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Development And Validation of A Scale For Measuring Petro Retail Service Quality: A Bilateral Approach

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Abstract

Purpose: Global retail fuel markets are being disrupted by a number of broad themes that are being highlighted by the emergence of alternative energy, new mobility models, and elevated customer expectations that are centered around convenience and personalization. Consumers express a need for individualized products and services that take into account each individual. Digital is becoming the norm in the new situation. The changing purchasing habits of customers are a result of technological advancements. As a result, factors affecting the consumer experience have also changed. The purpose of the study is to ascertain Petro Retail's service quality scale from an Indian standpoint.
Design /Methodology/ Approach: The study was conducted from October to December 2022 at fuel stations in Mumbai and Ranchi with face-to-face interviews with OMC officials at HQ and field levels. The primary data was collected through a Quantitative field studyanalysedlyzed using suitable statistical tools. Exploratory Sequential Mixed Method design (Qual-Quan) was followed for the study.
Findings and Originality: Technology advancements significantly impact consumers and industries and transform people's lifestyles and behaviour. Predictive analytics, artificial intelligence, and the Internet of Things are important components in developing customer-facing projects that result in the creation of service protocols for improved purchasing experiences.
Technology adoption in petroleum retail is dispersed, with IoT, automation, and AI/ML-based technological solutions being tested in isolated ways without a centralized understanding of the whole value chain. Utilizing assets more efficiently is the main goal of this type of technology adoption. Nevertheless, few applications have been explored to improve consumer purchasing behavior, such as identification and satisfaction. In the digital age, IoT is altering customer expectations and controlling the experience in India's petroleum retail industry from the viewpoints of both service providers and customers (a dyadic approach). Accordingly, the service quality has also evolved over a period of time. There is very limited work carried out on the Petro Retail service quality. The scale developed with the bilateral approach shall help academians and industry managers to understand the service quality in petro retail, and the "BISQUE" constract can be used for measuring the same. The study is one of its kind on the aspect of petro retail.

Keywords : Consumer Experience, Indian Fuel Retail, Digitization in Petro Retail, Customer Experience Drivers

Introduction

The last few decades have seen a substantial shift in the retail industry due to a variety of factors, including customer expectations, habits, and technology advancements. Customer service has therefore changed significantly as well. Consumer decision-making has also been profoundly changed by technology and the digital sphere (Purohit & Jain, 2020). Consumers are becoming more sophisticated and demanding digital solutions driven by technology (Purohit & Jain, 2021). Furthermore, social media is becoming an indispensable tool for marketing. Businesses utilize social media to build more enduring client relationships and to bolster their brand. Businesses use social media extensively to establish more direct and individualized connections with their clients (Moran et al., 2014).

In India, the retail industry is currently undergoing a significant transformation as new forms replace established merchants. These contemporary retail concepts give customers a wide selection and the best possible shopping experience by combining entertainment, merchandise, and services under one roof. Organized retail is preferred in India due to its ease and variety, and is driven by factors such as international exposure, product availability, and brand communication. India's retail industry is growing as a result of urbanization, rising income, demographic changes, and the digital revolution (Sahney, 2016). In addition to the organized retail sector's rapid expansion, customer purchasing behavior is also changing quickly in India (Sangvikar &

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Katole, 2012). In India, the majority of consumers choose to shop at organized retail establishments rather than unorganized ones. The majority of them are happy with the selection of products offered by organized retail stores, the pricing, and the quality of the services they receive. According to studies, consumers also favor organized retailing over disorganized retailing, and they do so even in Tier 1 and Tier 2 cities (Dineshkumar & Vikkraman, 2012).

Petro Retail has experienced significant global upheaval. Certain factors—like price, quality, etc.—remain important historically, but other factors—like rising competition or technology advancements—have emerged. Petro retail has seen a significant shift in the world market from commodity to service-based, and this shift also applies to the Indian context (Purohit & Jain, 2021). Petro retail has changed from what it used to be in yesteryears. Hence, petrol retail is on its way to the transformation from being an "undifferentiated commodity" to a "branded product." (Dugar, 2007).

In the Context of Indian Petro Retail, fuel was made available as a commodity in pre-independence and early post-independence. Since state-run oil companies (PSUs) controlled the majority of the market, the price of gasoline and diesel was regulated by the government, and retail sales of these products were restricted (Kavitha & Marry, 2018). Indian public sector companies traditionally dominated the market. However, the entry of private players has changed this dynamic by providing improved customer service facilities to end customers. Public marketing firms are under pressure from private oil marketing corporations to transition from selling petroleum to ensuring customer satisfaction via marketing and promotional efforts. Private companies like Shell, Reliance, and Nayara were able to enter the market on an even playing field because to the Government of India's gradual deregulation of petrol and diesel prices during the past 20 years. Private companies have implemented value-added services based on cutting-edge technology to improve consumer experience and greatly impact their purchasing decisions. The heightened competitiveness among Petro marketing companies has resulted in a need for them to modify and enhance their customer service strategies (Purohit & Jain, 2020).

Customers' developing requirements were given less attention, increasing their exposure to technological innovation. Although there is fierce intra-firm competition among the OMCs, the Petro retail sector is on the verge of oligopoly. Dealers and distributors focus on inventory, real estate, and human resources in order to provide value to clients and maintain their competitiveness. OMCs confront difficulties with brand awareness, consumer recognition, and ROI.The preferences that OMCs use to market their goods and services don't always align with those of the retail mix of their clientele (Yadav et al., 2012). OMCs are increasingly more competitive, offering a range of programs to draw clients and meet their fuel-related expectations. Concurrently, the government eased restrictions on private petroleum companies opening retail locations, increasing competition among service OMCs (Firms). Srinivasan (2015) said.

Simple fuel sales were the focus of the initial Fuel Retail models. But as the market became more competitive, OMCs began offering a variety of value-added services, such as a kids' area, clean restrooms, free air for car tires, car washes, quick car checks and services, convenience stores, and quick serve restaurants. Many direct marketing strategies, such as loyalty programs, cash back, free gifts, promotions, and schemes, have been successful in attracting and keeping consumers in the recent past (Suresh & Krithika, 2019). The idea of receiving value-added services, such as free air or oil changes, has changed consumer purchasing behavior and created an industry that is more focused on services than on commodities. OMCs are being forced to build large-format fuel stations that offer a multitude of value-added services as a result of the advancement of technology in society and the upgrading of customers in the technology landscape. This has increased and evolved customer desire to receive additional services under one roof (Priyadarshini & Divya, 2019). Stages of Consumer experience evolve day by day, and consumer buying behaviour and expectations are also changing with time.

In the Indian context, proximity, petrol station management, price of fuel and technology adoption emerged as the critical factors influencing customer preference. At the same time, petro station's image, service quality, product assortment, and additional services also closely relate to customer preference *(Purohit & Jain, 2021)*.

Literature review

Gilbert & Churchill (1979) suggested eight steps for measuring marketing construct. Once steps like specifying domain construct, generation sample of items, collection of data, and purification of measure are done, data collected with each application of the measuring instrument can provide more and more evidence related to the other steps. It is required to plan data collection and analysis more carefully to contribute to improved marketing measures. A study on the service quality Gap in the Indian petro retail business showed that overall service quality received is low compared to expected service quality and

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that a service gap exists. The maximum gap found is for the tangibles dimension, while the lowest is responsiveness *(Badlani & Singhal, 2017).* However, studies so far indicate the customer's perspective where a gap exists in identifying the service quality dimension from the provider's perspective *(Purohit & Jain, 2022).*

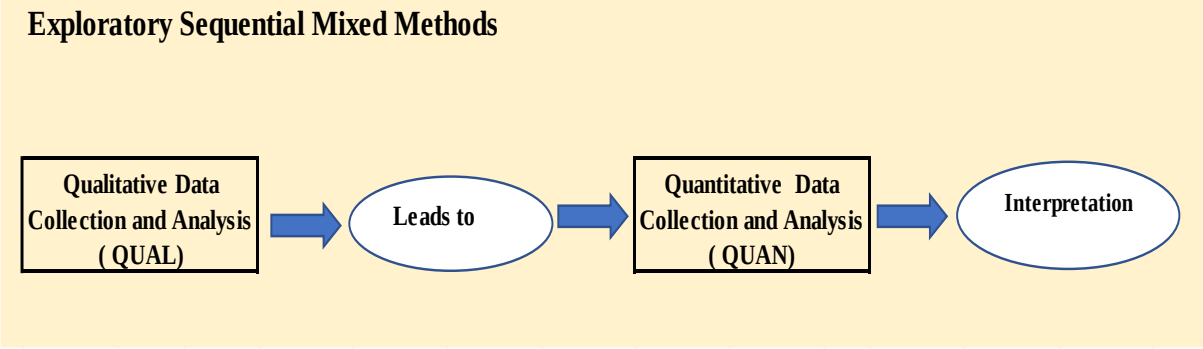
Although fuel retailing is also a service, they are inherently different from other industries in the service sector. Fuel retailing is still viewed as a commodity, and service quality is often difficult for the customers to judge even after the service is performed (purohit & Jain,2021). The customer's evaluation of service quality is their subjective assessment of services meeting the set criteria and their evaluation of enactment of the service delivery process. Customer usually has initial expectations from the services they are going to consume. The gap, i.e. discrepancy, measured between perception developed post-service receipt and the prior anticipations of the customer before receiving the service, is known as perceived service quality (Grönroos, C., 1984). Service Quality, therefore, can be defined as the discrepancy between consumers' perceptions of services and their expectations about the company offering such services(Boltan & Drew 1991) (Parasuraman et al.,1988). However, Petro retailing service quality is the discrepancy between customers' perceptions of services and their expectations about fuel station services (purohit & Jain, 2021).
Petro retail quality-specific research has identified various attributes: availability of modern equipment at fuel stations, visual appearance, meeting promises from time to time, redressal of problems immediately, the correct quantity of fuel, prompt services, courteousness, and attention to customers etc. (Badlani & Singhal, 2017) (Gronroos,1984) classified the quality of service as functional and technical quality. It is also suggested that technical quality is a precondition to the applicable quality.

The providers' viewpoints on the assessment of service quality characteristics have not been sufficiently explored in the published literature on petroleum retail services. Petro retail customers have expectations that they assess against their perception of performance (Parasuraman et.al, 1988). However, a gap may exist between what the customer expects and the provider's perception of the customer's expectation . Further, a gap may exist between the customer's assessment of the provider's performance and the provider's perception of their own performance. The convention of measuring service quality calls for measuring service gaps only in terms of what is expected by the customer and how they perceive the performance. The knowledge and perception gap in petroleum retail services is measured using irrelevant literature. Inadequately documented methods for measuring service quality gaps in petroleum retail services also incorporate supplier and customer viewpoints. Also, there are inadequately published works on the Customer Experience in Petro retail to ascertain the existing gaps and little published work on technological advancement & uses in Petro retail in India to meet customer expectations vs experience.

As a result, the goal of this study is to create a bilaterally approachable instrument for assessing the quality of service in petroleum retail, taking into account the views of both OMCs (Oil Marketing Companies, the suppliers) and customers.

Research Methodology

For this study, a mixed-method research design was adopted. The study's exploratory sequential mixed method design was chosen because it facilitates understanding of the various interpretations made from the qualitative and quantitative data. In order to prepare a measurement tool and thereafter administer it to a sizable sample for interpretation, this aids in the collection of qualitative data (Creswell, 2013, p. 267.).



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Qualitative Phase (Scale Construction)

The qualitative phase commenced with aggregating the interview responses. This phase's objective was to construct an item pool for measuring petro retail service quality. A list of assertions or items from earlier studies on the evaluation of service quality in the retail petroleum industry and other service sectors was used to generate the item pool. (b) SERVQUAL questionnaire; (c) service quality statements obtained from OMCs and clients of petro retail services throughout the interview rounds. All of the items that made the short list were put into a questionnaire.

In the phase -1, attributes were identified from the Petro retail seeker's (customer) using a qualititative reseach design and sampling process uses as Purposive sampling .The responded were identified at the fuel station where the customers came for fuelling their vehicle. The survey was conducted with the help of open ended questions in semi structured interviews.

Similarly, attributes were identified from the Petro retail service providers's (both PSU & private OMCs at filed and HQ level) using a qualitative research design and sampling process used as Snowball sampling . The survey was conducted with the help of open ended questions in semi-structured interviews.

The Modified Delphi method was used for data reduction and qualitative data analysis. The Delphi approach protects participant anonymity to allow for the open exchange of ideas and information, iterations to improve viewpoints, feedback control through sharing other participants' thoughts to consider shifting positions, and statistical analysis of data. The scale was validated by a panel of dealers, customers, and OMC executives. Items and phrases were chosen for additional assessment based on the panelists' replies; the median rating and item content validity served as the selection criteria. A panel's recommendation for the removal, alteration, and classification of certain things or assertions was also taken into consideration. Additional statistical analysis was performed on the last set of questions to determine the questionnaire's validity.

Quantitative Phase (Validation of Scale)

Customers of petro retail services who have visited any petrol station during the last three months were the source of a fresh set of data obtained through convenience sampling. Confirmatory Factor Analysis (CFA) was performed on the gathered data in this manner. Using the proper test statistics, the suggested scale's validity and reliability will be examined. As a result, a final tool was created to gauge the quality of the services.

Result & Discussion

Participants and Procedure

Semi-structured interviews were carried out with OMC officers, dealers, retail consumers, and staff members of petrol stations. The customers are considered who have visited any fuel station in the last three months period. OMC officers selected for interviews include strategy makers, implementers at the field level, dealers & their staff who have frequent contact with customers.

Amongst customers interviewed during September – October 2022 were in the age range of twenty to sixty-five years. Participants who had experienced service in petro retail industries in the last three months were identified using snowball sampling since it becomes difficult for customers to remember and narrate their old experiences clearly. Hence, other samples were dropped beyond three months of the visit to fuel stations.

During the same period of September – October 2022, fifteen OMC officers and 12 dealers, including fuel station staff, also consented to be part of the petro retail provider interview. The providers were contacted through referrals and constituted the sample for the interview round.Also 5 customers were contacted for this interview. The panelists' credibility was determined by looking at their Authoritative Coefficient (Cr> 0.7).

The Interview protocol was developed, tested, and revised in compliance with the recommendations (Fontana & Frey, 2000; Jacob & Furgerson, 2012). After obtaining the interviewee's verbal consent, interviews were audio recorded. The goal and expected results of the study were explained to the interview subjects, and their anonymity was guaranteed. Four interview sections were covered with open-ended questions: the gap between expectations and experiences, elements of the service, quality of the service, and assessment of the service.

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Purohit and Jain (2022) performed a thorough literature review beforehand in order to identify themes for conducting interviews. This made the lengthy, information-rich conversations more manageable.

The existence of priori themes, which assisted in assigning wider topics, made the analysis simpler. To minimize any blinkering impact, the first choice of themes was limited. According to Philip and Hazlett (1997), these a priori themes were categorized under the crucial, core, and peripheral wide dominating features of the PCP paradigm. The information was arranged to create a first linear list of templates. As Nigel King (2004) advised, "audit trails" and "respondent feedback" were created during the template creation and modification process. Table 1 below shows how the themes were arranged under 13 constructs:

Table – 1

Type of Attribute		
PIVOTAL	**CORE**	**PERIPHERAL**
Construct		
Adoption of Technology [AT]	Service Availability Communication [SAC]	Facilities and physical infrastructure [FPI]
Grievance Redressal [GR]	Staff Behaviour [SB]	Payment Methods & Arrangement [PMA]
Management of Fuel Station Operation [MFSO]	Process [PROC]	Image [IMG]
Staff Knowledge and Competence [SKC]	Fueling Cycle Experience (Entry, Waiting, Fueling, Exit) [FCE]	
Promptness in Service Delivery [PSD]		
Quality & Quantity [Q&Q]		

While the technical aspect is valued more by the service providers, seekers (customers) give more importance to the functional aspect of petro retail.

Certain persuasive and explicit viewpoints were held by both service providers and seekers. These opinions were coming up again and again in numerous interviews. Retailers of petroleum primarily depended on the professional expertise, abilities, and talents of dealers and their delivery personnel. This quality gives service providers the upper hand in any professional interpersonal interactions that arise while providing the service. Because customers of gasoline retail services have no choice but to put their trust and faith in them, service providers make all decisions pertaining to service protocol. The professional expertise, knowledge, and competency of dealers and delivery personnel are thought to be linked to the proper provision of services, according to further investigators and retailers of petroleum products.

The thirty-two members of the expert panel were informed of the study's objectives and their participation in the Delphi method (Table 2). All participants gave their informed consent and were guaranteed anonymity, which is a necessary prerequisite for the Delphi procedure.

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Table 2: Modified Delphi Panelist Profile and Authoritative Coefficient

	OMC Officers	Dealer & Fuel Station Staff	Customers
Number of panelists (*N =32*)	15	12	5
Age (yrs)			
20–30	3	1	1
31–45	5	5	3
>45	2	4	1
Educational qualification			
12 th or less		5	
Diploma	1	2	
Graduate	6	2	2
Masters	7	3	2
Doctorate	1		1
Avg work experience	10.66 yrs (SD = 6.48)	21 yrs (SD = 5.62)	14.2 yrs (SD = 5.72)
Recency of Hospital visit (weeks)			
<3	8	12	1
4–6	4	***	2
>6	3	***	2
Authoritative coefficient	0.825	0.768	0.821

First Round of Data Collection

A five-point Likert scale, from strongly disagree to agree strongly, was used to ask panelists to rate their agreement with each statement in the question pool. The panel's authoritative coefficient (Mean Cr = 0.80, sd. 0.03) was determined to be good. Each statement's median rating was determined and carried over to the next round. The median rating and ICVI were both below 4 and 0.79 for only 31 items, respectively.

A second Delphi round was conducted to ascertain the consensus. In the second round, the panelists saw the median rating for every statement next to each other. In addition to the median rating, each statement's panelists' own ratings were also visible. Every panelist had the opportunity to change their prior score based on the group's overall response. The previous rating was the final one for this round if there was no change in the rating. The entire thirty-two panelists took part in Delhi's second round. Items with an ICVI greater than 0.79 and a median rating of four or above were kept in this round. Sixty-one items were first thought to be included in a scale measuring Petro retail Service Quality after meeting the selection criteria.

Using a critical four-point ordinal scale—1 being not relevant, 2 being somewhat relevant, 3 being rather relevant, and 4 being highly relevant—panelists were also asked to score the importance of each topic in round 2. Relevance scores between three and four were regarded as valid content. For every response, an Item Content Validity (I-CVI) is determined. Our scale's S-CVI/Ave was 0.9087 (sd. 0.0501), indicating outstanding performance. The representativeness of sixty items in the scale assessing the quality of retail petroleum services was determined by the ICVI and S-CVI/Ave values (Table 3).

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Table 3: Items Reaching Agreement Following Round 2 of Delphi

S no	Statement	I-CVI
1	Availability of digital payment and billing system	0.8596
2	SMS / email confirmation of fuelling	0.8312
3	Technology platform for interaction by the customers	0.9153
4	Customer identification & recognisition	0.9211
5	Technology driven personalised attention	0.9325
6	Staff respond promptly to customers grievences	0.9565
7	Established mechanism for collection of feedback / grivences available at the fuel station	0.9132
8	Management of fuel station is keen to adress the customer grievences and enhance service delivery perfromance	0.9153
9	When customer has a problem , fuel station shows sincere interest to solve it	0.8672
10	Staff are able to handle customer grivences directly and immediately	0.8673
11	Is Cleanliness at fuel station maintained	0.8561
12	does the Queue Management properly followed in peak hours to handle crowd at the fuel station	0.8723
13	Does the fuel station Operate in convenience Hours	0.8674
14	Staff of the fuel station have knowledge to answer customers questions	0.9565
15	The behaviour of staffs instills confidence in customers	0.9867
16	Customer feel safe in their transactions at the fuel station	0.9231
17	Staff are wel aware of any promotional campaign for customer (ongoing / upcoming)	0.9354
18	Staff have knowledge of fuel usage in vehicles in different make	0.9342
19	Staff of fuel station should tell customer exact time of service and give prompt service	0.9565
20	Staff of fuel station should never be too busy to respond to customers' requests	0.9761
21	Faster fueling and payment process to reduce fueling & waiting time	0.9436
22	Fuel station ensure availability of different grade fuels	0.9721
23	Fuel station deliver exact fuel quantity in every transaction	0.9565
24	Fues station deliver proper quality if fuel for the vehicles	0.9576
25	Fuel station has signages on availability of services & there location there	0.8879
26	Usage of different communication medium / protocol to let customer aware of availability of services being offered at the fuel station	0.8797
27	Staff are trustworthy	0.9413
28	Customers feel safe in dealing	0.8561
29	Staffs are polite	0.9761
30	Staffs willing to help	0.9565
31	Employee Provide individualized attention	0.9413
32	Fuel station staff and management show professional integrity towards their work	0.9565
33	Fuel station conducts timely investigations on fuel quality and quantity delivery	0.9565
34	Fuel station and company captures all transaction for any audit and grevence redressal purpose	0.9761
35	Customer is given immediate attention whenever needed	0.9761
36	How easy was it for customer to identify the aisle?	0.9761
37	Did any staff provide aisle guidance?	0.9761
38	Customer's response to guidance	0.9761
39	No. of vehicles ahead in the queue	0.9413
40	Wait Time Discomfort	0.9565
41	Was customer speaking on mobile while in the queue?	0.9454
42	Did customer have to call staff for attention at the fueling point ?	0.9565
43	Greeting by Staff at the fuelling point	0.9231
44	Customer's action post reaching fueling point (Cars only)	0.9453
45	Fuel station has modern - looking equipments	0.8854
46	The physical facilities at the fuel staation are visualy appealing	0.9562
47	Materials associated with the fuel station are visually appealing	0.9565
48	The layout of the fuel station makes it easy for customers to find what they want	0.9656
49	Customers are attended immediately on arrival	0.8261
50	The fuel station has clean, attractive and convenient public area.	0.9232
51	showing zero before commencing of fueling	0.8786
52	Payment option available with Cash, Card, UPI etc mode	0.9878
53	Equipment available at the fueling point for acceptance of Digital payments	0.9878
54	Is the payment process smooth	0.8751
55	Is Fuel station History / heritage clean and reputed	0.9687
56	Is approach to the fuel station is smooth	0.8561
57	IS the appearance of the fuel station is appealing	0.8845
58	fuel rate is important and properly charged to customers	0.8388
59	Ligting at night time is appealng	0.9012
60	Ease of entry to the fuel station	0.8275
61	Availability of rest room - clean and hyginic	0.8587
	Scale Content validity ($SCVI/_{Ave}$	**0.9087**

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The multi-rater Kappa coefficient was utilized to compute the stability of the responses. The findings show that there was no likelihood of the panelists' agreement ($k=0.68$, $p<0.05$).

The scale of sixty-one items developed during the Delphi round was given to retailers and consumers of petroleum products. Convenience sampling was used to gather data using self-administered questionnaires. To prevent common technique bias, responses were gathered using both pen and paper and online methods. Confirmatory factor analysis (CFA) was used to verify the psychometric qualities of the questionnaire. Cronbach alpha values were used to verify scale dependability. The average variance explained (AVE>0.5) and composite reliability of the constructs (CR>0.7) were examined. It was determined whether each construct was one-dimensional by looking at the Comparative Fit Index (CFI>0.9).

In November 2022, a questionnaire consisting of sixty-one items was distributed. Five hundred and fifty people gave the questionnaire back. 411 individuals completed the online survey, while 139 responses were gathered from the hard copy surveys sent by purposive sampling. Because 21 of the replies contained some missing information, they were excluded from analysis. 529 replies after the first check are eligible for analysis. Eight responders provided unusual values for all variables; as a result, they were removed from the study as outliers. 521 valid answers were obtained as a consequence, and CFA (Confirmatory Factor Analysis) could be performed on them. Table 4 below provides the responder profile.

Table 4: Candidate Profile for CFA Stage

Classification	Nos.
Gender	
Male	337
Female	184
Age Group	
<20 yrs	51
21-30 yrs	89
31-40 yrs	166
41-50 yrs	148
51-60 yrs	48
>60 yrs	19
Highest Qualification	
Doctorate	6
Post-Graduate	118
Graduate	330
Intermediate	67
Emplyment Status	
Self Employed	84
Salaried	287
Homemaker	34
Student	59
Retired	28
Others	29
Work Profile	
Petro retail service Provider	157
Seekers	364
Time of Last Visit	
<3 weeks	388
4–6 weeks	92
>6 weeks	41

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Using AMOS 23 software, all sixty-one variables were maintained under the appropriate service quality construct dimension in the CFA model. To evaluate the model fit, values of the absolute, relative, and non-centrality-based indices were taken into account. With the exception of six items that did not significantly add to the model and were therefore eliminated from both the model and the questionnaire, all other items that met prescribed limits were kept in the CFA model.

The values of the various absolute, relative, and non-centrality based fit indices exceeded the suggested threshold values for each of the three attributes' dimensions. Following CFA rounds, the 55-item scale's Scale Content Validity Index Average (S-CVI/Ave) value increased to 0.9321 from 0.9087, suggesting improved content validity (Table 7). The construct reliability was established by the composite reliability (CR) of all dimensions in the 55-item scale being above 0.7.

Table 5: Goodness of Fit Indices

Fit index	Limit *	Pivotal Atrributes		Core Attributes		Peripheral attributes	
		No of items before CFA	No of items after CFA	No of items before CFA	No of items after CFA	No of items before CFA	No of items after CFA
		25 items	24 items	22 items	20 items	14 items	11 items
Absolute fit indices							
χ^2		239.874	*190.763*	534.699	*178.537*	217.694	*118.392*
df		78	*77*	158	*72*	72	*52*
p value	>0.05	0	0	0	0	0	0
χ^2 / df	1.00-5.00	3.075	2.477	3.384	2.480	3.024	2.277
RMR	<0.08	0.068	*0.057*	0.078	*0.062*	0.079	*0.052*
GFI	>0.90	0.932	*0.934*	0.911	*0.946*	0.931	*0.975*
AGFI	>0.80	0.902	*0.917*	0.901	*0.923*	0.879	*0.932*
Relative fit indices							
NFI	>0.80	0.916	*0.942*	0.901	*0.921*	0.911	*0.945*
PNFI	>0.50	0.701	*0.721*	0.699	*0.732*	0.711	*0.715*
IFI	>0.90	0.951	0.962	0.907	0.962	0.913	0.943
TLI	>0.90	0.937	0.9520	0.904	0.9410	0.934	0.9680
Non-centrality-based indices							
CFI	>0.90	0.956	*0.968*	0.919	*0.962*	0.924	*0.968*
PGFI	>0.50	0.608	*0.624*	0.682	*0.731*	0.612	*0.634*
RMSEA	<0.08	0.061	0.058	0.078	0.052	0.087	0.059

(χ2 / df) (Joseph F Hair et al., 2006); RMR (Hu & Bentler, 1999); GFI, AGFI (Joe F. Hair et al., 2011)

NFI, P NFI (Bentler & Bonett, 1980); IFI (Bollen, 1990); TLI (Tucker & Lewis, 1973); CFI (Joseph F Hair et al., 2006); PGFI, RMSEA (Steiger, 1990)

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Additionally, as can be seen in Table 6 below, the AVE for each construct was determined to be greater than 0.50, showing good convergent validity.

Table 6: Convergent Parameters of Validity

Attributes	Construct	Items	Factor loading [Above 0.5]	Composite reliability [Above 0.7]	AVE [Above 0.5]
Pivotal	AT	Q32	0.78	0.791	0.563
		Q33	0.79		
		Q34	0.62		
		Q35	0.71		
		Q36	0.74		
	GR	Q42	0.75	0.746	0.561
		Q43	0.63		
		Q44	0.71		
		Q45	0.76		
		Q56	0.75		
	MFSO	Q16	0.78	0.718	0.671
		Q17	0.7		
		Q18	0.77		
	SKC	Q37	0.71	0.787	0.618
		Q38	0.72		
		Q39	0.81		
		Q40	0.78		
		Q41	0.71		
	PSD	Q24	0.71	0.772	0.542
		Q25	0.74		
		Q26	0.71		
	QQ	Q47	0.78	0.762	0.514
		Q48	0.72		
		Q58	0.75		
Core	SAC	Q50	0.73	0.791	0.523
		Q51	0.75		
	SB	Q19	0.76	0.878	0.631
		Q20	0.84		
		Q21	0.78		
		Q22	0.81		
		Q23	0.78		
	PROC	Q52	0.76	0.753	0.561
		Q53	0.72		
		Q54	0.76		

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		Q57	0.78		
	FCE	Q1	0.74	0.781	0.532
		Q2	0.79		
		Q3	0.81		
		Q4	0.72		
		Q5	0.81		
		Q6	0.79		
		Q7	0.73		
		Q8	0.76		
		Q9	77		
Peripheral	FPI	Q27	0.71	0.81	0.564
		Q28	0.73		
		Q29	0.77		
		Q60	0.75		
		Q59	0.72		
	PMA	Q10	0.78	0.712	0.534
		Q11	0.71		
		Q12	0.72		
	IMG	Q61	0.81	0.812	0.598
		Q14	0.82		
		Q15	0.78		

Mixed results were obtained for the pivotal attributes of service quality. The maximum shared variance (MSV) values of 'promptness in service delivery', 'Quality & Quantity', and' staff knowledge & competence were greater than AVE of these constructs in the pivotal attribute subscale. The subscale of core attribute had deviation in achieving discriminant validity in 'process', 'Fueling cycle experience' and 'staff behavior' construct. While the peripheral subscale had shown deviation in discriminant validity between 'facilities and physical infrastructure' and 'payment method and arrangement'

The BISQE (Bilateral Instrument of Service Quality Evaluation) for Petro retail is displayed as follows (Table 7).

Table 7: Statements in the Questionnaire's Content Validation Index

Attribute / Dimension and item code	**Item**	**I-CVI**
A. 1 Pivotal: Adoption of Technology [AT]		
Q32	Availability of digital payment and billing system	0.8596
Q33	SMS / email confirmation of fuelling	0.8312
Q34	Technology platform for interaction by the customers	0.9153
Q35	Customer identification & recognition	0.9211
Q36	Technology driven personalized attention	0.9325
A.2 Pivotal: Grievance Redressal [GR]		
Q42	Staff respond promptly to customers grievances	0.9565
Q43	Established mechanism for collection of feedback / grievances available at the fuel station	0.9132
Q44	Management of fuel station is keen to address the customer grievances and enhance service delivery performance	0.9153

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Q45	When customer has a problem , fuel station shows sincere interest to solve it	0.8672
Q56	Staff are able to handle customer grievances directly and immediately	0.8673
A.3 Pivotal: Management of Fuel Station Operation [MFSO]		
Q16	Is Cleanliness at fuel station maintained	0.8561
Q17	does the Queue Management properly followed in peak hours to handle crowd at the fuel station	0.8723
Q18	Does the fuel station Operate in convenience Hours	0.8674
A.4 Pivotal: Staff Knowledge and competence [SKC]		
Q37	Staff of the fuel station have knowledge to answer customers questions	0.9565
Q38	The behaviour of staffs instils confidence in customers	0.9867
Q39	Customer feel safe in their transactions at the fuel station	0.9231
Q40	Staff are well aware of any promotional campaign for customer (ongoing / upcoming)	0.9354
Q41	Staff have knowledge of fuel usage in vehicles in different make	0.9342
A.5 Pivotal: Promptness in Service Delivery [PSD]		
Q24	Staff of fuel station should tell customer exact time of service and give prompt service	0.9565
Q25	Staff of fuel station should never be too busy to respond to customers' requests	0.9761
Q26	Faster fuelling and payment process to reduce fuelling & waiting time	0.9436
A.6 Pivotal : Quality & Quantity [Q&Q]		
Q47	Fuel station ensure availability of different grade fuels	0.9721
Q48	Fuel station deliver exact fuel quantity in every transaction	0.9565
Q58	Fuels station deliver proper quality if fuel for the vehicles	0.9576
B.1 Core: Service Availability Communication [SAC]		
Q50	Fuel station has signages on availability of services & there location there	0.8879
Q51	Usage of different communication medium / protocol to let customer aware of availability of services being offered at the fuel station	0.8797
B.2 Core: Staff Behaviour [SB]		
Q19	Staff are trustworthy	0.9413
Q20	Customers feel safe in dealing	0.8561
Q21	Staffs are polite	0.9761
Q22	Staffs willing to help	0.9565
Q23	Employee Provide individualized attention	0.9413
B.3 Core: Process [PROC]		
Q52	Fuel station staff and management show professional integrity towards their work	0.9565
Q53	Fuel station conducts timely investigations on fuel quality and quantity delivery	0.9565
Q54	Fuel station and company captures all transaction for any audit and grievance redressal purpose	0.9761
Q57	Customer is given immediate attention whenever needed	0.9761
B.4 Core: Fuelling Cycle Experience (Entry , Waiting, Fuelling, exit) [FCE]		
Q1	How easy was it for customer to identify the aisle?	0.9761
Q2	Did any staff provide aisle guidance?	0.9761
Q3	Customer's response to guidance	0.9761

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Q4	No. of vehicles ahead in the queue	0.9413
Q5	Wait Time Discomfort	0.9565
Q6	Was customer speaking on mobile while in the queue?	0.9454
Q7	Did customer have to call staff for attention at the fuelling point ?	0.9565
Q8	Greeting by staff at the fuelling point	0.9231
Q9	Customer's action post reaching fuelling point (Cars only)	0.9453
C.1 Peripheral : Facilities and physical infrastructure [FPI]		
Q27	Fuel station has modern - looking equipment	0.8854
Q28	The physical facilities at the fuel station are visually appealing	0.9562
Q29	Materials associated with the fuel station are visually appealing	0.9565
Q60	The layout of the fuel station makes it easy for customers to find what they want	0.9656
Q59	The fuel station has clean, attractive, and convenient public area.	0.9232
C.2 Peripheral: Payment Methods & Arrangement [PMA]		
Q10	Payment option available with Cash, Card, UPI etc mode	0.9878
Q11	Equipment available at the fuelling point for acceptance of Digital payments	0.9878
Q12	Is the payment process smooth	0.8751
C.3 Peripheral: Image [IMG]		
Q61	Is Fuel station History / heritage clean and reputed	0.9687
Q14	Is approach to the fuel station is smooth	0.8561
Q15	IS the appearance of the fuel station is appealing	0.8845
	Scale Content validity (SCVI/$_{Ave}$	**0.9312**

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A commonly used dependability coefficient measure The entire scale with 55 elements had a Cronbach's Alpha of 0.887. Reliability values of 0.911, 0.864, and 0.895 for the twenty items in the core attribute, eleven items in the peripheral attribute, and twenty items in the pivotal attribute exceed the threshold values (>0.7). It is necessary to test for multicollinearity between the variables when Cronbach alpha values are quite high. Nevertheless, no discernible shift in the correlation values is shown when calculating the interitem correlation between the variables of the three distinct sub-scales, namely the crucial, core, and peripheral qualities. For this reason, the Bilateral Instrument of Service Quality Evaluation (BISQE) for Petro Retail continued to include all 55 criteria.

Conclusion

Production and service delivery must happen at the same time for businesses that process services, such as gasoline retail. Value is created in gas stations by the surroundings, settings, and service standards. This process of creating value is driven by OMCs, or petroleum retail service providers. Conversely, customers, or service seekers, evaluate the value produced in terms of service encounters. The concept of simultaneous value production and consumption highlights the need for a shared understanding of petroleum retail services by both service providers and seekers. As a result, this research has led to the proposal of a bilateral strategy for evaluating the quality of petro retail services, taking into account the opinions of both OMCs and customers.

Value loss results from not understanding the service requirements of retail petroleum customers. The majority of people who seek out retail services from Petrol are laypeople who have no idea what to expect. Additionally, it is challenging for Petro retail customers to accurately evaluate the service due to the technical complexity of the service delivery and their innate nervousness while approaching a fuel station for service consumption. Consequently, either result and/or other readily evaluable alternative metrics are used in the process of petro retail customers' quality assessments. When OMCs evaluate service quality only based on results, they become vulnerable. On the other hand, it is also inaccurate for consumers to judge

the quality of service based on other metrics, such as the facilities and physical infrastructure, the appearance of the gas station, etc.

From an organizational standpoint, improved service quality gives OMCs a competitive edge in addition to increasing their profitability. The research's proposed bidirectional method provides managers with valuable insights into detecting service shortcomings from the perspectives of both customers and OMCs. In the context of India, this study aims to provide a questionnaire to gauge the quality of petro retail services and suggests a bilateral method for gauging service quality disparities. It is important to realize, though, that many aspects of service quality are context-specific and may change depending on the retail petroleum environments.

Contribution to the Literary Works

Any study can be considered noteworthy if it: (i) broadens the theoretical scope of measuring parameters, such as service quality; (ii) enhances the current research methodology; (iii) uses fresh approaches to comprehend the issue at hand. The significant degree of heterogeneity and intangibility makes assessing the quality of oil retail services difficult. As a people-processing service industry, fuel stations require participation from both service providers and service seekers. Evaluations that merely take the needs of the client into account will minimize the significance of the provider's knowledge, competence, and abilities as well as service procedures and procedural rules. The beneficiary of the value created i.e. the outcome of service is the petro retail seeker(customers) yet their experiences created in the value creation process require assessment of the bilateral exchanges takingplace in the value co-creation process (Osei-Frimpong, 2017). The production-centric approach on service quality ignores aspects of the petroleum retail industry such fuel station management, technology adoption, fuelling cycle experience, etc. and instead highlights the viewpoints of suppliers. To create a coherent picture of the quality of petro retail services, the diametrically opposed perspectives of consumers and suppliers in the professional exchanges must be sewn together.

Research Limitation: The study is conducted with available secondary and primary data collected through a survey. The survey result is subject to all the limitations of primary data.

Practical & Social Implication: The “BISQUE” instrument is built to have a bilateral approach considering both the seeker’s and provider’s perspectives in petro retail. The instrument can be used to measure the service quality at the fuel station. Since the instrument is one of its kind for petro retail and considering that petro retail has an impact on the country, the instrument shall have an impact in assessing the service quality in petro retail and thus shall have an impression on a sustainable economy.

Reference

[1] Badlani, M., and Singhal, D.K.,(2017), Analysis of Service Quality Gap Using SERVAQUAL Model: An Indian Petro Retailing Scenario, International Journal of Business and Management Invention, Volume 6 Issue 7 , PP—68-71
[2] Bolton, R.N. and Drew, J.H. (1991), “A multistage model of customers’ assessment of service quality and value”, Journal of Consumer Research, Vol. 54, April, pp. 69-82,
[3] Creswell, J.W. (2013) Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. 4th Edition, SAGE Publications, Inc., London., p 267
[4] Dineshkumar, U, and Vikkraman, P.(2012), Customers' Satisfaction towards Organized Retail Outlets Erode City, IOSR Journal of Business and Management (IOSRJBM) , Volume 3, Issue 4 (Sep,-Oct. 2012), PP 34-40
[5] Dugar, A. (2007). Marketing of Petrol in India - Transformation of an Undifferentiated Low Involvement Commodity into High Involvement Brands. Innovative Marketing , 3(4), pp 52-59
[6] Gilbert A. and Churchill, Jr. , A Paradigm for Developing Better Measures of Marketing Constructs, Journal of Marketing Research, Vol. 16, No. 1 (Feb., 1979), pp. 64-73
[7] Gronroos, c. (1984), “A service quality model and its marketing implications” European Journal of Marketing, Vol. 18 No. 4, pp. 3644.
[8] Kavitha, G., and Mary, S.A.,(2018) , A Study On Customer Perception Towards Service Quality Of Retail Petrol Outlets, Volume - 6, Issue- 7, July 2018
[9] King, N. (2004). Using templates in the thematic analysis of text. In C. Cassell & G. Symon (Eds.), Essential guide

to qualitative methods in organizational research (pp. 256–270). SAGE Publications.

[10] Moran, G , Laurent, M., Eoghan, N.,(2014), Consumer Moments of Truth in the digital Context: how 'search' and 'e-word of mouth' can fuel consumer decision making, Journal of Advertising Research. Vol. 54,

[11] Parasuraman, A., Zeithaml, V.A. and Berry, L.L. (1988), "SERVQUAL: a multiple-item scale for measuring consumer perceptions of service quality", Journal of Retiling, Vol. 64 No. 1, pp. 12-40,

[12] Philip, G. and Hazlett, S.A. (1997), "The measurement of service quality: a new PCP attributes model",International Journal of Quality and Reliability Management, Vol. 14 No. 3, pp. 260-286.

[13] Purohit S, Jain A.K (2021), Evolution of Customer Service Protocols with the enhancement of the technology adoption in Petro Retailing in India, ZENITH International Journal of Business Economics & Management Research, ZIJBEMR, Vol.11 (12), December (2021), pp 26-33

[14] Purohit S, Jain A.K (2022), Review of Service Quality Dimensions and their Measurements in Indian Petro-Retailing,(2022), Paideuma Journal of Research, Vol XV, Issue 1 2022, Page No: 1- 11,

[15] Purohit, S, Jain, A.K. (2021) The Science of Choice: Demystifying Consumer Preference in Indian Petro-Retail, Paideuma Journal of Research, Vol XIV, issue 5, pp 17-27.

[16] Atul Kathole , Dinesh Chaudhari "Secure Hybrid Approach for Sharing Data Securely in VANET", Proceeding of International Conference on Computational Science and Applications pp 217–221, © 2022 The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd.

[17] B. Kathole, K. N. Vhatkar, and S. D. Patil, "IoT-Enabled Pest Identification and Classification with New Meta-Heuristic-Based Deep Learning Framework," Cybernetics and Systems, vol. 0, no. 0, 2022, doi: 10.1080/01969722.2022.2122001.

[18] Purohit, S, Purohit S. (2021) Digital payments in Indian Petro-Retail: adoption & change in Landscape, International Journal for Research in Engineering Application & Management (IJREAM), Vol-06, Issue-12, 2021, Pp 32- 38,

[19] Purohit, S., Jain, A.K.(2020), Evolution of Fuel Retail In India Vis –a- vis India Customer: Shift in Consumer Behaviour, International Journal of Management (IJM), Volume 11, Issue 8, August 2020, ISSN 0976- 6510, pp. 199-207.

[20] Purohit, S., Jain, A.K.,(2020), Changing Face of Digitization in Indian Petro- Retail: From Enterprise to Customer, International Journal of Multidisciplinary Education Research, Volume 9, Issue 9(6), September 2020, pp. 121-129

[21] Sonali D.Patil, Atul B.Kathole, Savita Kumbhare, Kapil Vhatkar, Vinod V. Kimbahune,"A Blockchain-Based Approach to Ensuring the Security of Electronic Data", International Journal ofINTELLIGENT SYSTEMS AND APPLICATIONS IN ENGINEERING, IJISAE, 2024, 12(11s), 649–655. https://ijisae.org/index.php/IJISAE/article/view/4486/3145

[22] Sahney, A, (2016), A study on consumer buying behaviour towards branded retail outlets in India, International Journal of Advanced Research and Development, Volume 1; Issue 6; June 2016; Page No. 25-28

[23] K. N. Vhatkar and G. P. Bhole, "A comprehensive survey on container resource allocation approaches in cloud computing: State-of-the-art and research challenges," Web Intelligence, vol. 19, no. 4, pp. 295–316, 2021, doi: 10.3233/WEB-210474.

[24] Srinivasan, T. (2015), A Study on Consumer Preferences of Petroleum Retail Outlets, IOSR Journal of Business and Management (IOSR-JBM). Volume 17, Issue 2. Ver. II (Feb. 2015), PP 35-40

[25] Suresh,A., Keerthika. R. (2019), "An Empirical Study on Impact of Services Provided By Petroleum Retail Chains Over Retaining The Loyalty of Customers – Chennai Arena, India", Journal of Energy and Economic Development, 4(1), 1-10.N.

[26] K. Netaji Vhatkar and G. P. Bhole, "Self-improved moth flame for optimal container resource allocation in cloud," Concurrency and Computation: Practice and Experience, vol. 34, no. 23, Oct. 2022, doi: 10.1002/cpe.7200.

[27] Priyadharshini, Ms S. Divya, A Study On Consumer Satisfaction Towards Retail Petroleum Outlet Services In Coimbatore City, Indian Journal Of Research Volume-8 | Issue-5 | May-2019 | PRINT ISSN No. 2250 – 1991

[28] Atul Kathole , Dinesh Chaudhari "Securing the Adhoc Network Data Using Hybrid Malicious Node Detection Approach", Proceedings of the International Conference on Intelligent Vision and Computing (ICIVC 2021) pp 447–457 © 2022 The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd.

[29] Yadav,S., Sakariya,S., and Thaker,M.(2012), "Petro Retail Mix Elements: A Study Of Indian Market", Journal Of International Business And Economics, Volume 12, Number 2, pp 34- 45.