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A Study of Customer's Preference Towards CNG Cars With Special Reference To NCR And Non-NCR Regions Of Haryana State

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***Abstract**: The main aim of the study is to know and understand the behaviour of the automobile customer in the state of Haryana which is one of the fine developed states of India. The study is being carried out to understand the preferences of automobile customers in special reference to CNG cars. The objective of the study is to acknowledge the preferences and create awareness of the CNG cars for pollution reduction.*

***Keywords**: Customer awareness, CNG car, age group, geographical distribution.*

I. Introduction

With the ever-rising demand of energy and restricted availability of fossil fuels, the significance of use of alternative energy has been realized across the world. Sustainable energy sources are most often considered as all renewable sources such as solar power, biomass, wind power, geothermal power wave power and tidal power. In the 20th century, a dramatic 20 times increase in the consumption of energy has been observed. It is to be expected that the level of energy consumption will continue to increases in the future and fossil fuels will remain the major energy source.

The major cause of pollution is the pollution caused by the vehicles running on the roads. The pollution generated by vehicles is increasing because there are greater numbers of cars on the road. Therefore, concept of using alternative gaseous fuel in engines has gained extensive and worldwide attention. The increase in petroleum fuel prices and its deterioration to environment led to take a move towards the path that leads to the search for the alternative fuels from past several years. CNG is one of such fuels available in large quantities in many parts of world at appealing prices. It is a clean-burning fuel as compared to the conventional liquid fuels likewise gasoline or diesel. The emission from a CNG engine would typically be just water and carbon dioxide only, which are relatively harmless for the environment. Thus, a car user typically must be minded to use CNG to reduce the cost of running the car. The users may also be concerned about other aspects like maintenance, total cost of ownership, vehicle weight, acceleration, engine noise, gearing operations and safety along with the reduced cost per kilometre. Indeed, the economic and environmental benefits of CNG make this fuel the most beneficial option for the speedy achievement of sustainability targets in road transport.

Leading automotive manufacturers in every vehicular category have been taking efforts in the evolution of CNG variants with the advent of BS-VI. As the infrastructure for CNG improves in India, some manufacturers have revealed their hope for an increase in CNG vehicles. A joint collaborative strategy between all the key stakeholders of the automotive-ecosystem can prove to be extremely beneficial in this context.
No doubt, the CNG vehicle market in India has gigantic potential for development. The good news is that OEMs and automobile manufacturers are also working in the direction of government increased efforts towards CNG vehicles and are to develop technologies and new models which will fulfill increasing customer's expectations. However, on a worldwide level, the biggest benefit of a dedicated CNG adoption will be a cleaner, greener and sustainable planet.

II. Literatue Review

Shoeb, A., Usmani, K. and Siddiqui, M.S. (2020) investigated "Factors affecting buying behaviour of consumers for personal cars by fuel categories" to evaluate and measure the factors affecting the buying behaviour of personal cars by different fuel categories. Questionnaires were used to collect data from 700 car owners. Factor analysis and ANOVA was used for analysing the variables. It was found that personal cars across different fuel categories hold a prominent place in the automobile segment.

Bernieser, J. et al. (2020) conducted research on "The role of norms and collective efficacy for the importance of techno-economic vehicle attributed in Germany". The aim of this paper was to examine which technology attributes and person related factors influence EV adoption and in whether the differences in person-related factors affect the preference for EV.

Kanagavel, K.R., and Jayakrishnan, J. (2019) conducted research on "Consumer perceived risk in car purchase" which studied their behaviour towards purchase decision to buy automobiles in India. This study identified the factors like personality, brand, product attributes, purchase involvement, uniqueness, risk relievers and demographic profile. These factors were considered as independent factors and perceived risk as dependent factors. Friedman multiple comparison test was applied to find out the important risk relievers.

Choudhury, K., Mishra, B.B., and Mohanty, P.K. (2018) investigated "An empirical study of car selection factors". On the basis of extensive review of literature 45 variables were identified that may be taken care by the dealer to showcase the car to customers and should highlight these benefits for the acceptance. These variables were maintenance cost, mileage, repair facility, fuel variant and value for money, exterior look, durability, comfort, quality, innovation etc.

Komaladewi, R. and Indika, D. (2017) conducted a study on "A Review of Consumer Purchase Decision on Low Cost Green Car in West Java, Indonesia" and showed that the change in reference group by customers influences the change in purchase decision significantly. The result showed that reference group is more influential than the price.

III. Objective of the study

The understanding of consumer behavior is important for any business activity and more over if the product is to deal with the environment. The research focuses primarily on ascertaining the links between customer's beliefs, knowledge, attitude, intentions and vehicle purchase behaviour/ use behaviour as well as preference of the customers given to the environment while buying the car. This research study is to understand the customer preference towards the environment friendly CNG car. The objectives have been defined as:

1. To study the preference of the customers in the various demographic factors regarding CNG car in Haryana
2. To study the preference of the customers in NCR and Non-NCR areas regarding CNG car in Haryana.

IV. Research Hypothesis

The following Null hypothesis has been tested as a part of research:

H01: There is no significant difference in the preference of the customers in the various demographic factors regarding CNG car.

H02: There is no significant difference in the preference of the customers in NCR and Non-NCR areas regarding CNG car.

V. Research Methodology

This paper is exploratory in nature. Sample survey method has been employed for data collection. Primary data is used for the purpose of the study with the help of questionnaire. This research has been conducted to understand the behaviour of the customers in Haryana while purchasing a CNG car. The scope of the research is limited to CNG cars in Haryana.

Sample Design

I) **Universe of the study:** Universe can be infinite and finite. In this study, the universe will be all buyers/users and potential buyers of CNG cars.

II) **Sample Size:** A sample of 200 individuals using CNG cars will be selected to obtain response using appropriate sample technique.

III) **Sampling Technique:** In the present study convenient, snowball and quota sampling method will be used to collect the data.

Sampling media will be in the form of filling up of Questionnaire.

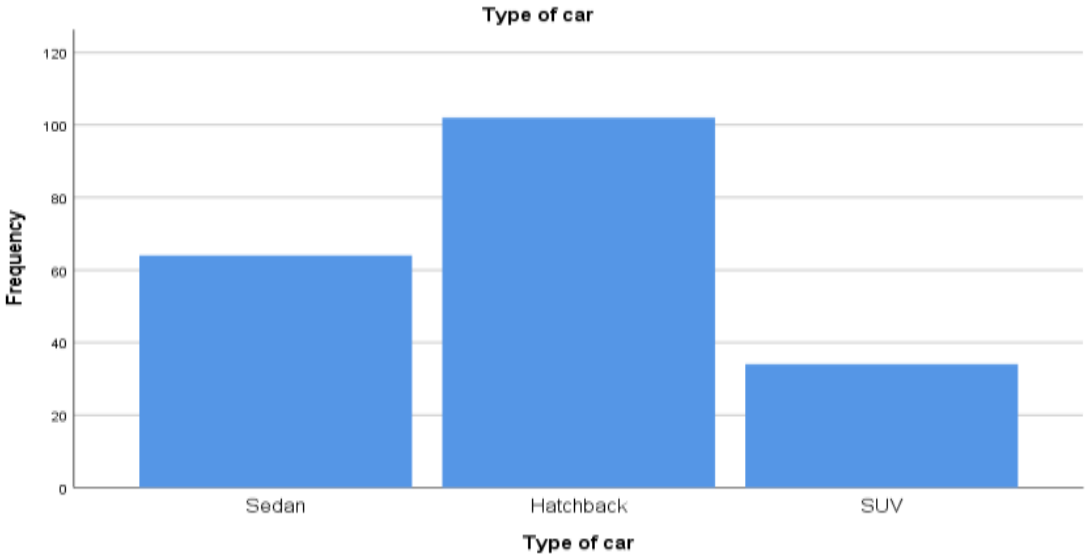
Data Collection Tools

A structured questionnaire has been used as the tools for collection of data. Five-point Likert scale has been used for the research purposes. T-test and ANOVA will be used to analyze the results.

AREA OF STUDY

Haryana is the state that includes 57% of its area in National Capital Region. This study includes total 10 districts out of which 05 districts are covered as NCR region (Gurugram, Faridabad, Jhajjar, Rohtak and Sonepat) and 05 districts as Non-NCR region (Hisar, Ambala, Kurukshetra, Panchkula and Sirsa). 20 respondents will be chosen from each district.

ANALYSIS & INTERPRETATION:



a)

Graph.1

Graph.1 shows that hatchback is the most preferred car among the automobile buyers. Then sedan is the most preferred at second position and SUV is least preferred. Hatchbacks are most preferred cars due to their less price

b)

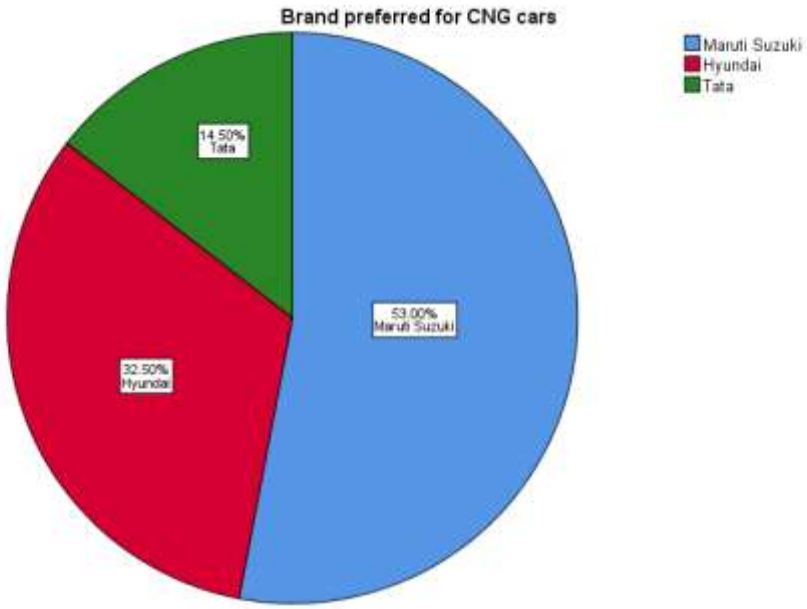


Table.1

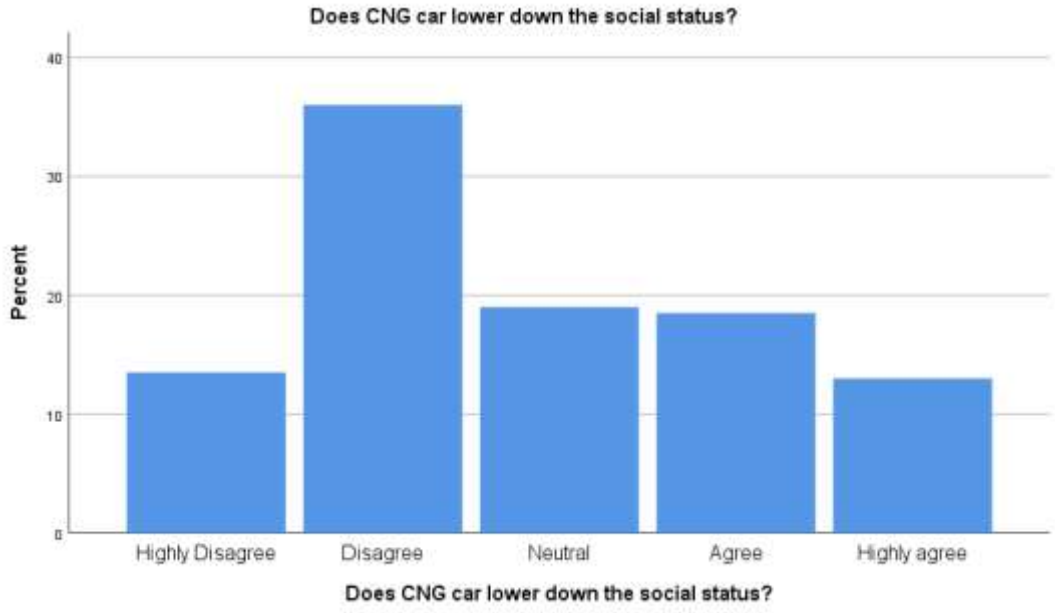
The study has been done on 200 respondents of Haryana. The above table no.1 depicts that Maruti Suzuki brand is the most preferred brand for buying CNG cars as per the perspective of automotive customers of Haryana state.

c)

Does CNG car lower down the social status?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Highly Disagree	27	13.3	13.5	13.5
	Disagree	72	35.5	36.0	49.5
	Neutral	38	18.7	19.0	68.5
	Agree	37	18.2	18.5	87.0
	Highly agree	26	12.8	13.0	100.0
	Total	200	98.5	100.0	
Total		200	100.0		

Table. 2



Graph.2

The above Table.2 and Graph.2 suggests that the automotive customers have a good perspective for CNG cars. A time ago people take CNG very inferior for their personal cars and a low profiled fuel to use. But as per this study the scenario is changing and customers perceive it an economic and environment friendly fuel.

d) H0: There is no significant difference in the preference of the customers in the various demographic factors regarding CNG car.

H1: There is no significant difference in the preference of the customers in the various demographic factors regarding CNG car.

ANOVA						
		Sig. of Gender	**Sig. of Age**	**Sig. of Edu. Level**	**Sig. of Employment**	**Sig.of Income**
Brand	**Between Groups**	0.68	0.315	0.68	0.586	0.009
	Within Groups					
	Total					

Price	**Between Groups**	0.921	0.376	0.921	0.104	0.647
	Within Groups					
	Total					
Safety	**Between Groups**	0.941	0.922	0.941	0.063	0.001
	Within Groups					
	Total					
Speed	**Between Groups**	0.573	0.94	0.573	0.714	.000
	Within Groups					
	Total					
Performance	**Between Groups**	0.948	0.133	0.948	0.942	0.178
	Within Groups					
	Total					
Advance Technology	**Between Groups**	0.77	0.847	0.77	0.259	0.267
	Within Groups					
	Total					
Colour	**Between Groups**	0.32	0.206	0.32	.000	0.211
	Within Groups					
	Total					
Size	**Between Groups**	0.148	0.712	0.148	0.591	.000
	Within Groups					
	Total					
Factory fitted CNG	**Between Groups**	0.19	0.723	0.19	0.447	0.66
	Within Groups					
	Total					
Interior and Exterior design	**Between Groups**	0.814	0.733	0.814	0.25	0.939
	Within Groups					
	Total					
Resale value	**Between Groups**	0.296	0.947	0.296	0.95	.000
	Within Groups					
	Total					
Mileage	**Between Groups**	0.065	0.337	0.065	0.385	0.016
	Within Groups					

	Total					
High Boot Space	**Between Groups**	0.992	0.291	0.992	0.574	0.322
	Within Groups					
	Total					
After sales service	**Between Groups**	0.923	0.401	0.923	0.142	0.583
	Within Groups					
	Total					
Availability of CNG cars	**Between Groups**	0.109	0.86	0.109	0.766	0.218
	Within Groups					
	Total					
Environment friendly	**Between Groups**	0.332	0.246	0.332	0.874	0.118
	Within Groups					
	Total					
Availability of CNG stations	**Between Groups**	0.931	0.318	0.931	0.253	0.378
	Within Groups					
	Total					
More life of CNG car	**Between Groups**	0.958	0.872	0.958	0.589	0.001
	Within Groups					
	Total					
Low maintenance cost	**Between Groups**	0.654	0.555	0.654	0.688	0.878
	Within Groups					
	Total					
Sustainability of Engine	**Between Groups**	0.333	0.141	0.333	0.364	0.127
	Within Groups					
	Total					

Table.3

In the above table.3, One-way ANOVA is applied to study the relation between demographic factors of automotive factors and preferred attributes of CNG cars. It has been seen that all values of 'Gender', 'Age', 'Education', 'Employment status' and 'Annual Income' are more than .05. Hence, null hypothesis is accepted that there is no significant difference in the preferences of these demographic factors regarding CNG cars. Gender, age and education consider all the attributes of CNG cars important. But in Employment status, Colour attribute has .000 value which is less than significant value .05. Hence null hypothesis is rejected in this case and it can be said that there is a significant difference in the preferences of different Employment levels in regard of colour of CNG cars. Similarly 'Annual Income' shows .000, .000, .000, .001 values with respect to speed, size, resale value and more life of CNG cars which is less than .05. Therefore, null hypothesis has been rejected and it can be said that customers of different income levels have different perspective for speed, size, resale value and life of CNG car. Safety, factory fitted CNG, interior and exterior design, mileage, boot space,

after sales service, availability of CNG cars and filling stations, engine sustainability, environment friendly are the most preferred attributes for CNG car as per this study.s

e) H0: There is no significant difference in the preference of the customers in NCR and Non-NCR areas regarding CNG car.
H1: There is no significant difference in the preference of the customers in NCR and Non-NCR areas regarding CNG car.

Descriptives									
		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
						Lower Bound	Upper Bound		
Brand	NCR	100	3.28	1.334	0.133	3.02	3.54	1	5
	NON-NCR	100	2.7	1.307	0.131	2.44	2.96	1	5
	Total	200	2.99	1.349	0.095	2.8	3.18	1	5
Price	NCR	100	4.25	1.201	0.12	4.01	4.49	1	5
	NON-NCR	100	3.89	1.428	0.143	3.61	4.17	1	5
	Total	200	4.07	1.328	0.094	3.88	4.26	1	5
Safety	NCR	100	4.38	1.196	0.12	4.14	4.62	1	5
	NON-NCR	100	4.05	1.29	0.129	3.79	4.31	1	5
	Total	200	4.22	1.252	0.089	4.04	4.39	1	5
Speed	NCR	100	3.47	1.352	0.135	3.2	3.74	1	5
	NON-NCR	100	3.29	1.387	0.139	3.01	3.57	1	5
	Total	200	3.38	1.369	0.097	3.19	3.57	1	5
Performance	NCR	100	4.33	0.975	0.097	4.14	4.52	1	5
	NON-NCR	100	3.8	1.407	0.141	3.52	4.08	1	5
	Total	200	4.07	1.236	0.087	3.89	4.24	1	5
Advance Technology	NCR	100	3.79	1.183	0.118	3.56	4.02	1	5
	NON-NCR	100	3.43	1.335	0.134	3.17	3.69	1	5
	Total	200	3.61	1.271	0.09	3.43	3.79	1	5
Colour	NCR	100	3.21	1.365	0.137	2.94	3.48	1	5
	NON-NCR	100	3.16	1.405	0.141	2.88	3.44	1	5
	Total	200	3.19	1.382	0.098	2.99	3.38	1	5
Size	NCR	100	3.67	1.295	0.13	3.41	3.93	1	5
	NON-NCR	100	3.43	1.402	0.14	3.15	3.71	1	5
	Total	200	3.55	1.352	0.096	3.36	3.74	1	5
Factory fitted CNG	NCR	100	4.26	1.236	0.124	4.01	4.51	1	5
	NON-NCR	100	3.98	1.435	0.144	3.7	4.26	1	5
	Total	200	4.12	1.343	0.095	3.93	4.31	1	5
Interior and Exterior design	NCR	100	4.14	1.189	0.119	3.9	4.38	1	5
	NON-NCR	100	4.03	3.243	0.324	3.39	4.67	1	33

	Total	200	4.09	2.437	0.172	3.75	4.42	1	33
Resale value	NCR	100	3.44	1.5	0.15	3.14	3.74	1	5
	NON-NCR	100	3.7	1.453	0.145	3.41	3.99	1	5
	Total	200	3.57	1.479	0.105	3.36	3.78	1	5
Mileage	NCR	100	4.46	0.979	0.098	4.27	4.65	1	5
	NON-NCR	100	4.4	1.128	0.113	4.18	4.62	1	5
	Total	200	4.43	1.054	0.075	4.28	4.58	1	5
High Boot Space	NCR	100	4.24	1.138	0.114	4.01	4.47	1	5
	NON-NCR	100	3.67	1.429	0.143	3.39	3.95	1	5
	Total	200	3.96	1.32	0.093	3.77	4.14	1	5
After sales service	NCR	100	4.56	0.914	0.091	4.38	4.74	1	5
	NON-NCR	100	4.02	1.295	0.129	3.76	4.28	1	5
	Total	200	4.29	1.15	0.081	4.13	4.45	1	5
Availability of CNG cars	NCR	100	4.57	0.891	0.089	4.39	4.75	1	5
	NON-NCR	100	4.6	0.943	0.094	4.41	4.79	1	5
	Total	200	4.59	0.915	0.065	4.46	4.71	1	5
Environment friendly	NCR	100	4.28	1.055	0.105	4.07	4.49	1	5
	NON-NCR	100	3.97	1.381	0.138	3.7	4.24	1	5
	Total	200	4.13	1.236	0.087	3.95	4.3	1	5
Availability of CNG stations	NCR	100	4.5	1	0.1	4.3	4.7	1	5
	NON-NCR	100	4.22	1.16	0.116	3.99	4.45	1	5
	Total	200	4.36	1.089	0.077	4.21	4.51	1	5
More life of CNG car	NCR	100	4.22	1.26	0.126	3.97	4.47	1	5
	NON-NCR	100	3.98	1.392	0.139	3.7	4.26	1	5
	Total	200	4.1	1.33	0.094	3.91	4.29	1	5
Low maintenance cost	NCR	100	4.52	1.03	0.103	4.32	4.72	1	5
	NON-NCR	100	4.01	1.33	0.133	3.75	4.27	1	5
	Total	200	4.26	1.213	0.086	4.1	4.43	1	5
Sustainability of Engine	NCR	100	4.34	1.085	0.108	4.12	4.56	1	5
	NON-NCR	100	4.01	1.439	0.144	3.72	4.3	1	5
	Total	200	4.18	1.282	0.091	4	4.35	1	5

Table.4

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Brand	**Between Groups**	16.82	1	16.82	9.649	0.002
	Within Groups	345.16	198	1.743		

	Total	361.98	199			
Price	**Between Groups**	6.48	1	6.48	3.724	0.055
	Within Groups	344.54	198	1.74		
	Total	351.02	199			
Safety	**Between Groups**	5.445	1	5.445	3.52	0.062
	Within Groups	306.31	198	1.547		
	Total	311.755	199			
Speed	**Between Groups**	1.62	1	1.62	0.863	0.354
	Within Groups	371.5	198	1.876		
	Total	373.12	199			
Performance	**Between Groups**	14.045	1	14.045	9.586	0.002
	Within Groups	290.11	198	1.465		
	Total	304.155	199			
Advance Technology	**Between Groups**	6.48	1	6.48	4.072	0.045
	Within Groups	315.1	198	1.591		
	Total	321.58	199			
Colour	**Between Groups**	0.125	1	0.125	0.065	0.799
	Within Groups	380.03	198	1.919		
	Total	380.155	199			
Size	**Between Groups**	2.88	1	2.88	1.581	0.21
	Within Groups	360.62	198	1.821		
	Total	363.5	199			
Factory fitted CNG	**Between Groups**	3.92	1	3.92	2.185	0.141
	Within Groups	355.2	198	1.794		
	Total	359.12	199			
Interior and Exterior design	**Between Groups**	0.605	1	0.605	0.101	0.75
	Within Groups	1180.95	198	5.964		
	Total	1181.555	199			
Resale value	**Between Groups**	3.38	1	3.38	1.55	0.215
	Within Groups	431.64	198	2.18		
	Total	435.02	199			
Mileage	**Between Groups**	0.18	1	0.18	0.161	0.688

	Within Groups	220.84	198	1.115		
	Total	221.02	199			
High Boot Space	**Between Groups**	16.245	1	16.245	9.737	0.002
	Within Groups	330.35	198	1.668		
	Total	346.595	199			
After sales service	**Between Groups**	14.58	1	14.58	11.612	0.001
	Within Groups	248.6	198	1.256		
	Total	263.18	199			
Availability of CNG cars	**Between Groups**	0.045	1	0.045	0.054	0.817
	Within Groups	166.51	198	0.841		
	Total	166.555	199			
Environment friendly	**Between Groups**	4.805	1	4.805	3.181	0.076
	Within Groups	299.07	198	1.51		
	Total	303.875	199			
Availability of CNG stations	**Between Groups**	3.92	1	3.92	3.343	0.069
	Within Groups	232.16	198	1.173		
	Total	236.08	199			
More life of CNG car	**Between Groups**	2.88	1	2.88	1.633	0.203
	Within Groups	349.12	198	1.763		
	Total	352	199			
Low maintenance cost	**Between Groups**	13.005	1	13.005	9.198	0.003
	Within Groups	279.95	198	1.414		
	Total	292.955	199			
Sustainability of Engine	**Between Groups**	5.445	1	5.445	3.354	0.069
	Within Groups	321.43	198	1.623		
	Total	326.875	199			

Table.5

In table.5 the significant value of brand, performance, high boot space, after sale service and low maintenance attributes is less than .05 value. Hence null hypothesis is rejected for these attributes and it can be said that there is a significant difference in the preferences of NCR and Non-NCR in respect of brand, performance, high boot space, after sale service and low maintenance.

VI. CONCLUSION

From this study it is to be concluded that CNG car is going to be a booster in automobile industry. We know that the future is electric car but it is not affordable by all customers who want to buy an alternate fuel car. It still needs infrastructure to grow more. The majority of customers are buying small hatchbacks and cheap cars. So, CNG car is the best option for these customers.

VII. Suggestions

It has been long time that CNG is used as an alternative fuel in transportation but it is never used upto the mark. Every time when petrol prices rise up, the CNG gained popularity but after some time people again move on to the conventional fuels. The CNG is again gaining popularity and people have started to fit CNG kits in their cars means social stigma is also vanishing at a good speed. People are becoming more friendly with CNG cars. The government should focus more on the availability of CNG fuel stations so that it could be easy for CNG car users to get the fuel at needed time. It is also a matter of benefit that if CNG get finished in the car you can run the car with other liquid fuel at the same time. The companies need to focus more on the technology and design of the CNG cars. The CNG tank can be fitted below the beneath the boot so that boot space cannot be occupied. So, it is suggested that government should introduce incentives for CNG cars and automobile companies should focus on the research and development side of the CNG cars.

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