
Customer satisfaction on Indian domestic gas delivery

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Abstract: LP gas is extremely versatile and portable. It can be transported using sea, rail or road transport. LP gas is available in a wide variety of packaging and storage options and is available in even the remotest of areas. LP gas is used throughout the home, as a gas to cook with, a source of fuel for central heating and hot water. LP gas is also commonly used in the agricultural sector and as a lower emission automotive transportation fuel. Indian households are fully dependent on LPG cylinders. Therefore, attention needs to be diverted towards customers' perception on quality of supply of LPG gases and its related services so that distributors can focus on specific areas of concern to improve customer satisfaction. In this paper, attempt is made for concrete and measurable improvements in the service through an extensive study on customer's perception and various extents of the LPG gas supply. Some suggestions are provided for the improvement in service quality in Indian context.

Keywords: customer satisfaction; service quality; LPG gas delivery.

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1 Introduction

The World LP Gas Association (WLPGA) is the authoritative global voice for the LP Gas industry. The WLPGA is a worldwide industry association which represents the interests of the liquefied petroleum gas (LPG) industry globally. The WLPGA promotes the use of LP Gas to foster a cleaner, healthier and more prosperous world.

Across the world, LPG industry is constantly facing strong competition. LPG sector is constantly facing challenges from the market. The systematic delivering service is to be systemise for maintaining customer allegiance. With these crowded competitive business environments, utilities have to spread his business processes in every area. Quality control are refer for ensuring the quality of a service or product. Quality control factor have been always important for an industry. All over the world, gas prices are one of the major issues. The reduced prices in global market can binds the customers. Pati et al. (2010) explained that in business environment employee's attitude is very much necessary for increasing organisational performances.

In India, for establishing service quality standard of LPG several surveys have to be organised to obtain the problems associated with the service quality evaluation and customer satisfaction of LPG industries for getting cost effective solutions. In some parts of India, performance standard is up to the mark of customer satisfactory level but on other hand there are some places where customers are not satisfied with the LPG industry. Pricing and distribution is the basic problems faced by Indian customers. The gas distribution problem occurs due to the lack of interest among the consumers.

In today's LPG market, complains registration is done through computerised process by the customers and the customers are becoming more sensitive to LPG gas problems. Customers also have the right to select their suppliers of LPG as well as good service quality. For understanding these complex processes and developing tools, factor analysis has been conducted. On the basis of questionnaire survey, a model has been proposed for helping the practitioners to improve the service quality.

2 Literature review

Customer satisfaction is a term which is frequently used in marketing. This is the main goal of any organisation in the world. An organisation progresses only if they can satisfy their customer by the performance of their product. If we see from the customer's point of view then a customer only be satisfied when the product that is bought by the customer has met the expectation of the customer. This expectation can be like low cost, high performance, high resistivity, rigidity, etc., Khan et al. (2009) explained regarding the internet banking in India. A recent study by Ojo (2010) in the telecommunication industry showed that a positive relationship exists between service quality and customer satisfaction. The same relationship is demonstrated by Oyeniya and Abiodun (2008). A utility company's quality-of-service applies to the delivery of services to the end user. 'delivery' in this context includes activities preceding and following the service delivery and the network components (hardware and software) through which those services are provided customer satisfaction of an organisation can be defined as the percentages of customer are satisfied by the product or the services are provided by the particular organisation. A main term quality has a major role in this customer satisfaction program.

The customer satisfaction plays a major role in LPG industries. But service industries has become very competitive nowadays.

The liquid petroleum gas was discovered by Dr. Walter Snelling in 1912. From 1912 to 1920 the developing of LPG has occurred. The first time LPG had helped us to cook in 1912 and to drive a car in 1913. The selling of this LPG gas was started at 1920. Vinayagamoorthy and Shankar (2011) have surveyed on Indian gas to understand the level of service satisfaction in Salem. According to Priyan and Karthihaiselvi (2010) in India most of the LPG customers are facing problem in late gas distribution process. Indian customers mostly prefer the Indene gas for quick response, economic, convenience and cleanliness.

The Indian Oil Corporation Limited, one of the Maharatna status companies in India, has their LPG gas products named Indene. Beside this there are also gasses like Bharat gas and Hp in India.

Service quality can be defined as the comparison between expectation and performance. From this state it is clear that if some industry has that level of performance of the product that meet their customer's expectation, then only service quality of that particular industry will call good.

According to Sandhu and Bala (2011), in today's competitive market the service quality turn in to a highly instrumental coefficient. According to Charoenpong (2003) the service quality is the measurement factor of customer satisfaction. If we perceived the process quality and output quality then service quality is a function of pre purchase customers' expectation. Parasuraman et al. (1985–1988) have defined the service quality as the gaps created between the customers' expectation from the service and the service experience of the industry.

From 1980s the increment of the interest on the topic of service quality is in quite very high speed. Because all the developed and developing countries have their service economics. And there is another reason behind this high rate of incrimination rate of the service quality is the competitive industrial market, because this service quality provides a winning competitive strategy. Actually the service quality has become a source of success for almost every company in the world. The essentiality of understanding the different dimensions of service is the basic need of almost every company.

Customer service is an activity which is used by the organisations to win and retain the customers' expectation. There are several elements under this customers' service. They are:

- 1 organisation
- 2 customer care
- 3 communication
- 4 front line people
- 5 leadership.

There are two types of service qualities:

- 1 external service quality
- 2 internal service quality.

External service quality is the quality of service has gained as per promise with the customers' expectation and variable preferences of the customers. This ESQ is the weapon of almost every company to attract the new customers, to increase the productivity, to lead higher in the share market, to enhance the financial performance, to increase the profitability.

In the process of production, when the employees come into the contact with the customers to provide the service, then this internal service quality comes into the picture. Here the human factor forms the key factor of the service quality of the organisation as the human, who has presented to the customer for service, reflects the service of the organisation. So it is obvious for the service marketers to motivate the employees for a better serve to the customer. Internal service quality is thought of the employees regarding their job, colleagues and company. It mainly depends upon the feeling about work life of the employee. It can be measure by benefits, pay, opportunities, openness, job security, pride in work, friendliness and fairness in the organisation.

Because it measures and manages the service quality with the help of technological techniques. There is also a technique that is called CARTER with an extra dimension.

Service quality differs person to person with respect to the condition. It generally can be defined as the degree and direction of the discrepancy between customer perception and expectation. There are some dimensions like reliability, assurance, empathy, responsiveness and tangibles. But for reliability there is service as promised, providing priority to within time service, maintain error free record, etc., Franceschini et al. (2009) described that the evaluation of service quality is usually carried out using a suitable set of performance indicators (PIs). Gopal (2009) discussed that the high-conformance quality services of dealers and value-added customer relationships offering high customer satisfaction develop lifetime customer value and strengthen the customer-dealer relationship. Boxer and Rekettye (2011) explained about the relation between emotional intelligence and innovation increased the perceived value of service in the customers' eyes, leading to higher affective commitment and increased loyalty to the company. Ulkuniemi and Pekkarinen (2011) in their study put forth how modularity makes services visible and how it enables the customers to participate in service co-creation. Seegy et al. (2008) analysed the role of innovations in the service sector, to analyse how innovation activities are organised and to identify the factors of success. The increased involvement and demands of the public, and the awareness by utility. Customers can transfer their pleasure about the service, the place where the service is offered and their judgments about their previous experiences. Learning the customer's reactions to the service process plays an important role in increasing the reactions of pleasure and satisfaction.

3 Status of Indian LPG gas

There are four public sectors oil marketing company, they are Indian Oil Corporation Limited, Hindustan Petroleum Corporation Limited, Bharat Petroleum Corporation Limited and IBP. They distribute the cylinders to the customers through several distributors in different region. Indane is one of the largest packed LPG brands and it has been coveted 'consumer super brand' status by super brand council of India. It has launched in the time of mid 60s. There is also Bharat gas from Bharat petroleum has been dominating the LPG market since three decades. This Bharat gas has brought some

innovative offerings to the customer for customer satisfaction, they are like easy access to consumers including online access, responsively home delivery, LPG supply through pipe line to the mega residential complex, through rural marketing vehicle they can supply the LPG to the rural areas and the remote areas. Presently in India the LPG market is government dominated and there is quite low competition. There are more domestic uses than non domestic use. The ratio between the domestic and non-domestic user is 9 : 1. Demand of LPG is growing at the rate of 6% per annum.

Till the date of 1st April of 2005 the no. of LPG customers are served about 845 Lakh through 9,001 LPG distributors of Indian LPG companies. The 1.2 million Indane cylinders are delivered per day to the door of 53 million houses. Bharat gas is also serving 25 million houses. The no of retail outlet in India is about 40,819 till the year of 2011. IOCL has the largest retail outlet in India with no. of 19,057 till the year of 2011. This no. of retail outlet is continuously increasing. The no, of LPG distributor is 9,686 till the year of 2010.

3.1 Research methodology

For determining the customer satisfaction with service quality of LPG utility industry, a questionnaire is designed for all type of consumers and as per these consumers questionnaire survey is conducted. The questionnaire consists of 24 items for investigating the respondent's perception about the service quality of LPG industry. The 24 items explain how the service is delivered to consumers. 245 questionnaires are distributed to many consumers by phone, personal contact and internet. Among them 188 responses are obtained. The response rate is 76.73% and is good for this type of survey. A five point Likert scale is designed for each item (1 = totally disagree, 2 = somewhat disagree, 3 = no reply, 4 = somewhat agree, 5 = totally agree). After collecting the data, regression, correlation and linear discriminate analysis is done. First of all factor analysis is done as it is a statistical method used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables. After factor analysis regression analysis and correlation analysis is done to find the relation between independent variable (factors) and dependent variable (service satisfaction on gas delivery) and among independent variables. Lastly discriminate analysis is implemented to model the difference between the classes of data.

The item details of questionnaire are given in Table 1.

4 Results and discussions

The collected data's or responses of LPG gas cylinder consumers are subjected to various statistical analyses such as factor analysis, and Kaiser-Meyer-Olkin (KMO) test. Factor analysis on 188 useful responses has been conducted using principal component method followed by varimax rotation via SPSS 19.0. Twenty three items were loaded more than 0.5 among them 16 for measuring customer satisfaction. These 23 items categorised under eight dimensions constituting various variables for proposed instrument for measuring the customer satisfaction. The items that fail to get loaded less than 0.5 were not considered for further analysis. They refer to items 1, 4, 9, 15, 18, 19, 21 and 23. Percentage of total variance explained was found to be 76.9% which is an acceptable value for the principal component varimax rotated factor loading procedure. The internal

consistency of the actual survey data were tested by computing the Cronbach's alpha (α). The value of alpha for each dimension is shown in Tables 2 and 3 and the value of alpha for all dimensions is .7884 which is well above the acceptable value of 0.70 for demonstrating internal consistency of the established scale (Nunnally, 1998). The value of KMO, which is a measure of sampling adequacy, was found to be 0.68 indicating that the factor analysis test has proceeded correctly and the sample used is adequate as the minimum acceptable value of KMO is 0.5. Therefore, it can be concluded that the matrix did not suffer from multicollinearity or singularity. The result of Bartlett test of sphericity shows that it is highly significant (sig. = 0.000) which indicates that the factor analysis processes is correct and suitable for testing multidimensionality. Therefore, the statistical tests has resulted that the proposed items and all dimensions of instruments are sound enough for analysis. In Tables 1 and 2 the dimensions are named like performance, feature, reliability, conformance, durability, serviceability, aesthetics and prestige according to the character.

Table 1 The questionnaires for all type of consumers

<i>S. no.</i>	<i>Items</i>	<i>Rank</i>				
1	Customer care centres are available for listening complains.	1	2	3	4	5
2	The bill is paid after accepting money.	1	2	3	4	5
3	Money is deposited in consumer's bank after getting subsidy.	1	2	3	4	5
4	The weight of gas is done at the time of delivery.	1	2	3	4	5
5	The delivery boys are friendly and good behaved.	1	2	3	4	5
6	Provide immediately what ever is promised.	1	2	3	4	5
7	Gas cylinder and accessories are checked at the time of installation.	1	2	3	4	5
8	No ques./long lines for applying for connection.	1	2	3	4	5
9	No extra charges are demanded for home delivery.	1	2	3	4	5
10	The customers are valued.	1	2	3	4	5
11	The bill is paid after accepting money.	1	2	3	4	5
12	Immediate steps are taken after listening the complain/filling up gas.	1	2	3	4	5
13	The gas is delivered door to door.	1	2	3	4	5
14	Complains can be given by phone/mail/personal contact.	1	2	3	4	5
15	Provide pleasant knowledgeable employees.	1	2	3	4	5
16	For any case of transfer the deposited money are repaid.	1	2	3	4	5
17	Special subsidies are provided to all senior citizens.	1	2	3	4	5
18	Procedures are made easy for the consumers to take gas connection.	1	2	3	4	5
19	As per the Govt. rules the consumers are not harassed for identity proof.	1	2	3	4	5
20	No extra charges are demanded for home delivery.	1	2	3	4	5
21	As per the Govt. rule the money is charged.	1	2	3	4	5
22	Provide pleasant knowledgeable employees.	1	2	3	4	5
23	The clear written manuals are provided for ease of understanding.	1	2	3	4	5
24	The customers are satisfied with the type of service provided.	1	2	3	4	5

Table 2 Factor analysis

<i>Dimension</i>	<i>Item</i>	<i>Factor 1</i>	<i>Factor 2</i>	<i>Factor 3</i>	<i>Factor 4</i>	<i>Factor 5</i>	<i>Factor 6</i>	<i>Factor 7</i>	<i>Factor 8</i>	<i>Chrobanch's alpha</i>
Performance	7	0.666								0.572
	16	0.771								0.711
	20	0.517								0.517
Feature	12		0.726							0.689
	17		0.719							0.719
Reliability	13			0.761						0.714
	3			0.567						0.643
Conformance	11				0.686					0.757
	21				0.825					0.649
Durability	2					0.656				0.632
	6					0.801				0.715
Serviceability	8						0.519			0.720
	14						0.799			0.574
Aesthetics	5							0.505		0.540
	22							0.812		0.719
Prestige	10								-0.864	0.786

Table 3 Naming of constructs

<i>Dimension</i>	<i>Item</i>	<i>Naming of constructs</i>
Performance	7	Gas cylinder and accessories are checked at the time of installation.
	16	For any case of transfer the deposited money are repaid.
	20	No extra charges are demanded for home delivery.
Feature	12	Immediate steps are taken after listening the complain/filling up gas.
	17	Special subsidies are provided to all senior citizens.
Reliability	13	The gas is delivered door to door.
	3	The weight of gas is done at the time of delivery.
Conformance	11	The bill is paid after accepting money.
	21	As per the Govt. rule the money is charged.
Durability	2	Customer care centres are available for listening complains.
	6	For any case of transfer the deposited money are repaid.
Serviceability	8	No ques./long lines for applying for connection.
	14	Complains can be given by phone/mail/personal contact.
Aesthetics	5	The delivery boys are friendly and good behaved.
	22	Provide pleasant knowledgeable employees.
Prestige	10	The customers are valued.

Table 4 Ranking of CONSTRUCTs

<i>Dimension</i>	<i>Communalities variance explained</i>	<i>Rank</i>
Performance	18.7	1
Feature	10.7	2
Reliability	8.2	3
Conformance	7.8	4
Durability	7.5	5
Serviceability	7.1	6
Aesthetics	6.2	7
Prestige	5.9	8

The items under each dimension are shown in Table 3. In Table 4, these dimensions are ranked according to its importance.

After naming the constructs further correlation and regression analysis is done to find the relation between the elements present in the constructs.

5 Correlation analysis

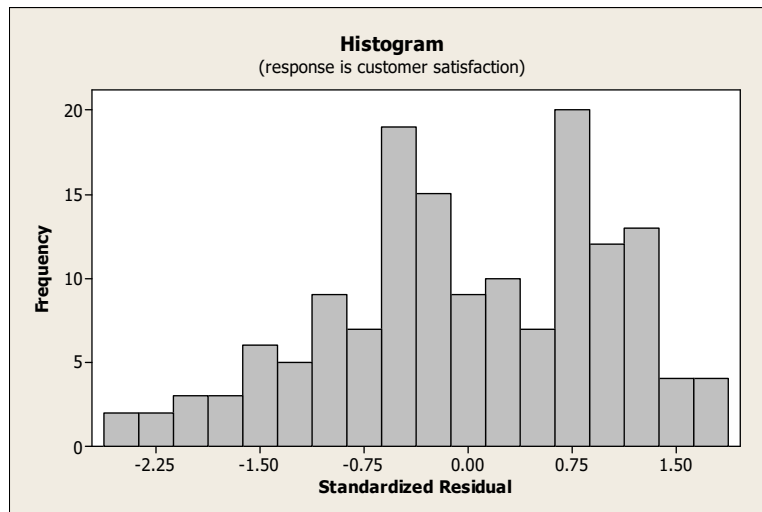
Correlation is a measure of the relation between two or more variables. The measurement scales used should be at least interval scales, but other correlation coefficients are available to handle other types of data. Correlation coefficients can range from -1.00 to $+1.00$. The value of -1.00 represents a perfect negative correlation while a value of $+1.00$ represents a perfect positive correlation. A value of 0.00 represents a lack of correlation.

Table 5 Correlation analysis

	<i>Performance</i>	<i>Feature</i>	<i>Reliability</i>	<i>Conformance</i>	<i>Durability</i>	<i>Serviceability</i>	<i>Aesthetics</i>	<i>Prestige</i>
<i>Performance</i>	1							
<i>Feature</i>	0.306	1						
	0.000							
<i>Reliability</i>	0.184	0.323	1					
	0.029	0.000						
<i>Conformance</i>	0.047	0.250	0.349	1				
	0.577	0.003	0.000					
<i>Durability</i>	-0.043	0.083	-0.129	0.333	1			
	0.069	0.329	0.127	0.000				
<i>Serviceability</i>	-0.112	0.059	-0.062	-0.055	0.242	1		
	0.185	0.486	0.469	0.514	0.004			
<i>Aesthetics</i>	0.160	-0.161	-0.003	0.005	0.073	0.310	1	
	0.059	0.056	0.972	0.951	0.388	0.000		
<i>Prestige</i>	0.064	0.235	0.100	-0.076	0.048	0.209	-0.094	1
	0.448	0.005	0.239	0.368	0.569	0.013	0.266	

Person correlation was used to describe the strength and direction of the relationship between two variables (Pallant, 2001). The values of the correlation coefficients (r) indicate the strength of the relationship between variables. The computation of the person correlation coefficient was performed to obtain an understanding of the relationship between all variables in the study. The value of the correlation coefficients (r) indicates the strength of the relationship between the variables. The average score of the multi-items for a construct was computed since a single construct in the questionnaire was measured by multiple items, and the score was used in further analysis such as correlation analysis and regression analysis. In Table 5; it is interesting to observe that highest degree of significant positive correlation exists between constructs responsiveness and compensation. A high degree of significant positive correlation is also observed between dimension performance and feature, feature and reliability, reliability and confirms, durability and serviceability and serviceability and aesthetics. It is clear from this, that the Indian customers are satisfied with the constructs like performance, feature, reliability, confirms, durability, serviceability and aesthetics as these constructs are having positive relations with each other. Again negative correlations are observed in the last rows containing prestige and serviceability and aesthetics as these correlations are of low degree. From the lowest correlations it is confirm that these constructs are not suitable for India customers and they do not have good relations with each other.

Figure 1 Standardised residual for customer satisfaction for LPG gas distribution (see online version for colours)



5.1 The regression analysis

To determine the effect of customer satisfaction on LPG gas multiple regression analysis is done. In this type of analysis first of all variables are detected into two types like dependent variable and independent variable:

- Independent variables: The proposed eight dimensions are treated as the independent variables for the regression equation. They are: performance, feature, reliability, conformance, durability, serviceability, aesthetics and prestige.
- Dependent variable (Y): The customer satisfaction in the quality of LPG cylinder.

The results of regression analysis for customers' perceived online shopping service quality are presented in Table 6. The R^2 for this model is .678, with $F = 5431.029$. All independent variables, which are performance, feature, reliability, conformance, durability, serviceability, aesthetics and prestige had statistically significant and positive relationships with the customer satisfaction in LPG gas delivery service, where $p \leq 0.05$. The dimension feature are the most significant independent variable with the largest beta coefficient ($\beta = 0.94820$) at the 0.002 significance level, followed by the dimension prestige ($\beta = 0.91345$) at the 0.004 significance level, and dimensions reliability and serviceability are the insignificant variable. The VIF value of less than ten for all variables show that the problem of multi-collinearity have not existed.

The mathematical representation of the regression equation is as follows:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8$$

where

b_0 Constant, Value of dependent variable when value of independent variables are zero.

Also called intercepts, because it determines where the regression line meets the Y-axis.

b_1, \dots, b_8 Coefficients, that represents the estimated change in mean value of dependent variable for each unit change in the independent variable value.

$X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8$ are representing the eight constructs found from factorial analysis. Then the regression equation will be in the following form:

$$Y = 1.8144 - 0.00926X_1 + 0.94820X_2 + 0.09400X_3 + 0.06994X_4 + 0.01219X_5 + 0.00524X_6 + 0.06918X_7 + 0.91345X_8$$

Table 6 Regression analysis

	<i>Coefficients</i>	<i>Std. error coefficient</i>	<i>T</i>	<i>P</i>
	<i>1.8144</i>	<i>0.6815</i>	<i>1.19</i>	<i>0.023</i>
Performance	-0.00926	0.06636	2.14	0.004
Feature	0.94820	0.07851	1.40	0.002
Reliability	0.09400	0.08252	-1.23	0.130
Conformance	0.06994	0.06695	-0.71	0.007
Durability	0.01219	0.07612	0.079	0.005
Serviceability	0.00524	0.08089	2.27	0.446
Aesthetics	0.06918	0.08114	0.76	0.010
Prestige	0.91345	0.08007	-1.47	0.004

Table 7 Sector-wise difference for performance

Independent items	Mean values			Wilks' Lambda	F-value	Significance	Min. D squared	Between group
	HP gas agency	Indian gas agency	Bharat gas agency					
Item 7	3.8947	4.2143	4.1765	0.978	0.580	0.575	0.002	2 and 3
Item 16	2.6842	4.1429	3.8235	0.721	9.074	0.000	0.092	2 and 3
Item 20	3.1053	3.7143	3.8235	0.904	2.216	0.127	0.010	2 and 3

Notes: At each step, the question that minimises the overall Wilks' Lambda is entered.

5.2 Linear discriminate analysis

LDA is a pattern recognition method providing a classification model based on the combination of variables that best predicts the category or group to which a given object belongs. In this study, the independent variables are service satisfaction on group variables are three types of gas delivery agencies (Agency Type 1 – HP gas, Agency Type 2 – Indian gas and Agency Type 3 – Bharat gas Agency). The procedures focused on finding out significant difference of variables (items) under each dimension in three agency types. The responses are divided into three group's agency wise. In linear discriminant analysis, the minimum F entry value (F_{\min}) is set to 3.84 and the maximum F removal value (F_{\max}) is set to 2.71 since these are default setting values in software SPSS. Stepwise discriminant analysis is carried out for all dimensions obtained in factor analysis. The decision is made based on Wilks' Lambda because a lambda of 1.00 occurs when observed group means are equal (all the variance is explained by factors other than difference between those means) while a small lambda occurs when within-groups variability is small compared to the total variability. A small lambda indicates that group means appear to differ. It can be seen from Table 7 that Item 7, 16 and 20 differ significantly in Indian gas (Agency Type 2) and Bharat gas (Agency Type 3) for dimension one (performance). For example, Lambda of 0.721 has a significant value (sig. = 0.000) for item 16; thus, the group means appear to differ for Agency Types 2 and 3. As far as other dimensions are concerned, no difference is found in any item for Hp gas agency vs. Indian gas agency and Hp gas agency vs. Bharat gas agency.

However, it is to be noted that not a single item in other dimensions shows statistically significant difference agency wise.

6 Conclusions, limitations and future work

For the LPG market of India this is an important competitive time for them LPG companies. Like the main LPG companies like Indian Oil Corporation Limited, Hindustan Petroleum Limited, Bharat Petroleum Limited should compete to survive in the market. But there is a big chance for other new LPG companies to get on the field of LPG market. Now service quality is the only key to success. If the customers are satisfied with the company then only a company can survive. This data are collected from the various part of the India. From the result we can see that the LPG customers of India are not fully satisfied with the companies. So it is the time for the existing companies to take some serious and effective steps for better service quality to satisfy their customers.

This paper explores the customer satisfaction of LPG gas delivery service in India from customer's perspective. The study has adopted factor analysis to a survey questionnaire specifically designed to capture perception of the customers in LPG gas delivery. The factor analysis with varimax rotation results eight dimensions such as out of 24 items, 16 items are loaded on eight dimensions having factor loading score of 0.5. Subjected to various statistical analyses such as factor analysis, and KMO test. Factor analysis on 188 useful responses has been conducted using principal component method followed by varimax rotation via SPSS 19.0. Twenty three items were loaded more than 0.5 among them 16 for measuring customer satisfaction. These 23 items categorised under eight dimensions constituting various variables for proposed instrument for measuring the customer satisfaction. The items that fail to get loaded less than 0.5 were

not considered for further analysis. They refer to items 1, 4, 9, 15, 18, 19, 21 and 23. Percentage of total variance explained was found to be 76.9% which is an acceptable value for the principal component varimax rotated factor loading procedure. The internal consistency of the actual survey data were tested by computing the Cronbach's alpha (α). The value of alpha for all dimensions is .7884 which is well above the acceptable value of 0.70 for demonstrating internal consistency of the established scale (Nunnally, 1998). The value of KMO, which is a measure of sampling adequacy, was found to be 0.68 indicating that the factor analysis test has proceeded correctly and the sample used is adequate as the minimum acceptable value of KMO is 0.5. Therefore, it can be concluded that the matrix did not suffer from multicollinearity or singularity. The result of Bartlett test of sphericity shows that it is highly significant (sig. = 0.000) which indicates that the factor analysis processes is correct and suitable for testing multidimensionality. Therefore, the statistical tests has resulted that the proposed items and all dimensions of instruments are sound enough for analysis. The dimensions are named like performance, feature, reliability, conformance, durability, serviceability, aesthetics and prestige according to the character.

A high degree of significant positive correlation is also observed between dimension performance and feature, feature and reliability, reliability and confirms, durability and serviceability and serviceability and aesthetics. It is clear from this, that the Indian customers are satisfied with the constructs like performance, feature, reliability, confirms, durability, serviceability and aesthetics as these constructs are having positive relations with each other. Again negative correlations are observed in the last rows containing Prestige and serviceability and aesthetics as these correlations are of low degree. From the lowest correlations it is confirm that these constructs are not suitable for India customers and they do not have good relations with each other. All independent variables, which are performance, feature, reliability, conformance, durability, serviceability, aesthetics and prestige had statistically significant and positive relationships with the customer satisfaction in LPG gas delivery service, where $p \leq 0.05$. The dimension feature are the most significant independent variable with the largest beta coefficient ($\beta = 0.94820$) at the 0.002 significance level, followed by the dimension prestige ($\beta = 0.91345$) at the 0.004 significance level, and dimensions reliability and serviceability are the insignificant variable.

The findings therefore can be generalised to a given period, a pre-defined market, and economic scenarios. A longitudinal study could probably overcome or alleviate this limitation. The study also is confined to the Indian scenario. Geo-demographic could have a great deal of influence on the customer expectations and perceptions. It is also not amiss to mention here that the zone of tolerance could vary from one customer to another. This variation has not been assessed in the current study.

In future studies, the customer satisfaction on domestic gas delivery may be evaluated for other countries. Furthermore, a small sample may not be the representative of the whole population and hence, in future, the research can be conducted by taking a large sample to facilitate a robust examination of the service quality of the LPG gas supply. The future study can also be conducted to identify the relative importance of each dimension. Future research should focus on the similar study of factors affecting customer satisfaction in after-sales service in other prominent industries such as automotive, construction and other manufacturing as well as service sectors. By doing this, hopefully we can get a clearer picture on the extended scope of after-sales service of

several industries environment, which can be further examined. Eventually, a comparison can be made between the findings of the different industries so that such constructible findings and conclusions can be made to the study.

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