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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES  
DEHRADUN

SUMMER INTERNSHIP REPORT  
ON

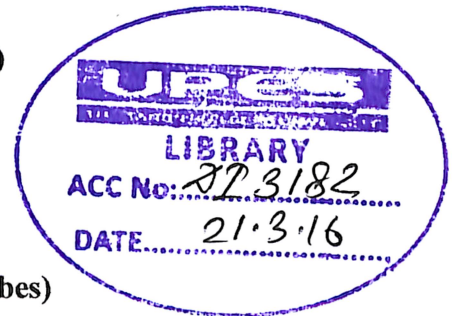
**Study of Business potential through Service Marketing at Retail Outlets**

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT  
OF THE DEGREE OF

MBA (Oil & Gas Management)

Mentor:

Mr Prashant K. Mullick  
State Regional Sales Manager (Lubes)



Submitted By:

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MBA (O&G)

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R020212049

August 2013



Study of Business potential through Service Marketing at Retail Outlets



## COVER LETTER

**Date:** 16<sup>th</sup> August, 2013

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**Address:** U.P.E.S Dehradun

**Company Name:** Indian Oil Corporation Limited

**Company Address:** : 2<sup>nd</sup> Floor, World Trade Centre, Connaught Place, Babar Road, Barakhamba Lane, New Delhi – 110001

Dear Sir,

Presently at the threshold of my career, with an expected MBA degree in Oil & Gas management, I have completed my summer internship at Indian Oil Corporation Limited, New Delhi.

As of now I stand with buoyancy of comprehensive knowledge in field of Market Survey and of Research Methodology (RM) of a reputed organisation like Indian Oil Corporation Limited. I extend my deepest gratitude to U.P.E.S, Dehradun & explicitly to my mentor, Mr. P.K. Mullick (SM – Lubes) for being the channel in putting my summer internship through.

With Regards,

Shivam Agarwal

MBA (Oil & Gas Management)

500021376



इंडियन ऑयल कॉर्पोरेशन लिमिटेड

विपणन प्रभाग : स्टेट ऑफिस (दिल्ली एवं हरियाणा)

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Indian Oil Corporation Limited

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Internet Site : <http://www.iocl.com>



IndianOil

A Maharatna  
Company

विपणन प्रभाग

Marketing Division

## TO WHOM IT MAY CONCERN

This is to certify that Mr Shivam Agarwal, student of MBA (Oil & Gas Management), University of Petroleum and Energy Studies, Dehradun has successfully completed his training in Indian Oil Corporation Limited from 28.05.2013 to 26.07.2013. The training emphasized mainly on learning "Study of business potential through service marketing at retail outlets". His overall conduct and performance during the training was found to be good.

We wish him all success in his career.

  
26/7/13

Devesh Kumar  
Mgr(RLS) Delhi  
Delhi State Office

दिवेश कुमार / DEVESH KUMAR  
मैनेजर (लूब्स असा.एस.) / Manager (Lubes R.S.)  
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### **ACKNOWLEDGEMENT**

It gives me immense pleasure in thanking Mr K.L. MURTHY, General Manager (LS) and Mr D. BHATTACHARJEE, Chief Manager (Lubes-RS), HO for giving us an opportunity to intern at Indian Oil Corporation Limited. I wish to express my deep sense of gratitude to my internal guides for their able guidance and useful suggestions, which helped me in completing the project work in time.

I would also like to thank our mentor Mr Prashant K. Mullick for without his guidance and support it would not have been possible to deliver such promising results in such a short period.

Mere words cannot describe my appreciation towards Mr Devesh Kumar who had the vision and concept of the work assigned to me during the duration of my training.

Needless to mention that Mr Khurana was always there to provide me with every facility that I needed during the course of my project for his timely guidance in the conduct of our project.

Finally, yet importantly, I would like to express heart full thanks to my beloved parents for their blessings, my friends and classmates for their help and wishes for the successful completion of this project.



## DECLARATION

I am submitting herewith my summer internship report entitled “Study of Business potential through Service Marketing at Retail Outlets” for the period 28/05/2013 to 26/07/2013 authorised by my external mentor for the purpose of assessment of summer internship programme.

This is hereby stated that this report is original in every sense of the term and it carries a sense of creditability and strength and that I have taken no shortcuts and remained both rigorous and scholarly.

I have tried my best to keep this work as watertight and clean as possible.

It may be further stated here that in the preparation of this report and projects undertaken some aid has been taken from a pool of professionally shared knowledge, a detailed description of which has been mentioned in the bibliography section of this report.

Shivam Agarwal  
MBA (Oil & Gas Management)  
500021376

Date: 26.07.2013



## EXECUTIVE SUMMARY

Almost 12% Compounded Annual Growth Rate (CAGR) for passenger vehicles in last 15 years demands huge expansion in the service network in our country. But due to high capital investment and lack of space in the cities make this expansion difficult for auto – OEMs. This creates a huge business potential for downstream companies like IOCL by providing service station at retail outlets. This research project aimed at studying such business potential which will lead to increased lubricants sales and extra revenue generated due to the vehicle care services provided at retail outlets.

Therefore to start the research, questionnaire survey was conducted with 100 passenger vehicle owners which included questions mainly related to their vehicles, vehicle care services, type of service station they prefer, their satisfaction level etc. Another survey was conducted at 7 workshops which had questions related to the type of equipment required at workshops, details of various services provided at workshops, various operating expenses etc. Apart from these surveys two years lubricants sales data was collected from 8 retail outlets with service station and 7 retail outlets without service station respectively.

Then various hypothesis tests like T-Test for difference between means, Z-Test, Analysis Of Variance (ANOVA), Bonferroni test etc were performed on the collected data which led to the following conclusions:

- Lubricants sales at retail outlets with service station is more than that at retail outlets without service stations.
- People's preference and satisfaction at various service stations like Authorized, Branded and Roadside workshops differ for vehicle care services like Routine Maintenance, Minor Repair, Major Repair and Accidental Repair.
- And it differ in the order Authorized > Branded > Roadside workshops for all 4 vehicle care services.
- People are likely to visit a petrol pump which provides multi brand car service facilities managed by renowned auto service providers (Like auto-OEMs, authorized OEM dealers) only for Routine Maintenance and Minor Repairs. And they are unlikely to visit the same for Major Repairs and Accidental Repairs.





## Study of Business potential through Service Marketing at Retail Outlets



Also financial analysis was done on the primary data collected through workshop survey form and secondary data collected through internet, journals etc which led to the following conclusions:

- It is financially viable to open an authorized service station at retail outlets that shall have facilities for Routine maintenance and Minor repairs only.
- Various equipment and tools required for such service stations are suggested.
- Initial fixed capital investment required is approximate ₹ 12,76,760
- This service station will be able to generate a revenue of approximate ₹ 2,28,090 from services per month. And an additional revenue of approximate ₹ 1,02,600 from lubricants sales per month.
- Operating expenses for such service stations will be around ₹ 1,50,000 per month.

Thus to conclude the research I can say that there is a huge business potential for downstream companies like IOCL if they provide vehicle care services at their retail outlets. This will not only increase the sales of lubricants through such service station but will also generate extra revenue from the services provided.





## CONTENTS

List of Tables	Page 8
List of Figures	Page 8
List of Variables	Page 8
1 Indian Oil Corporation Limited (Overview)	Page 9
1.1 About Company	Page 9
1.2 Vision	Page 9
1.3 Business	Page 9
1.4 Major Projects	Page 9
1.5 About Particular Site/Office	Page 10
1.6 Organizational Structure / Various Departments	Page 10
2 Introduction	Page 12
3 Literature Review	Page 14
4 Objectives and Hypothesis	Page 15
4.1 Objectives	Page 15
4.2 Hypotheses	Page 15
5 Research Methodology	Page 18
5.1 Design of sampling plan	Page 18
5.2 design of questionnaire	Page 18
5.3 execution of survey and data collection	Page 18
6 Data Analysis	Page 20
6.1 Hypothesis 1	Page 20
6.2 Hypothesis 2	Page 23
6.3 Hypothesis 3	Page 30
6.4 Structured interview report (workshop)	Page 34
6.4.1 critical analysis	Page 36
6.5 conclusions from hypothesis tests	Page 36



## Study of Business potential through Service Marketing at Retail Outlets



7 Conclusions	Page 37
7.1 Research Findings	Page 37
7.2 Contribution of the Study	Page 38
7.3 Limitations	Page 38
7.4 Scope for the Future Research	Page 38
8 References	Page 39
9 Appendices	Page 40
9.1 Workshop Questionnaire	Page 40
9.2 Customer Questionnaire Form	Page 42
9.3 Workshop Equipment Price List 2012-13 (Apex Technologies)	Page 45
9.4 Z – Test Data	Page 48
9.4.1 Routine Repairs	Page 48
9.4.2 Minor Repairs	Page 49
9.4.3 Major Repairs	Page 50
9.4.4 Accidental Repairs	Page 51
9.5 ANOVA Technique Data	Page 52
9.5.1 Routine Repairs	Page 52
9.5.2 Minor Repairs	Page 53
9.5.3 Major Repairs	Page 54
9.5.4 Accidental Repairs	Page 55
9.6 Z – Test Value Table	Page 56
9.7 Critical Values for student's t – Distribution	Page 57



## LIST OF TABLES

Number	Detail
6.1	Two years lubes sales data of RO with service station
6.2	Two years lubes sales data of RO without service station
6.3	ANOVA Table – Routine maintenance
6.4	ANOVA Table – Minor Repair
6.5	ANOVA Table –Major Repair
6.6	ANOVA Table –Accidental Repair
9.4.1	Z-Test data: Routine Maintenance
9.4.2	Z-Test data: Minor Repair
9.4.3	Z-Test data: Major Repair
9.4.4	Z-Test data: Accidental Repair
9.5.1	One way ANOVA technique data – Routine Maintenance
9.5.2	One way ANOVA technique data – Minor Repair
9.5.3	One way ANOVA technique data – Major Repair
9.5.4	One way ANOVA technique data – Accidental Repair
9.6	Z Table (Area of a standard normal distribution)
9.7	Critical value of student's t distribution

## LIST OF FIGURES

Number	Detail
Fig 1.1	Organization structure of IOCL
Fig 2.1	Domestic sales of Passenger Vehicles during last 15 years

## LIST OF VARIABLES

Abbreviation	Meaning
$H_0$	Null hypothesis
$H_a$	Alternative hypothesis
$\bar{X}$	Mean value
$\sigma_s$	Standard deviation of sample
N	No of samples
T	Test statistic t value
Z	Test statistic z value
F	Test statistic f value
M	Hypothesized mean
A	Level of significance





## 1. INDIAN OIL CORPORATION LIMITED (Overview)

### 1.1 About Company

Indian Oil Corporation Limited, or Indian Oil, is an Indian state-owned oil and gas company with its headquarters in New Delhi, India. It began its operations in 1959 as Indian Oil Company Ltd. The Indian Oil Corporation was formed in 1964, with the merger of Indian Refineries Ltd. Indian Oil is the biggest oil producer and marketer Oil's product range covers petrol, diesel, LPG, auto LPG, aviation turbine fuel, lubricants, naphtha, bitumen, paraffin, kerosene etc. Xtra Premium petrol, Xtra Mile diesel, Servo lubricants, Indane LPG cooking gas, Autogas LPG, IndianOil Aviation are some of its prominent brands.

Recently Indian Oil has also introduced a new business line of supplying LNG (liquefied natural gas) by cryogenic transportation. This is called "LNG at Doorstep". The company is the world's 83<sup>rd</sup> largest public corporation, according to the Fortune Global 500 list, and the largest public corporation in India when ranked by revenue. Indian oil and its subsidiaries account for a 49% share in the petroleum products market, 31% share in refining capacity and 67% downstream sector pipelines capacity in India. The Indian oil group of companies owns and operates 10 of India's 22 refineries with a combined refining capacity of 65.7 million metric tons per year.

### 1.2 Vision of IOCL

Vision of IOCI is to be "The Energy of India" and A Globally Admired Company through Ethics, People, Innovation, Environment, Technology and Customers.

### 1.3 Business

The business of IOCL encompasses seven areas of work i.e. Refining, Pipelines, Marketing, R&D, Petrochemicals, Natural Gas and E&P.

### 1.4 Major Projects

Some undergoing projects which are expected to be completed soon are as follows:

- Augmentation of Paradip-Haldia-Barauni Crude oil pipeline
- Paradip-Haldia-Durgapur LPG Pipeline
- De Bottlenecking of Salaya-Mathura crude pipeline
- Paradip – Raipur – Ranchi pipeline
- Refinery Project at Paradip (Orissa)



## Study of Business potential through Service Marketing at Retail Outlets

- FCC unit revamping in Mathura
- Butadiene Extraction unit at Panipat
- Construction of tanks and blending facility at Vadinar (5 X 85,000 KL)
- Integrated crude oil handling facility at Paradip

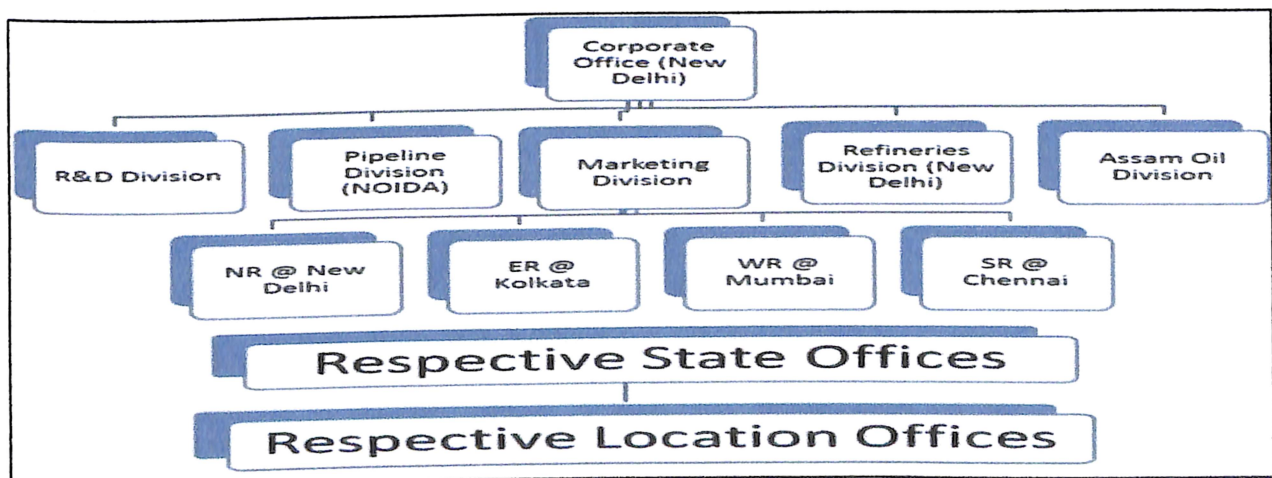
### 1.5 About Particular Site / Office

IOCL (Marketing Division) has its Head Office at Bandra, Mumbai and four Regional Offices in the Metro cities viz. Delhi, Kolkata, Mumbai and Chennai, 16 State Offices, 42 Divisional Offices and 33 LPG area offices.

I had to report to Delhi State Office situated at: 2<sup>nd</sup> Floor, World Trade Centre, Connaught Place, Babar Road, Barakhamba Lane, New Delhi – 110001.

### 1.6 Organizational Structure / Various Departments

The whole of Indian Oil Corporation (IOC) works under Corporate Office located at New Delhi. It follows hierarchical structure where the decision flows from top to bottom and the data flows from bottom to top. Under the corporate office there are 5 divisions namely- Pipelines, Refineries, R&D, Marketing & Assam oil division. The Marketing division located at Mumbai co-ordinates with the regional offices i.e. North, South, East & West Region office, the other Divisional Offices & SBI for decisions regarding investments. The Regional offices co-ordinates with respective state office that in turn co-ordinates with respective location offices.



**Fig 1.1 Organizational Structure of IOCL**





## Study of Business potential through Service Marketing at Retail Outlets



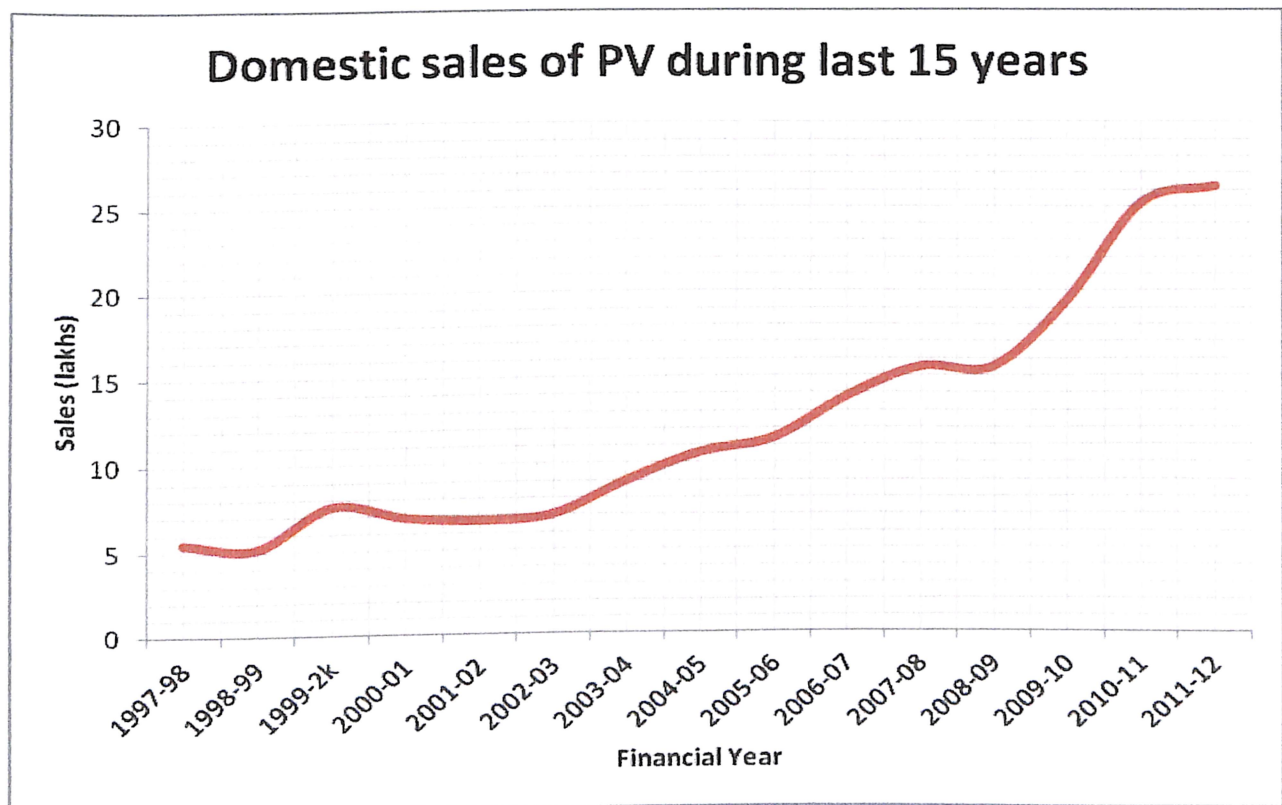
The Delhi State Office (DSO) has three different departments for Indane Customers, for Retail Product Consumers (Retail Sales) and for Industrial / Institutional Bulk Consumers. All the concerned departments are headed by General Manager In – Charge (GM I/C) – DSO followed by General Manager (GM) LPG, General Manager (GM) Retail Sales (RS) and DGM Consumer Sales (CS).

Indane, Retail Sales and Bulk Consumer departments are further managed by Delhi Area Office under Chief Area Manager (LPG), Delhi Divisional Office (DDO) under Chief Divisional Retail Sales Manager (CDRSM) and Delhi Divisional Office (DDO) under Chief Divisional Consumer Sales Manager (CDCSM) respectively.



## 2. INTRODUCTION

The auto industry has been growing steadily in India. Though there has been little dip in the growth momentum during 2012-13, the Compounded Annual Growth Rate (CAGR) for passenger vehicles segment during last 15 years is almost 12%. While such huge growth in Passenger vehicles demands huge expansion of service network, due to very high capital requirement and scarcity of suitable space especially in cities make the expansion difficult for auto-OEMs. Most of the expansions take place in the outskirts of the cities where the real estate cost is lower. This makes the place inconvenient to the vehicle owners. As a result, either the workshops within the city limits are overcrowded or the city workshop is made the primary contact point and some vehicles are dispatched to workshops outside the city limit.



**Fig 2.1 Domestic sales of Passenger Vehicles during last 15 years**

The downstream oil companies play a very crucial role in capturing this gap in business opportunity by providing service stations at petrol pumps where at least routine maintenance and minor repairs can be undertaken. These outlets can be also the primary contact points for



## Study of Business potential through Service Marketing at Retail Outlets



the customers who will always find the petrol pumps the most suitable and convenient place. For higher requirement of services like major repairs, accident repairs etc., the vehicles can be taken to the bigger format workshops. Since the petrol pump dealers may not have the required expertise in this business, collaboration can be made with OEMs or OEM dealers for providing these services with mutually agreed terms and conditions.

This study is to analyse the difference in sales of the Lubricants at Retail Outlets with and without service stations respectively. This study is also to get the customer feedback on their preference of availing services from a petrol pump if it is provided by professional groups. The study will also address the potential of such business at petrol pumps and financial viability of the business.



### 3. LITERATURE REVIEW

Study of business potential through service marketing at retail outlets is a topic of great importance for the downstream companies in India. It includes the study of all possible businesses and benefits that could be extracted by the downstream companies if they provide services at their retail outlets.

From all the articles that we studied for this research we understood the following scenarios:

- The inability of Government to add to public transport adequately will make people buy more and more passenger vehicles each year. The increasing number of vehicles on road will add to burden of services required by them.
- There has been constant increase in domestic sales of passenger cars in nation throughout past decade. The increase in vehicles on roads requires constant care and services.
- The CAGR for passenger vehicles segment during last 15 years is almost 12% which demands huge expansion of service network.
- Very high capital requirement and scarcity of suitable space especially in cities make the expansion of service network difficult for auto-OEMs.
- I got know all the basic equipments and their prices which are required to start a workshop.

Thus to conclude literature survey I can say that there has been a tremendous growth in the sales of passenger vehicles during last 15 years due to various factors like poor public transport facilities etc. This calls for huge expansion of service network in the cities. The difficulty in the expansion of service network due to high capital cost and scarcity of space in the cities opens a huge business potential for the downstream companies. Through service marketing downstream companies can make a significant difference in the sales of lubes at retail outlets. It will also lead to increased revenue generated due to the services provided at retail outlets.





## 4. OBJECTIVES AND HYPOTHESIS

### 4.1 Objectives:

- To analyse the difference in sales of the lubricants at retail outlets with and without service station respectively.
- To get the customer feedback on their preference of availing services from a petrol pump if it is provided by professional groups.
- To address the potential of such business at petrol pumps and financial viability of the business.

### 4.2 Hypothesis

The main objective of this project is to analyse the feasibility of opening a service station at a retail outlet. And to do that I have assumed and tested the following hypothesis:

1. “Lubricants sales at retail outlets with service station is more than the retail outlets without service station”

Null hypothesis ( $H_0$ ) : Lubes sales at retail outlets with service station is less than the retail outlets without service station.

$$H_0 : \mu_{ros} < \mu_{ro}$$

Alternative hypothesis ( $H_a$ ) : Lubes sales at retail outlets with service station is more than the retail outlets without service station.

$$H_a : \mu_{ros} \geq \mu_{ro}$$

**Note:** To prove the above hypothesis, **T-Test** was performed on the lubes sales data collected from various retail outlets with and without service stations respectively.

2. “People’s satisfaction and preference for various services like Routine maintenance, Minor repair, Major repair and Accidental repair vary at Authorized, Branded and Unorganized workshops”

This hypothesis was further divided into four parts for Routine maintenance, Minor repair, Major repair and Accidental repair separately as follows:





## Study of Business potential through Service Marketing at Retail Outlets

- a. Null hypothesis ( $H_0$ ) : People's satisfaction and preference for **Routine Maintenance** does not vary at Authorized, Branded and Unorganized workshops.

$$H_0 : \mu_{aut} = \mu_{br} = \mu_{un}$$

Alternative hypothesis ( $H_a$ ) : People's satisfaction and preference for **Routine Maintenance** vary at Authorized, Branded and Unorganized workshops.

$$H_a : \mu_{aut} \neq \mu_{br} \neq \mu_{un}$$

- b. Null hypothesis ( $H_0$ ) : People's satisfaction and preference for **Minor Repair** does not vary at Authorized, Branded and Unorganized workshops.

$$H_0 : \mu_{aut} = \mu_{br} = \mu_{un}$$

Alternative hypothesis ( $H_a$ ) : People's satisfaction and preference for **Minor Repair** vary at Authorized, Branded and Unorganized workshops.

$$H_a : \mu_{aut} \neq \mu_{br} \neq \mu_{un}$$

- c. Null hypothesis ( $H_0$ ) : People's satisfaction and preference for **Major Repair** does not vary at Authorized, Branded and Unorganized workshops.

$$H_0 : \mu_{aut} = \mu_{br} = \mu_{un}$$

Alternative hypothesis ( $H_a$ ) : People's satisfaction and preference for **Major Repair** vary at Authorized, Branded and Unorganized workshops.

$$H_a : \mu_{aut} \neq \mu_{br} \neq \mu_{un}$$

- d. Null hypothesis ( $H_0$ ) : People's satisfaction and preference for **Accidental Repair** does not vary at Authorized, Branded and Unorganized workshops.

$$H_0 : \mu_{aut} = \mu_{br} = \mu_{un}$$

Alternative hypothesis ( $H_a$ ) : People's satisfaction and preference for **Accidental Repair** vary at Authorized, Branded and Unorganized workshops.

$$H_a : \mu_{aut} \neq \mu_{br} \neq \mu_{un}$$

**Note:** To prove the above hypothesis, **Analysis Of Variance (ANOVA)** was performed on the data collected through question no. 11 of the questionnaire. Then to verify the rank of preference among Authorized, Branded and Unorganized workshops, **Bonferroni Test** was performed on the results of ANOVA.



3. “Passenger vehicle owners are likely to avail vehicle care services from a multi-brand car service facilities managed by renowned auto service providers at retail outlets”

This hypothesis was further divided into four parts for different vehicle care services at a petrol pump as Routine Maintenance, Minor Repair, Major Repair and Accidental Repair.

a. Null hypothesis ( $H_0$ ) : People are un-likely to visit a multi-brand car service facilities at retail outlets for Routine Maintenance.

$$H_0 : \mu_{H_0} < 3.5$$

Alternative hypothesis ( $H_a$ ) : People are likely to visit a multi-brand car service facilities at retail outlets for Routine Maintenance.

$$H_a : \mu_{H_0} \geq 3.5$$

b. Null hypothesis ( $H_0$ ) : People are un-likely to visit a multi-brand car service facilities at retail outlets for Minor Repairs.

$$H_0 : \mu_{H_0} < 3.5$$

Alternative hypothesis ( $H_a$ ) : People are likely to visit a multi-brand car service facilities at retail outlets for Minor Repairs.

$$H_a : \mu_{H_0} \geq 3.5$$

c. Null hypothesis ( $H_0$ ) : People are un-likely to visit a multi-brand car service facilities at retail outlets for Major Repairs.

$$H_0 : \mu_{H_0} < 3.5$$

Alternative hypothesis ( $H_a$ ) : People are likely to visit a multi-brand car service facilities at retail outlets for Major Repairs.

$$H_a : \mu_{H_0} \geq 3.5$$

d. Null hypothesis ( $H_0$ ) : People are un-likely to visit a multi-brand car service facilities at retail outlets for Accidental Repairs.

$$H_0 : \mu_{H_0} < 3.5$$

Alternative hypothesis ( $H_a$ ) : People are likely to visit a multi-brand car service facilities at retail outlets for Accidental Repairs.

$$H_a : \mu_{H_0} \geq 3.5$$

**Note :** To prove the above four hypothesis **Z-Test** was performed on the data collected through question no. 17 of the questionnaire.



## 5. RESEARCH METHEDODOLOGY

### 5.1 Design of sampling plan

- Type of universe under study for this research is finite. I planned to take samples from the whole population of this city (New Delhi).
- Sampling unit for the research is chosen to be the passenger vehicle owners of this city.
- Sampling frame for this research includes passenger vehicle owners visiting the retail outlets for refueling, various commercial vehicle organizations and passenger vehicle owners availing vehicle care services at various workshops across the city.
- The size of sample for the customer questionnaire decided is hundred. Whereas the sample size for retail outlets from where the lubricants sales data has to be recorded is chosen to be five for retail outlets with service station and five for retail outlets without service station.
- Stratified random sampling is chosen for this research. I divided finite universe into four geographical areas as North, South, East and West. And then random samples are to be chosen from the defined strata (geographical area).

### 5.2 Design of questionnaire

- Questionnaire for passenger vehicle owners contains 17 questions. They are mostly related to vehicle services, people's satisfaction at various workshops, and people's tendency to visit workshops at retail outlets. It also contains questions regarding age, price and ownership of the vehicles
- Questionnaire for the workshop owner contains questions related to the workshop, equipments available and services provided to the customers at workshop. It also contains questions regarding the service charges, various operating expenditures and approximate revenue generated, number of cars they service each day and quantity of lubes they sell each month at the workshop.

### 5.3 Execution of survey and data collection

- Survey were conducted at various retail outlets and workshops which covered all our defined strata i.e. north, south, east and western part of the city.
- Primary data
  1. It was collected through questionnaires.
  2. Personal interview with workshop owners.
  3. Personal interview with retail outlet owners.



## Study of Business potential through Service Marketing at Retail Outlets



- Secondary data (Collected through internet and journals)
  1. The population and growth trend of passenger vehicles in the country.
  2. Current price list of various equipments used at the service stations
  3. Information related to various taxation policies on petroleum products and service industry.
- All the collected data was tabulated in MS Excel for its analysis and was also coded for the researcher's convenience.





## 6 DATA ANALYSIS

**6.1 Null hypothesis ( $H_0$ ) :** Lubes sales at retail outlets with service station is less than the retail outlets without service station.

$$H_0 : \mu_{ros} < \mu_{ro}$$

**Alternative hypothesis ( $H_a$ ) :** Lubes sales at retail outlets with service station is more than the retail outlets without service station.

$$H_a : \mu_{ros} \geq \mu_{ro}$$

### Data Collected:

RO with service station		
RO Name	Lubes sold (Litres)	
	2011-12	2012-13
Image	14821	10085
Sabharwal	6305	5111
Gupta	18022	15618
Raj super	13950	9420
S Vidya	19595	14400
Hundered	13046	13101
Jai Garud	20670.5	18968
Capital	4105	3853
Total	110514.5	90556
<b>Mean</b>	<b>13814.3125</b>	<b>11319.5</b>
<b>Variance</b>	<b>35772992.5</b>	<b>27009437</b>

RO without service station		
RO Name	Lubes sold (Litres)	
	2011-12	2012-13
Millenium	6592	4570.35
Sahid OM	5399	3723
Sethi	5707.5	4461
CITI Fuels	6918.5	4074
CM Enterprises	13547	11747
Total	38164	28575.35
<b>Mean</b>	<b>7632.8</b>	<b>5715.07</b>
<b>Variance</b>	<b>11316973.33</b>	<b>11482177.15</b>

Table 6.1

Table 6.1





**Hypothesis test:**

Above hypothesis was tested using T-Test for difference between means.

**(a) 2011-12**

RO	Mean Sales ( $\bar{X}$ )	Variance ( $\sigma_s$ ) <sup>2</sup>	Size of sample (n)
With Service station (1)	13814.3125	35772992	8
Without service station (2)	7632.8	11316973	5

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1 - 1)\sigma_{s1}^2 + (n_2 - 1)\sigma_{s2}^2}{n_1 + n_2 - 2}}} \times \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

With d.f. =  $n_1 + n_2 - 2 = 8 + 5 - 2 = 11$

$t = 2.0914$

As  $H_a$  is one-sided, we shall apply a one tailed test for determining the rejection region at 5 percent level which come to as under, using table of t-distribution for 11 degrees of freedom.

R :  $|t| > 1.796$

*The observed value of t is 2.0914 which falls in the rejection region therefore we reject the null hypothesis and conclude that Lubes sales at retail outlets with service station is more than retail outlets without service station.*

**(b) 2012-13**

RO	Mean Sales ( $\bar{X}$ )	Variance ( $\sigma_s$ ) <sup>2</sup>	Size of sample (n)
With Service station (1)	11319.5	27009437	8
Without service station (2)	5715.07	11482177	5



## Study of Business potential through Service Marketing at Retail Outlets



$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1 - 1)\sigma_{s1}^2 + (n_2 - 1)\sigma_{s2}^2}{n_1 + n_2 - 2}} \times \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

With d.f. =  $n_1 + n_2 - 2 = 8 + 5 - 2 = 11$

$t = 2.1269$

As  $H_a$  is one-sided, we shall apply a one tailed test for determining the rejection region at 5 percent level which comes to as under, using table of t-distribution for 11 degrees of freedom.

$R : |t| > 1.796$

*The observed value of t is 2.1269 which fall in the rejection region therefore we reject the null hypothesis and conclude that Lubes sales at retail outlets with service station are more than retail outlets without service station.*



**6.2 “People’s satisfaction and preference for various services like Routine maintenance, Minor repair, Major repair and Accidental repair vary at Authorized, Branded and Unorganized workshops”**

This hypothesis was further divided into four parts for Routine maintenance, Minor repair, Major repair and Accidental repair separately as follows:

**Data collected:** It is attached at the end in the appendix.

**Hypothesis test:**

[A] The above hypothesis is tested by using One-way ANOVA technique and the methodology used is stated below.

**Methodology:**

- (i) Obtain the mean of each sample i.e, obtain

$$\bar{X}_1, \bar{X}_2 \text{ and } \bar{X}_3$$

- (ii) Work out the mean of the sample means as follows:

$$\bar{\bar{X}} = \frac{\bar{X}_1 + \bar{X}_2 + \bar{X}_3}{3}$$

- (iii) Take the deviations of the sample mean from the mean of the sample means and calculate the square of such deviations which may be multiplied by the number of items in the corresponding sample, and then obtain their total. This is known as sum of squares for variance between the samples (or SS between). Symbolically this can be written:

$$SS \text{ between} = n_1(\bar{X}_1 - \bar{\bar{X}})^2 + n_2(\bar{X}_2 - \bar{\bar{X}})^2 + n_3(\bar{X}_3 - \bar{\bar{X}})^2$$

- (iv) Divide the result of the above step by the degrees of freedom between the samples to obtain variance or mean square (MS) between samples. Symbolically this can be written as:

$$MS \text{ between} = \frac{SS \text{ between}}{K - 1}$$

where (K-1) represents degrees of freedom (d.f.) between samples.

- (v) Obtain the deviations of the values of the sample items for all the samples from corresponding means of the samples and calculate the squares of such deviations and then obtain their total. This total is known as the sum of squares for variance within samples (or SS within). Symbolically this can be written as:



## Study of Business potential through Service Marketing at Retail Outlets

$$SS \text{ within} = \sum_{i=1}^k (X_{1i} - \bar{X}_1)^2$$

$i = 1, 2, 3$

- (vi) Divide the result of above step by the degrees of freedom within samples to obtain the variance or mean square (MS) within samples. Symbolically, this can be written as:

$$MS \text{ within} = \frac{SS \text{ within}}{(n - K)}$$

Where (n-k) represents degrees of freedom within samples,

n = total number of items in all the samples i.e.,  $n_1 + n_2 + n_3$

k = number of samples

- (vii) Finally F ratio can be worked out as under:

$$F - \text{Ratio} = \frac{MS \text{ between}}{MS \text{ within}}$$

This ratio is used to judge whether the difference among several sample means is significant or not.

[B] The results from ANOVA were then analysed using Bonferroni Test to determine the rank of preference among Authorized, Branded and Unorganized workshops.

### Methodology:

- (i) This is applied to all pairs.

- (ii) Find the following interval

$$\bar{X}_i - \bar{X}_j \pm t_{\frac{\alpha}{2c}} \sqrt{MSE \left( \frac{1}{n_i} + \frac{1}{n_j} \right)}$$

Where,

- $\bar{X}_i$  and  $\bar{X}_j$  are mean of the two pairs.
- $t_{\frac{\alpha}{2c}}$  is the t value and level of significance divided by two times the total number of pairs.
- MSE is Mean Square (MS) within samples.
- $n_i$  and  $n_j$  are the number of items in the two samples.

- (iii) Reject  $H_0$  or conclude that  $\bar{X}_i > \bar{X}_j$  if the above interval doesn't contain zero.



### 6.2.1 Routine maintenance

Null hypothesis ( $H_0$ ) : People's satisfaction and preference for Routine Maintenance doesn't vary at Authorized, Branded and Unorganized workshops.

$$H_0 : \mu_{aut} = \mu_{br} = \mu_{un}$$

Alternative hypothesis ( $H_a$ ) : People's satisfaction and preference for Routine Maintenance vary at Authorized, Branded and Unorganized workshops.

$$H_a : \mu_{aut} \neq \mu_{br} \neq \mu_{un}$$

#### ANOVA Table:

SUMMARY				
Groups	Count	Sum	Average	Variance
Authorized	100	385	3.85	1.623737
Branded	100	247	2.47	3.605152
Roadside	100	134	1.34	3.034747

ANOVA					
Source of Variation	SS	Df	MS	F	F crit
Between Groups	316.0467	2	158.0233	57.36821	3.026153
Within Groups	818.1	297	2.754545		
Total	1134.147	299			

Table 6.3

The above table shows that the calculated value of F is 57.36 which is more than the critical value of 3.02 at 5% level with d.f. being  $v_1 = 2$  and  $v_2 = 297$ . Which rejects the null hypothesis and thus we can conclude that "People's satisfaction and preference for Routine Maintenance vary at Authorized, Branded and Unorganized workshops".

i.e.  $\mu_{aut} \neq \mu_{br} \neq \mu_{un}$

#### Bonferroni Test:

Pairs	Interval	Conclusion
Authorized & Branded	$0.7806 < x_i - x_j < 1.9794$	$X_{aut} > X_{br}$
Authorized & Unorganized	$1.9106 < x_i - x_j < 3.1094$	$X_{aut} > X_{un}$
Branded & Unorganized	$0.5306 < x_i - x_j < 1.7294$	$X_{br} > X_{un}$



## Study of Business potential through Service Marketing at Retail Outlets

$$\text{OR, } X_{\text{aut}} > X_{\text{br}} > X_{\text{un}}$$

Thus we can conclude that people's satisfaction and preference for Routine maintenance vary and decrease in the order of Authorized, Branded and Unorganized.

### 6.2.2 Minor repair

Null hypothesis ( $H_0$ ) : People's satisfaction and preference for Minor repair doesn't vary at Authorized, Branded and Unorganized workshops.

$$H_0 : \mu_{\text{aut}} = \mu_{\text{br}} = \mu_{\text{un}}$$

Alternative hypothesis ( $H_a$ ) : People's satisfaction and preference for Minor repair vary at Authorized, Branded and Unorganized workshops.

$$H_a : \mu_{\text{aut}} \neq \mu_{\text{br}} \neq \mu_{\text{un}}$$

#### ANOVA Table:

SUMMARY				
Groups	Count	Sum	Average	Variance
Authorized	100	325	3.25	2.734848
Branded	100	228	2.28	3.254141
Roadside	100	139	1.39	2.886768

ANOVA					
Source of Variation	SS	df	MS	F	F crit
Between Groups	173.0867	2	86.54333	29.25159	3.026153
Within Groups	878.7	297	2.958586		
Total	1051.787	299			

**Table 6.4**

The above table shows that the calculated value of F is 29.2515 which is more than the critical value of 3.02 at 5% level with d.f. being  $v_1 = 2$  and  $v_2 = 297$ . Which rejects the null hypothesis and thus we can conclude that "People's satisfaction and preference for Minor Repair vary at Authorized, Branded and Unorganized workshops".

$$\text{i.e. } \mu_{\text{aut}} \neq \mu_{\text{br}} \neq \mu_{\text{un}}$$

## Study of Business potential through Service Marketing at Retail Outlets

### Bonferroni test

Pairs	Interval	Conclusion
Authorized & Branded	$0.3488 < x_i - x_j < 1.5912$	$X_{aut} > X_{br}$
Authorized & Unorganized	$1.2388 < x_i - x_j < 2.4812$	$X_{aut} > X_{un}$
Branded & Unorganized	$0.2688 < x_i - x_j < 1.5112$	$X_{br} > X_{un}$

**OR,**     $X_{aut} > X_{br} > X_{un}$

Thus we can conclude that people's satisfaction and preference for Minor repair vary and decrease in the order of Authorized, Branded and Unorganized.

### 6.2.3 Major repair

Null hypothesis ( $H_0$ ) : People's satisfaction and preference for Major repair doesn't vary at Authorized, Branded and Unorganized workshops.

$$H_0 : \mu_{aut} = \mu_{br} = \mu_{un}$$

Alternative hypothesis ( $H_a$ ) : People's satisfaction and preference for Major repair vary at Authorized, Branded and Unorganized workshops.

$$H_a : \mu_{aut} \neq \mu_{br} \neq \mu_{un}$$

### ANOVA Table:

SUMMARY				
Groups	Count	Sum	Average	Variance
Authorized	100	264	2.64	3.828687
Branded	100	161	1.61	3.230202
Roadside	100	69	0.69	1.549394

ANOVA					
Source of Variation	SS	df	MS	F	F crit
Between Groups	190.3267	2	95.16333	33.16457	3.026153
Within Groups	852.22	297	2.869428		
Total	1042.547	299			

**Table 6.5**





## Study of Business potential through Service Marketing at Retail Outlets

The above table shows that the calculated value of F is 33.1645 which is more than the critical value of 3.02 at 5% level with d.f. being  $v_1 = 2$  and  $v_2 = 297$ . Which rejects the null hypothesis and thus we can conclude that "People's satisfaction and preference for Major Repair vary at Authorized, Branded and Unorganized workshops".

$$\text{i.e. } \mu_{\text{aut}} \neq \mu_{\text{br}} \neq \mu_{\text{un}}$$

### Bonferroni test

Pairs	Interval	Conclusion
Authorized & Branded	$0.4182 < x_i - x_j < 1.6418$	$X_{\text{aut}} > X_{\text{br}}$
Authorized & Unorganized	$1.3382 < x_i - x_j < 2.5618$	$X_{\text{aut}} > X_{\text{un}}$
Branded & Unorganized	$0.3082 < x_i - x_j < 1.5318$	$X_{\text{br}} > X_{\text{un}}$

$$\text{OR, } X_{\text{aut}} > X_{\text{br}} > X_{\text{un}}$$

Thus we can conclude that people's satisfaction and preference for Major repair vary and decrease in the order of Authorized, Branded and Unorganized.

### 6.2.4 Accidental repair

Null hypothesis ( $H_0$ ) : People's satisfaction and preference for Accidental repair doesn't vary at Authorized, Branded and Unorganized workshops.

$$H_0 : \mu_{\text{aut}} = \mu_{\text{br}} = \mu_{\text{un}}$$

Alternative hypothesis ( $H_a$ ) : People's satisfaction and preference for Accidental repair vary at Authorized, Branded and Unorganized workshops.

$$H_a : \mu_{\text{aut}} \neq \mu_{\text{br}} \neq \mu_{\text{un}}$$

### ANOVA Table:

SUMMARY				
Groups	Count	Sum	Average	Variance
Authorized	100	182	1.82	4.351111
Branded	100	117	1.17	2.930404
Roadside	100	44	0.44	0.976162





ANOVA					
Source of Variation	SS	Df	MS	F	F crit
Between Groups	95.32667	2	47.66333	17.31601	3.026153
Within Groups	817.51	297	2.752559		
Total	912.8367	299			

**Table 6.6**

The above table shows that the calculated value of F is 17.3160 which is more than the critical value of 3.02 at 5% level with d.f. being  $v_1 = 2$  and  $v_2 = 297$ . Which rejects the null hypothesis and thus we can conclude that “People’s satisfaction and preference for Accidental Repair vary at Authorized, Branded and Unorganized workshops”.

i.e.  $\mu_{aut} \neq \mu_{br} \neq \mu_{un}$

**Bonferroni test**

Pairs	Interval	Conclusion
Authorized & Branded	$0.0508 < x_i - x_j < 1.2492$	$X_{aut} > X_{br}$
Authorized & Unorganized	$0.7808 < x_i - x_j < 1.9792$	$X_{aut} > X_{un}$
Branded & Unorganized	$0.1308 < x_i - x_j < 1.3292$	$X_{br} > X_{un}$

OR,  $X_{aut} > X_{br} > X_{un}$

Thus we can conclude that people’s satisfaction and preference for Accidental repair vary and decrease in the order of Authorized, Branded and Unorganized.



**6.3** “Passenger vehicle owners are likely to avail vehicle care services from a multi-brand car service facilities managed by renowned auto service providers at retail outlets”

This hypothesis was further divided into four parts for different vehicle care services at a petrol pump as Routine Maintenance, Minor Repair, Major Repair and Accidental Repair.

**Data collected:** It is attached at the end in the appendix.

**Hypothesis test:**

[A] The above hypothesis is tested by using Z-TEST and the methodology used is stated below.

**Methodology:**

- (i) Calculate the mean of samples as

$$\bar{X} = \frac{X_1 + X_2 + X_3 \dots + X_n}{n}$$

Where, n is the total number of samples.

- (ii) Calculate the standard deviation of the samples ( $\sigma_s$ ) as

$$\sigma_s = \sqrt{\frac{\sum(X_i - \bar{X})^2}{(n - 1)}}$$

- (iii) Calculate the test statistic Z as

$$Z = \frac{\bar{X} - \mu_{H_0}}{\frac{\sigma_s}{\sqrt{n}}}$$

- (iv) Compare the calculated value of Z with the value of Z from normal curve area table at 5% level of significance.
- (v) Reject the null hypothesis if test statistic Z value lies in the rejection region or else accept the null hypothesis.

**6.3.1 Routine Maintenance**

**Null hypothesis ( $H_0$ ) :** People are un-likely to visit a multi-brand car service facilities at retail outlets for Routine Maintenance.

$$H_0 : \mu_{H_0} < 3.5$$

**Alternative hypothesis ( $H_a$ ) :** People are likely to visit a multi-brand car service facilities at retail outlets for Routine Maintenance.

$$H_a : \mu_{H_0} \geq 3.5$$



**Z-Test**

Mean	$\Sigma(X_i - \bar{X})^2$	$\sigma_s$	Statistic Z
3.75	118.75	1.095215	2.282658

As  $H_a$  is one sided in our case. We shall be applying a one-tailed test for determining the rejection region at 5% level of significance which comes to as under, using normal curve table:

$$R : |z| > 1.645$$

The observed value of Z is 2.28 which falls in the rejection region and thus  $H_0$  is rejected.

Thus we may conclude that

*“People are likely to visit a multi-brand car service facility at retail outlets for Routine Maintenance”.*

**6.3.2 Minor Repairs**

Null hypothesis ( $H_0$ ): People are un-likely to visit a multi-brand car service facilities at retail outlets for Minor repairs.

$$H_0 : \mu_{H_0} < 3.5$$

Alternative hypothesis ( $H_a$ ): People are likely to visit a multi-brand car service facilities at retail outlets for Minor repairs.

$$H_a : \mu_{H_0} \geq 3.5$$

**Z-Test**

Mean	$\Sigma(X_i - \bar{X})^2$	$\sigma_s$	Statistic Z
3.68	107.76	1.043305	1.725287

As  $H_a$  is one sided in our case. We shall be applying a one-tailed test for determining the rejection region at 5% level of significance which comes to as under, using normal curve table:

$$R : |z| > 1.645$$



## Study of Business potential through Service Marketing at Retail Outlets

The observed value of Z is 1.72 which falls in the rejection region and thus  $H_0$  is rejected.

Thus we may conclude that

*“People are likely to visit a multi-brand car service facility at retail outlets for Minor Repairs”.*

### **6.3.3 Major Repairs**

Null hypothesis ( $H_0$ ) : People are un-likely to visit a multi-brand car service facilities at retail outlets for Major repairs.

$$H_0 : \mu_{H_0} < 3.5$$

Alternative hypothesis ( $H_a$ ) : People are likely to visit a multi-brand car service facilities at retail outlets for Major repairs.

$$H_a : \mu_{H_0} \geq 3.5$$

#### **Z-Test**

Mean	$\Sigma(X_i - \bar{X})^2$	$\sigma_s$	Statistic Z
2.89	169.79	1.309599	-4.65791

As  $H_a$  is one sided in our case. We shall be applying a one-tailed test for determining the rejection region at 5% level of significance which comes to as under, using normal curve table:

$$R : |z| > 1.645$$

The observed value of Z is -4.65 which falls in the acceptance region and thus  $H_0$  is accepted.

Thus we may conclude that

*“People are un- likely to visit a multi-brand car service facility at retail outlets for Major Repairs”.*





### 6.3.4 Accidental Repairs

Null hypothesis ( $H_0$ ) : People are un-likely to visit a multi-brand car service facilities at retail outlets for Accidental repairs.

$$H_0 : \mu_{Ho} < 3.5$$

Alternative hypothesis ( $H_a$ ) : People are likely to visit a multi-brand car service facilities at retail outlets for Accidental repairs.

$$H_a : \mu_{Ho} \geq 3.5$$

#### Z-Test

Mean	$\Sigma(X_i - \bar{X})^2$	$\sigma_s$	Statistic Z
2.6	188	1.378038	-6.53102

As  $H_a$  is one sided in our case. We shall be applying a one-tailed test for determining the rejection region at 5% level of significance which comes to as under, using normal curve table:

$$R : |z| > 1.645$$

The observed value of Z is -6.53 which falls in the acceptance region and thus  $H_0$  is accepted. Thus we may conclude that  
“People are un- likely to visit a multi-brand car service facility at retail outlets for Accidental Repairs”.



#### 6.4 STRUCTURED INTERVIEW REPORT (WORKSHOP)

Based on the information we collected after visiting 6 workshops, I could conclude the following points:

- Average number of vehicles that can be serviced per month in a nominal sized workshop is 160.
- Average lubes and greases sold per month is 360 litres.
- Number of service bays required is 2-3.
- Approximate areas of different facilities in the workshop.

Facility	Area required
Service area	500 ft <sup>2</sup>
Customer lounge	NIL
Office area	60 ft <sup>2</sup>
Stores	90 ft <sup>2</sup>

- Various equipment required quantity and approximate cost.

Name of equipments/ tools	Number (qty)	Approx cost per equipment/set
Hydraulic lifts (Two post)	2	220000
Wheel alignment (Computerized wheel alignment)	1	310000
Wheel balancer	1	125000
Fuel Injector cleaner	1	40000
Battery charger and checking machines	1	25000
Scanning machine (Engine scanner)	1	190000
AC Compressor ( 5HP, 225 Litre Tank, 2 stage, 3 Phase)	1	72000
ETA plant	1	100000
<b>TOTAL</b>		<b>1082000</b>
<b>VAT (14%)</b>		<b>151480</b>
<b>Packing, Transportation and other charges (4%)</b>		<b>43280</b>
<b>Grand total</b>		<b>12,76,760</b>





## Study of Business potential through Service Marketing at Retail Outlets

- Various vehicle care services to be provided at the workshop, their rates and approximate income generated per month from the services.

Services available	Rate per such service	Approx income generated per month from these services (₹)
General service	550	55000
Washing	280	28000
Dry cleaning	550	27500
Wheel alignment & balancing	200+200	40000
Battery charging	50	2500
Minor accidental job	>2000	50000
	<b>Total</b>	<b>2,03,000</b>

- Manpower required and cost incurred per month

Type	Number	Total cost per month (₹)
Mechanic	4	12000*4 = 48000
Helper	3	8000*3 = 24000
Others	3	6000*3 = 18000
<b>Total</b>	<b>10</b>	<b>90,000</b>

- Other expenditures incurred by the workshop  
Electricity bill, water bill and other miscellaneous expenses = ₹ 70000 per month.

- Revenues generated

Service revenue	₹ 2,03,000
Service tax (12 %)	₹ 24,360
Cess tax (2% of service tax)	₹ 487.20
H Cess tax (1% of service tax)	₹ 243.6
<b>Total</b>	<b>₹ 2,28,090.8</b>

Lubes sales (per month)	₹ 90,000
VAT (12.5%)	₹ 11,250
SDT (1.5%)	₹ 1,350
<b>Total</b>	<b>₹ 1,02,600</b>

Therefore, total revenue generated = ₹ 3,30,690.8 (per month)



### 6.4.1 CRITICAL ANALYSIS

Avg no of vehicles serviced (per month)	160
Avg lubes sold (per month)	360 litres
Approx Fixed capital investment	₹ 12,76,760
Approx revenue generated from services (per month)	₹ 2,28,090.80
Approx revenue generated from lubes sales (per month)	₹ 1,02,600
Manpower cost (per month)	₹ 90,000
Other expenses (electricity, water etc), per month	₹ 70,000

### 6.5 Conclusions from Hypothesis Tests

- Lubricants sales at retail outlets with service station is more than the retail outlets without service station.
- People's satisfaction and preference for various services like Routine maintenance, Minor repair, Major repair and Accidental repair differ at Authorized, Branded and Unorganized workshops and it vary in the order  
Authorized > Branded > Unorganized
- Passenger vehicle owners are likely to visit a multi brand service station at retail outlet only for Routine maintenance and Minor repairs and unlikely to visit for Major repairs and Accidental repairs.





## 7 CONCLUSIONS

### 7.1 Research findings

- Huge growth of the auto industry in our country demands huge expansion of vehicle care service network.
- Based on the T-Test performed at the lubes sales data at various retail outlets I found that Lubricants sales at retail outlets with service station is significantly more than retail outlets without service station. This is mainly due to approximate 350-400 litres of extra lubes sold at the service station every month.
- ANOVA test performed on the data collected through questionnaire proved that people's satisfaction and preference for various vehicle care services vary significantly at Authorized, Branded and Unorganized service stations. This is mainly due to the difference in quality of repair, genuine spares, service time, transparency in billing and various other factors.
- Bonferroni test applied further on the results obtained from ANOVA test proved that people are most satisfied with Authorized service station. Then comes other branded service station and they are least satisfied with unorganized service stations. They prefer authorized service station the most and unorganized service station the least.
- Z-Test performed on the data collected through questionnaire proved that people are likely to visit a petrol pump which provides multi-brand car service facilities managed by renowned auto service providers (like auto-OEMs, authorized OEM dealers, reputed multibrand operators) only for Routine maintenance and Minor repairs. They are unlikely to visit the same for Major and Accidental repairs.  
This is because that people are more likely to visit the main authorized OEM service station with more vehicle care facilities for major and accidental repairs rather than smaller service stations at retail outlets.
- It is financially viable to open a small authorized service station at retail outlets which should have facilities for routine maintenance and minor repairs.
- Various equipment required for such service station are suggested. Initial fixed capital investment required is approximate ₹ 12,76,760. This service station will generate a revenue of approximate ₹ 2,28,090.80 from services per month. And an additional revenue of approximate ₹ 1,02,600 from lubricants sales per month.  
Operating expenditure for such service stations will be around ₹ 1,50,000 per month.



### **7.2 Contribution of the study**

- Since it was the first research of its kind, it will contribute in the further study if done by any researcher.
- Findings of the study will contribute to the organization's decision making in the same field.

### **7.3 Limitations**

- This study is only limited to the passenger vehicles and can't be applied to heavy motor vehicles like trucks, buses etc.
- Chi-square test couldn't be applied for more analysis because of lesser samples.

### **7.4 Scope for the future research**

- This study can well be used by other researchers in their literature review.
- By increasing the size of sample, the findings of this study can be improved and also more analysis can be done then.
- The findings of this study can be used in organization's decision making.



## 8 REFERENCES

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## 9 APPENDICES

### 9.1 Workshop questionnaire

Name of workshop: .....

Place: ..... District: ..... State: .....

- Type of workshop: (please tick)
1. OEM Authorized (name the OEM.....)
  2. Other organized (name of the brand, if any .....
  3. Unorganized (local garage)

Name of Owner/ Head Mechanic: .....

No of years of operation: .....

Average no of vehicles serviced per day: .....  
(Approx number serviced in month divided by no of days of operation)

Average lube & greases oils sold/ changed per month .....lit/kg

No of vehicles that can be serviced at a time/ no of service bays available: .....

What are the approximate areas for different facilities in the workshop. Mention nil is not available.

Service area	Customer lounge	Office area	Stores	Others. Pl specify

What are the equipments/ Tools positioned:

Name of equipments/ tools	Number (qty)	Approx cost per equipment/set
Other equipments that may be necessary for better customer service (feedback from mechanic)		

Other facilities including branding provided at the workshop to be noted. Approximate cost of such facilities to be assessed.

Other facilities provided	Approx. cost	How relevant to the workshop operation





## Study of Business potential through Service Marketing at Retail Outlets

Services provided (if required write overleaf or on separate sheet)

Services available	Rate per such service	Approx income per month from these services

Manpower cost

Type	Number	Total cost per month
Mechanic		
Helper		
Others (pl specify)		

Other expenditure incurred by the workshop (please specify):



## Study of Business potential through Service Marketing at Retail Outlets

### 9.2 Customer questionnaire form

#### QUESTIONNAIRE

A survey is being conducted on the need for organized auto service of passenger vehicle segment. Your feedback in the following questionnaire will be very useful in this survey. You are requested to kindly give a few minutes of your valuable time in this regard. Please tick the appropriate boxes and give your information at other places, as required.

1	Category of your vehicle (by length):	Mini (A1) upto 3.4M	Compact (A2) >3.4M to 4.0M	Midsize (A3) >4.0M to 4.5M	Executive (A4) >4.5M to 4.7M	Premium (A5) >4.7M to 5M	Luxury (A6) above 5M	Van (B1)	MPV/SUV (B2)
2	Make of the vehicle:				Model:				
3	Your link with the vehicle?	Owner but chauffer driven			Owner & self driven		Driver but not owner		
4	Status of ownership?	1st owner			2nd owner		3rd & more		
5	Purchase price of the vehicle (Rs/lakhs)?			Upto 3	More than 3 & upto 5	More than 5 & upto 7	More than 7 & upto 10	More than 10	
6	Use of the vehicle?			Private		Commercial			
7	Age of your vehicle (in years)?			upto 2	More than 2 & upto 4	More than 4 & upto 6	More than 6 & upto 8	More than 8 & upto 10	More than 10
8	Annual income slab of the owner (Rs in lakhs)?			upto 10	More than 10 & upto 20	More than 20 & upto 30	More than 30 & upto 40	beyond 40	
9	Category of your place of residence?			Metro city (Tier-I)	Big city/town (Tier-II)	small town (Tier-III)	Rural area	Name of State:	
10	Where did you avail service last?			Authorised workshop	Other branded workshop		Unorganized (roadside) workshop		
	For routine maintenance								
	For minor repair								
	For major repair								
	For accidental repair								
11	How frequently did you have to visit workshops for the following services in recent times?								
				Nil	Once a year	Twice a year	Thrice a year	more than thrice in a year	
	For routine maintenance								
	For minor repair								
	For major repair								
	For accidental repair								



## Study of Business potential through Service Marketing at Retail Outlets

12 How satisfied are you on services if availed by you ever at these workshops ? (5-highly satisfied, 4-satisfied, 3-neither satisfied nor dissatisfied, 2-dissatisfied, 1-highly dissatisfied, 0-no experience)									
				Authorised workshop	Other branded workshop	Unorganized workshop			
For routine maintenance									
For minor repair									
For major repair									
For accidental repair									
13 What was your approx. expenditure (Rs. per year) in the recent times?									
				Upto 1000	1001-3000	3001-5000	5001-7000	7001-10000	Above 10000
	Routine maintenance	Not yet		Upto 1000	1001-3000	3001-5000	5001-7000	7001-10000	Above 10000
	Minor repair	Not yet		Upto 1000	1001-3000	3001-5000	5001-7000	7001-10000	Above 10000
	Major repair	Not yet		Upto 5000	5001-10000	10001-15000	15001-20000	20001-25000	Above 25000
	Accidental repair	Not yet		Upto 10000	10001-20000	20001-30000	30001-40000	40001-50000	Above 50000
14 How important are the following factors to you?									
				Very High	High	Moderate	Low	Very Low	
Cost of service									
Genuinity of spares									
Quality of repair									
Service time									
Timeliness in delivery									
Access to oversee repair works at the workshop									
Equality in treatment regardless class of vehicle									
Attention given for minor works									
Transparency in billing									
Efficiency in dealing for insurance claim in case of accident repair									
Professional approach									
15 How satisfied are you on the above factors with your service providers?									
				Highly satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Highly dissatisfied	
Cost of service									
Genuinity of spares									
Quality of repair									
Service time									
Timeliness in delivery									
Access to oversee repair works at the workshop									





## Study of Business potential through Service Marketing at Retail Outlets

	Equality in treatment regardless class of vehicle								
	Attention given for minor works								
	Transparency in billing								
	Efficiency in dealing for insurance claim in case of accident repair								
	Professional approach								
<b>16</b>	<b>How likely you may visit a multi-brand car service outlet for servicing your vehicle if the outlet is managed by renowned professional groups (like auto-OEMs, authorised OEM dealers, reputed multibrand operators) with expertise in auto service?</b>								
					Most likely	Likely	Neutral	unlikely	most unlikely
	For routine maintenance								
	For minor repair								
	For major repair								
	For accidental repair								
<b>17</b>	<b>How likely you may visit a petrol pump which provides multi-brand car service facilities managed by renowned auto service providers (like auto-OEMs, authorised OEM dealers, reputed multibrand operators) for the following services?</b>								
					Most likely	Likely	Neutral	unlikely	most unlikely
	For routine maintenance								
	For minor repair								
	For major repair								
	For accidental repair								
<b>Thank you very much for your kind cooperation.</b>									

**9.3 Workshop Equipment Price List 2012-13 (Apex technologies)**

Apex Equipment price list 2012-2013		Price
	<b>Workshop &amp; Wheel Diagnostic Equipments</b>	
1	a) 3D Wheel Alignment	540,000
	b) Computerized Wheel Alignment ( Model Sapphire I ) 4 Wheel Alignment, 4 Head 8 sensor, RF/ Bluetooth Transmission	310,000
	Laser Wheel Alignment ( Redline )	108000
	Laser Wheel Alignment (Redline - P ) Portable	90,000
	Optional:	
	a) Laser Wheel Alignment - Alignment & Printout Software	8,000
	c) HCV Alignment Kit	15,000
2	Wheel Balancer	
	Wheel Balancer ( Orbit D ) Digital Display	75,000
	Optional : Wheel Protection Cover	5,000
	Wheel Balancer ( Orbit V ) Video-graphic TFT display	110,000
	Optional:	
	b) Balancing weights (one set)	11,100
3	Tyre Changer – Pneumatic ( <i>Jupiter</i> )	75,000
	Truck Tyre Changer— ( <i>Jupiter T</i> )	360,000
4	Nitrogen Generator ( with inbuilt Tyre Inflator )	110,000
5	Tyre Inflator / Deflator ( Double Display Range 150 Psi )	28,500
	MS stand ( Regular)	4,000
6	Two Post Lift ( 3.2 Ton Electrohydraulic )	110,000
	Portable Scissor Lift ( Scissor Lift With Wheels 3.2 Ton )	115,000
	Four Post Lift ( 4 Ton Hydraulic ) ( <i>Tusker - 4</i> )	260,000
	Scissor Lift ( 3.2Ton Hydraulic, Low/High Rise ) ( <i>Tusker - 3S</i> )	130,000
7	Petrol Injector Cleaner	



## Study of Business potential through Service Marketing at Retail Outlets

	Fuel Injector Cleaner ( <i>Rainbow</i> )	40,000
	Optional:	
	a) Ultrasonic Bath	22,000
	b) Cleaner Fluid (5 Lts. Pack)	1,500
8	Engine De-carbonizer ( Petrol Cum Diesel )	45,000
	Cleaning Solvent ( 1 Litre bottle )	800
9	Air Compressors ( Apex Air Jet )	
	1 HP , 110 Litre tank, 1 Stage 1 Phase	19,300
	2HP, 45 Litre Tank ,Portable direct drive 1 Stage, 1 Phase	21,000
	2HP, 110 Litre Tank , 1 Stage, 1 Phase	34,300
	3HP, 180 Litre Tank , 2 Stage, 1/3 Phase	53,000
	5HP, 225 Litre Tank, 2 stage, 3 Phase	72,000
	7.5 HP, 250 Litre Tank, 3 stage , 3 Phase	84,800
	10 HP, 420 Litre Tank, 3 Stage, 3 Phase	108,000
10	AC Servicing Equipment ( Fully Automatic )	155,000
	AC Servicing Equipment ( Semi Automatic )	135,000
11	Smoke Check ( Pollution checking Equipment , Diesel )	150,000
12	Four Gas Analyzer ( Pollution Checking Equipment , Petrol )	155,000
13	Engine scanner ( Launch X-431 )	190,000
14	Immobilizer Key encoder & duplicator	110,000
15	Washing Hoist ( W/o Hydraulic Oil )	100,000
16	Head Beam Aligner ( <i>Optoline</i> )	18,500
17	Multi jet Parts Cleaner	36,000
	Body Shop Equipments	
18	MIG Welding System 250A	78,000
19	Spot Welding System	138,000
	Spot Welding System 9000A	205,000
20	Plasma Cutter 12mm	85,000





## Study of Business potential through Service Marketing at Retail Outlets

21	Panel Repair System with Spot Welder	210,000
22		
23	Infra red Dryer 3 Tube	85,000
24	Painting Booth 7m Double Blower	650,000
25	Crash Repair System Double Puller, Mechanical measurement	870,000
	Washing & Upholstery Cleaning	
26	Upholstery Cleaner Wet & Dry	42,000
27	Car Washer - High pressure Car washer	36,000
	Car washer - 350 rpm, 12 lpm Double Piston	42,000
28	Car Cleaning Foam dispenser	18,000
	<b>Terms &amp; Conditions:</b>	
.	Payment Terms: 100% before despatch of goods.	
.	VAT /CST & other levies extra as per applicable Govt rule.	
.	Packing & Forwarding @ 1% of basic prices.	
.	Transportation: On actual basis ,To be borne by customer.	
.	Transit Insurance: @1% of basic prices ( if desired by the customer )	



## Study of Business potential through Service Marketing at Retail Outlets

### 9.4 Z-TEST Data

#### 9.4.1 Routine maintenance

Routine maintenance							
S. No	Score	Xi-X	(Xi-X) <sup>2</sup>				
1	4	0.25	0.0625	51	2	-1.75	3.0625
2	4	0.25	0.0625	52	3	-0.75	0.5625
3	4	0.25	0.0625	53	5	1.25	1.5625
4	4	0.25	0.0625	54	3	-0.75	0.5625
5	4	0.25	0.0625	55	2	-1.75	3.0625
6	4	0.25	0.0625	56	1	-2.75	7.5625
7	4	0.25	0.0625	57	5	1.25	1.5625
8	4	0.25	0.0625	58	5	1.25	1.5625
9	3	-0.75	0.5625	59	5	1.25	1.5625
10	5	1.25	1.5625	60	2	-1.75	3.0625
11	4	0.25	0.0625	61	5	1.25	1.5625
12	4	0.25	0.0625	62	5	1.25	1.5625
13	4	0.25	0.0625	63	4	0.25	0.0625
14	4	0.25	0.0625	64	5	1.25	1.5625
15	4	0.25	0.0625	65	2	-1.75	3.0625
16	4	0.25	0.0625	66	5	1.25	1.5625
17	3	-0.75	0.5625	67	1	-2.75	7.5625
18	5	1.25	1.5625	68	5	1.25	1.5625
19	5	1.25	1.5625	69	2	-1.75	3.0625
20	4	0.25	0.0625	70	4	0.25	0.0625
21	2	-1.75	3.0625	71	2	-1.75	3.0625
22	5	1.25	1.5625	72	5	1.25	1.5625
23	4	0.25	0.0625	73	4	0.25	0.0625
24	4	0.25	0.0625	74	5	1.25	1.5625
25	4	0.25	0.0625	75	1	-2.75	7.5625
26	3	-0.75	0.5625	76	5	1.25	1.5625
27	3	-0.75	0.5625	77	4	0.25	0.0625
28	4	0.25	0.0625	78	5	1.25	1.5625
29	4	0.25	0.0625	79	4	0.25	0.0625
30	5	1.25	1.5625	80	4	0.25	0.0625
31	4	0.25	0.0625	81	2	-1.75	3.0625
32	4	0.25	0.0625	82	4	0.25	0.0625
33	5	1.25	1.5625	83	4	0.25	0.0625
34	4	0.25	0.0625	84	3	-0.75	0.5625
35	4	0.25	0.0625	85	4	0.25	0.0625
36	4	0.25	0.0625	86	3	-0.75	0.5625
37	4	0.25	0.0625	87	4	0.25	0.0625
38	5	1.25	1.5625	88	4	0.25	0.0625
39	4	0.25	0.0625	89	4	0.25	0.0625
40	3	-0.75	0.5625	90	4	0.25	0.0625
41	4	0.25	0.0625	91	5	1.25	1.5625
42	4	0.25	0.0625	92	4	0.25	0.0625
43	1	-2.75	7.5625	93	3	-0.75	0.5625
44	2	-1.75	3.0625	94	4	0.25	0.0625
45	4	0.25	0.0625	95	3	-0.75	0.5625
46	5	1.25	1.5625	96	3	-0.75	0.5625
47	4	0.25	0.0625	97	5	1.25	1.5625
48	4	0.25	0.0625	98	4	0.25	0.0625
49	1	-2.75	7.5625	99	4	0.25	0.0625
50	4	0.25	0.0625	100	4	0.25	0.0625





## Study of Business potential through Service Marketing at Retail Outlets

### 9.4.2 Minor repair

Minor Repair							
S. No	Score	Xi-X	(Xi-X) <sup>2</sup>				
1	4	0.32	0.1024	51	4	0.32	0.1024
2	4	0.32	0.1024	52	3	-0.68	0.4624
3	4	0.32	0.1024	53	4	0.32	0.1024
4	4	0.32	0.1024	54	3	-0.68	0.4624
5	4	0.32	0.1024	55	3	-0.68	0.4624
6	4	0.32	0.1024	56	1	-2.68	7.1824
7	3	-0.68	0.4624	57	4	0.32	0.1024
8	5	1.32	1.7424	58	4	0.32	0.1024
9	4	0.32	0.1024	59	5	1.32	1.7424
10	4	0.32	0.1024	60	2	-1.68	2.8224
11	3	-0.68	0.4624	61	5	1.32	1.7424
12	4	0.32	0.1024	62	5	1.32	1.7424
13	4	0.32	0.1024	63	4	0.32	0.1024
14	3	-0.68	0.4624	64	5	1.32	1.7424
15	5	1.32	1.7424	65	3	-0.68	0.4624
16	3	-0.68	0.4624	66	4	0.32	0.1024
17	5	1.32	1.7424	67	1	-2.68	7.1824
18	5	1.32	1.7424	68	5	1.32	1.7424
19	4	0.32	0.1024	69	2	-1.68	2.8224
20	3	-0.68	0.4624	70	3	-0.68	0.4624
21	5	1.32	1.7424	71	2	-1.68	2.8224
22	4	0.32	0.1024	72	5	1.32	1.7424
23	4	0.32	0.1024	73	4	0.32	0.1024
24	3	-0.68	0.4624	74	5	1.32	1.7424
25	3	-0.68	0.4624	75	1	-2.68	7.1824
26	4	0.32	0.1024	76	5	1.32	1.7424
27	4	0.32	0.1024	77	4	0.32	0.1024
28	5	1.32	1.7424	78	5	1.32	1.7424
29	4	0.32	0.1024	79	4	0.32	0.1024
30	1	-2.68	7.1824	80	4	0.32	0.1024
31	4	0.32	0.1024	81	2	-1.68	2.8224
32	4	0.32	0.1024	82	3	-0.68	0.4624
33	3	-0.68	0.4624	83	4	0.32	0.1024
34	4	0.32	0.1024	84	3	-0.68	0.4624
35	3	-0.68	0.4624	85	4	0.32	0.1024
36	4	0.32	0.1024	86	3	-0.68	0.4624
37	4	0.32	0.1024	87	4	0.32	0.1024
38	4	0.32	0.1024	88	4	0.32	0.1024
39	3	-0.68	0.4624	89	3	-0.68	0.4624
40	4	0.32	0.1024	90	4	0.32	0.1024
41	4	0.32	0.1024	91	5	1.32	1.7424
42	1	-2.68	7.1824	92	4	0.32	0.1024
43	2	-1.68	2.8224	93	3	-0.68	0.4624
44	4	0.32	0.1024	94	4	0.32	0.1024
45	5	1.32	1.7424	95	3	-0.68	0.4624
46	5	1.32	1.7424	96	2	-1.68	2.8224
47	4	0.32	0.1024	97	5	1.32	1.7424
48	1	-2.68	7.1824	98	4	0.32	0.1024
49	4	0.32	0.1024	99	4	0.32	0.1024
50	4	0.32	0.1024	100	4	0.32	0.1024





## Study of Business potential through Service Marketing at Retail Outlets

### 9.4.3 Major repair

Major repair							
S. No	Score	Xi-X	(Xi-X) <sup>2</sup>				
1	4	1.11	1.2321	51	2	-0.89	0.7921
2	4	1.11	1.2321	52	3	0.11	0.0121
3	2	-0.89	0.7921	53	5	2.11	4.4521
4	5	2.11	4.4521	54	4	1.11	1.2321
5	4	1.11	1.2321	55	2	-0.89	0.7921
6	4	1.11	1.2321	56	1	-1.89	3.5721
7	3	0.11	0.0121	57	1	-1.89	3.5721
8	5	2.11	4.4521	58	3	0.11	0.0121
9	3	0.11	0.0121	59	1	-1.89	3.5721
10	3	0.11	0.0121	60	2	-0.89	0.7921
11	2	-0.89	0.7921	61	2	-0.89	0.7921
12	2	-0.89	0.7921	62	5	2.11	4.4521
13	2	-0.89	0.7921	63	4	1.11	1.2321
14	3	0.11	0.0121	64	5	2.11	4.4521
15	2	-0.89	0.7921	65	2	-0.89	0.7921
16	3	0.11	0.0121	66	1	-1.89	3.5721
17	5	2.11	4.4521	67	1	-1.89	3.5721
18	5	2.11	4.4521	68	5	2.11	4.4521
19	4	1.11	1.2321	69	2	-0.89	0.7921
20	2	-0.89	0.7921	70	1	-1.89	3.5721
21	5	2.11	4.4521	71	2	-0.89	0.7921
22	4	1.11	1.2321	72	2	-0.89	0.7921
23	1	-1.89	3.5721	73	3	0.11	0.0121
24	3	0.11	0.0121	74	4	1.11	1.2321
25	3	0.11	0.0121	75	1	-1.89	3.5721
26	2	-0.89	0.7921	76	4	1.11	1.2321
27	4	1.11	1.2321	77	3	0.11	0.0121
28	5	2.11	4.4521	78	5	2.11	4.4521
29	2	-0.89	0.7921	79	4	1.11	1.2321
30	1	-1.89	3.5721	80	2	-0.89	0.7921
31	2	-0.89	0.7921	81	1	-1.89	3.5721
32	2	-0.89	0.7921	82	4	1.11	1.2321
33	1	-1.89	3.5721	83	3	0.11	0.0121
34	4	1.11	1.2321	84	3	0.11	0.0121
35	2	-0.89	0.7921	85	5	2.11	4.4521
36	2	-0.89	0.7921	86	3	0.11	0.0121
37	2	-0.89	0.7921	87	3	0.11	0.0121
38	2	-0.89	0.7921	88	1	-1.89	3.5721
39	2	-0.89	0.7921	89	1	-1.89	3.5721
40	2	-0.89	0.7921	90	2	-0.89	0.7921
41	4	1.11	1.2321	91	1	-1.89	3.5721
42	1	-1.89	3.5721	92	4	1.11	1.2321
43	2	-0.89	0.7921	93	3	0.11	0.0121
44	4	1.11	1.2321	94	3	0.11	0.0121
45	5	2.11	4.4521	95	3	0.11	0.0121
46	5	2.11	4.4521	96	2	-0.89	0.7921
47	4	1.11	1.2321	97	4	1.11	1.2321
48	1	-1.89	3.5721	98	3	0.11	0.0121
49	4	1.11	1.2321	99	4	1.11	1.2321
50	4	1.11	1.2321	100	2	-0.89	0.7921









## Study of Business potential through Service Marketing at Retail Outlets



### 9.5 ANOVA Technique data

#### 9.5.1 Routine maintenance

S No	ROUTINE MAINTENANCE			51	3	0	0
	Authorized	Branded	Roadside				
1	5	4	0	52	4	0	0
2	5	4	0	53	4	4	0
3	5	4	0	54	3	4	2
4	5	4	0	55	3	0	0
5	5	4	0	56	5	5	0
6	3	3	1	57	5	5	0
7	4	4	3	58	4	4	0
8	3	2	2	59	5	4	4
9	3	4	1	60	5	0	0
10	2	5	1	61	4	4	0
11	4	3	0	62	4	0	0
12	4	4	2	63	4	4	4
13	4	4	2	64	3	3	4
14	5	5	0	65	5	0	0
15	3	0	0	66	4	0	0
16	5	1	0	67	5	0	0
17	1	3	0	68	0	0	4
18	0	5	0	69	4	0	0
19	4	4	2	70	4	5	0
20	4	0	0	71	4	3	5
21	5	0	0	72	3	5	0
22	4	3	2	73	5	0	0
23	4	4	0	74	4	0	0
24	2	2	3	75	4	4	0
25	5	0	0	76	4	0	4
26	4	0	0	77	2	3	5
27	5	0	0	78	5	3	3
28	4	0	0	79	3	3	4
29	5	5	5	80	4	3	0
30	3	0	0	81	4	4	2
31	4	0	0	82	4	4	0
32	4	0	0	83	4	3	0
33	0	0	4	84	4	0	0
34	4	0	0	85	4	5	0
35	4	4	0	86	5	0	0
36	5	4	4	87	5	4	3
37	5	4	2	88	4	3	4
38	5	4	4	89	5	3	0
39	4	2	0	90	5	4	0
40	4	0	5	91	4	4	0
41	0	3	0	92	3	3	3
42	4	0	0	93	4	4	4
43	4	0	0	94	5	4	4
44	4	4	2	95	5	4	3
45	3	3	0	96	4	3	2
46	0	0	0	97	4	4	4
47	4	4	3	98	5	4	3
48	3	0	0	99	5	4	4
49	0	0	4	100	5	0	4
50	5	4	3				





## Study of Business potential through Service Marketing at Retail Outlets

### 9.5.2 Minor repair

MINOR REPAIR				51	2	0	0
S No	Authorized	Branded	Roadside	52	4	0	0
1	5	3	0	53	3	3	0
2	5	4	0	54	2	4	2
3	4	5	0	55	0	3	3
4	4	5	0	56	5	4	0
5	0	0	0	57	5	4	0
6	3	3	1	58	4	4	0
7	4	4	2	59	5	4	0
8	3	2	2	60	4	0	0
9	3	5	1	61	4	4	0
10	2	5	2	62	4	0	0
11	4	0	0	63	4	4	4
12	0	4	3	64	3	3	4
13	0	4	3	65	5	0	0
14	0	3	4	66	4	0	0
15	3	0	0	67	5	0	0
16	5	1	0	68	0	0	4
17	1	3	0	69	4	0	0
18	0	5	0	70	4	5	0
19	4	4	2	71	4	3	5
20	4	0	3	72	3	4	0
21	4	4	0	73	4	0	0
22	4	3	4	74	4	0	0
23	4	3	0	75	4	4	0
24	1	2	2	76	4	0	4
25	5	0	0	77	2	3	5
26	4	0	0	78	4	4	3
27	4	0	0	79	3	3	4
28	4	0	0	80	3	4	3
29	5	4	4	81	3	3	2
30	3	0	0	82	3	4	3
31	0	0	4	83	3	2	0
32	0	0	0	84	4	0	0
33	0	0	4	85	4	0	4
34	0	0	0	86	5	0	0
35	4	4	0	87	5	4	3
36	0	4	0	88	4	3	4
37	4	3	0	89	5	3	0
38	4	4	0	90	5	3	0
39	4	3	0	91	4	4	0
40	5	0	3	92	3	3	3
41	0	3	0	93	4	4	3
42	4	0	0	94	4	3	4
43	0	0	0	95	4	4	2
44	3	3	4	96	4	3	2
45	3	3	0	97	4	3	4
46	0	0	0	98	5	3	3
47	4	4	3	99	5	3	4
48	3	0	0	100	5	0	3
49	0	0	0				
50	5	2	3				





## Study of Business potential through Service Marketing at Retail Outlets

### 9.5.3 Major repair

S No	MAJOR REPAIR			51	4	0	0
	Authorized	Branded	Roadside				
1	5	4	0	52	4	0	0
2	5	4	0	53	4	4	0
3	4	0	0	54	3	5	1
4	0	0	0	55	0	0	0
5	0	0	0	56	5	4	0
6	3	3	1	57	5	4	0
7	4	4	2	58	0	4	0
8	3	2	2	59	5	4	0
9	3	4	1	60	4	0	0
10	3	4	1	61	0	0	0
11	0	0	0	62	4	0	0
12	0	4	3	63	4	4	4
13	0	4	3	64	3	3	0
14	0	3	0	65	5	0	0
15	2	0	0	66	0	0	0
16	5	1	0	67	5	0	0
17	1	3	0	68	0	0	4
18	0	4	0	69	0	0	0
19	3	4	2	70	0	0	0
20	4	0	0	71	3	3	4
21	0	0	0	72	4	0	0
22	3	4	3	73	0	0	0
23	0	0	0	74	4	0	0
24	2	2	2	75	4	4	0
25	5	0	0	76	3	0	3
26	4	0	0	77	2	3	4
27	4	0	0	78	5	4	3
28	4	0	0	79	3	3	4
29	5	0	0	80	3	4	3
30	0	0	0	81	3	3	0
31	0	0	0	82	4	4	0
32	0	0	0	83	1	3	0
33	4	0	0	84	0	0	0
34	0	0	0	85	0	0	0
35	5	0	0	86	5	0	0
36	0	0	0	87	4	4	2
37	0	0	0	88	4	0	0
38	4	0	0	89	0	0	0
39	3	3	0	90	5	0	0
40	4	0	0	91	4	0	0
41	0	3	0	92	3	0	0
42	0	0	0	93	4	0	2
43	0	0	0	94	3	3	0
44	3	4	2	95	4	4	0
45	3	3	0	96	4	3	2
46	0	0	0	97	5	2	2
47	4	4	3	98	5	3	0
48	0	0	0	99	5	3	3
49	3	3	0	100	5	0	0
50	5	2	3				





## Study of Business potential through Service Marketing at Retail Outlets

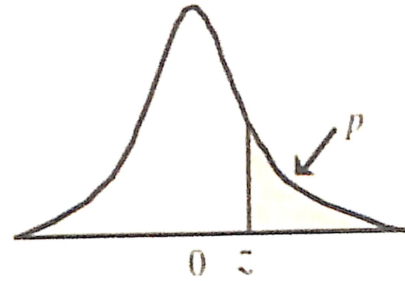
### 9.5.4 Accidental repair

ACCIDENTAL REPAIR				51	4	0	0
S No	Authorized	Branded	Roadside	52	4	0	0
1	5	3	0	53	4	5	0
2	5	3	0	54	3	4	1
3	5	0	0	55	0	0	0
4	0	0	0	56	0	0	0
5	0	0	0	57	5	4	0
6	0	0	0	58	0	0	0
7	4	4	2	59	0	0	0
8	3	2	2	60	0	0	0
9	3	5	1	61	0	0	0
10	4	4	2	62	4	0	0
11	4	0	0	63	4	4	4
12	0	4	3	64	0	0	0
13	0	4	3	65	5	0	0
14	1	4	4	66	0	0	0
15	2	0	0	67	0	0	0
16	5	1	0	68	0	0	0
17	1	3	0	69	0	0	0
18	0	4	0	70	0	0	0
19	3	4	2	71	4	3	0
20	4	0	0	72	4	0	0
21	0	0	0	73	0	0	0
22	3	4	2	74	0	0	0
23	0	0	0	75	4	4	0
24	0	0	0	76	0	0	0
25	5	0	0	77	0	3	0
26	0	0	0	78	0	0	0
27	0	0	0	79	0	3	2
28	4	0	0	80	0	4	3
29	5	0	0	81	3	3	0
30	0	0	0	82	0	0	0
31	0	0	0	83	1	1	0
32	0	0	0	84	0	0	0
33	0	0	0	85	0	0	0
34	0	0	0	86	5	0	0
35	0	0	0	87	5	4	0
36	0	0	0	88	4	0	0
37	0	0	0	89	0	0	0
38	0	0	0	90	0	0	0
39	0	0	0	91	4	0	0
40	0	0	0	92	3	0	0
41	0	0	0	93	0	0	0
42	0	0	0	94	2	0	0
43	0	0	0	95	4	4	0
44	4	4	2	96	4	3	2
45	3	3	0	97	5	2	2
46	0	0	0	98	5	1	0
47	4	4	3	99	5	2	1
48	0	0	0	100	5	0	0
49	0	0	0				
50	5	3	3				



## Study of Business potential through Service Marketing at Retail Outlets

### 9.6 Z - table



Second decimal place of z

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
0.7	.2420	.2389	.2358	.2327	.2297	.2266	.2236	.2206	.2177	.2148
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026

**9.7 Critical value of student's t-Distribution**

The <i>t</i> Distribution							
d.f.	One tail, $\alpha$	0.25	0.10	0.05	0.025	0.01	0.005
	Two tails, $\alpha$	0.50	0.20	0.10	0.05	0.02	0.01
1		1.000	3.078	6.314	12.706	31.821	63.657
2		.816	1.886	2.920	4.303	6.965	9.925
3		.765	1.638	2.353	3.182	4.541	5.841
4		.741	1.533	2.132	2.776	3.747	4.604
5		.727	1.476	2.015	2.571	3.365	4.032
6		.718	1.440	1.943	2.447	3.143	3.707
7		.711	1.415	1.895	2.365	2.998	3.499
8		.706	1.397	1.860	2.306	2.896	3.355
9		.703	1.383	1.833	2.262	2.821	3.250
10		.700	1.372	1.812	2.228	2.764	3.169
11		.697	1.363	1.796	2.201	2.718	3.106
12		.695	1.356	1.782	2.179	2.681	3.055
13		.694	1.350	1.771	2.160	2.650	3.012
14		.692	1.345	1.761	2.145	2.624	2.977
15		.691	1.341	1.753	2.131	2.602	2.947
16		.690	1.337	1.746	2.120	2.583	2.921
17		.689	1.333	1.740	2.110	2.567	2.898
18		.688	1.330	1.734	2.101	2.552	2.878
19		.688	1.328	1.729	2.093	2.539	2.861
20		.687	1.325	1.725	2.086	2.528	2.845
21		.686	1.323	1.721	2.080	2.518	2.831
22		.686	1.321	1.717	2.074	2.508	2.819
23		.685	1.319	1.714	2.069	2.500	2.807
24		.685	1.318	1.711	2.064	2.492	2.797
25		.684	1.316	1.708	2.060	2.485	2.787
26		.684	1.315	1.706	2.056	2.479	2.779
27		.684	1.314	1.703	2.052	2.473	2.771
28		.683	1.313	1.701	2.048	2.467	2.763
(z) ?		.674	1.282	1.645	1.960	2.326	2.576