a generalized conclusion across the diesel engine system.
3. Future study can focus and correlate the personal factor like Age, Income level, education of the respondents with their preference and expectations.
4. Also the adaptation of each OEM's with the customer expectation and technology change can be analyzed.

APPENDIX-1

QUESTIONNAIRE

A STUDY ON CUSTOMERS PERCEPTION AND MARKET POTENTIAL FOR COMMON RAIL INJECTION SYSTEM TECHNOLOGY

1. Name :

Kindly tick in the appropriate boxes.

2. Age
   - ☐ 20-30
   - ☐ 31-40
   - ☐ 41-50
   - ☐ 51 and above

3. Are you aware of the CRDI technology?
   - ☐ YES
   - ☐ NO

4. Do you own a car?
   - ☐ YES
   - ☐ NO

5. Which car do you have now?

_____

6. What do you think about the government laws of regulating the emission in India?

- ☐ Very stringent
- ☐ Stringent
- ☐ Normal
- ☐ Liberal

7. What do you think about the maintenance of the car in India?

- ☐ Very Costly
- ☐ Costly
- ☐ Medium cost
- ☐ Less cost
- ☐ Least cost

8. Have you used a car, which is not having the CRDI technology?

- ☐ YES
- ☐ NO

If No directly go to question no 16.

9. Does your car have the new automotive technology (CRDI)?

- ☐ YES
- ☐ NO

10. Is the fuel consumption of the new car better than the old car?

    | YES

    | NO

11. Is the exhaust emission of the new car lesser than the old car?

    |:   YES

    |:   NO

12. Does your new car make you to drive comfort?

    |:   YES

    |:   NO

13. Is the pulling power of the new car better than the old car?

    |.   YES

    |⌐   NO

14. Is the engine noise level of the new car lesser than the old car?

    | YES

    |:   NO

    |:

15. Order the satisfying level of characteristics of your vehicle?

Basic characteristics	Rank the performance
Reducing the consumption of fuel	
Increased power	
Low noise	
Low emissions	

16. Which of the following information source did you use to find out about the car
    you bought about other considered?

Information source	Tick if used
Car magazines	
TV programmer	
Friends, relatives, colleagues	
Manufactures/dealer brochures	
News paper articles	
Internet/world wide web	
Dealer sales staff	
Motor shows, exhibitions	
TV advertisement	

17. Will you suggest others to buy this CRDI technology car?

    ☐   YES

    ☐   NO

Thanks for your answers!

18. Do you have a plan for purchasing of new car? What is maximum year you will take to buy a new car from now?

  i.   Less than 2 years

  ii   2-5 years

  iii   Above 5 years

19. Do you have any plan to change your car and buy a CRDI tech car?

  □   YES

  □   NO

20. Does the new cars with extreme technology advancements, tempt you to change the car.

  :   YES

       NO

21. What is your maximum budget for a car?

  | Less than 3 lakhs

       3-6 lakhs

  | 6-12 lakhs

  :   Above 12 lakhs

22. Which car you will prefer & Order your performance of preference of new car?

- TATA
- Maruti
- Hyundai
- Honda
- FORD
- FIAT
- VW
- Mercedes
- BMW
- TOYOTA
- Any other

23. What is the reason behind that particular car and OEM?

- Best Service facilities
- Best Performance
- Cost of the car
- Maintenance

24. Income (Per annum)

- Less than 3.5 Lakhs
- 3.5 to 5
- 5-7
- 7-10
- Above 10 lakhs

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