International Refereed, Blind Peer-Reviewed Multidisciplinary & Open Access Research Journal

Special Issue 01 | Vol.: 12 | June 20, 2025 | Pages: 70-81 | RRSSH | ISSN: 2348 – 3318 |

ICSSR | |National Seminar on "Indian Knowledge System: Education and Prosperity" Org. by Dhanauri P.G. College, Roorkee (28-29 Mar., 2025)

DOI : 10.5281/zenodo.15823685

Integrating the Indian Knowledge System into Ethical and Quality Centric Service to Ujjwala Customers

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Received : 10/04/2025	***1st BPR*** : 27/04/2025	***2nd BPR*** : 21/05/2025	***Accepted*** : 06/06/2025

Abstract

The Oil Marketing Companies (OMCs) are having 32.83 Crores of domestic Liquefied Petroleum Gas (LPG) customers, pan India. This huge customer base includes 10.33 Crores of Pradhan Mantri Ujjwala Yojana (PMUY) customers, the scheme which was launched in the year 2016. A total 25517 number of LPG distributors provide services to these customers. Against a total per capita, number of LPG cylinders (LPG Refill) consumed per annum, of 5.69 LPG refills; the PMUY customers are having a per capita consumption of only 4.34 LPG refills. There is a huge LPG consumption gap amongst the PMUY and non-PMUY customers. In spite of the initial release of security free LPG connection to these PMUY customers and subsequent direct benefit transfer of LPG targeted subsidy against each LPG refill, currently at Rupees 300/- per 14.2 Kg LPG refill, the LPG consumptions of these Ujjwala beneficiaries is picking up at a snail's pace. This study aims for a comprehensive analysis of service quality parameters and LPG consumption patterns under PMUY. Key aspects such as Tangibility, Reliability, Responsiveness, Assurance, and Empathy are measured along with annual consumption of LPG. Furthermore, this research also evaluates the impact of Indian Knowledge System (IKS) perspective on service quality emphasizing a holistic approach, drawing from ancient Indian philosophies that prioritize customer well-being, ethical conduct, and a deep understanding of individual needs, often incorporating concepts like "Atithi Devo Bhava" (guest is God) to ensure exceptional service delivery, going beyond just transactional interactions and focusing on building long-term relationships with customers; essentially, placing high value on respect, empathy, and personalized attention as key aspects of quality service. (Data source: 1) LPG Profile Report H1 FY 2024-25, Petroleum Planning and Analysis Cell, 2) PIB Delhi posted on 2nd December 2024 by Ministry of Petroleum and Natural Gas)

Keywords**:** Indian Knowledge System, IKS, Pradhan Mantri Ujjwala Yojana, PMUY, LPG Consumption, Tangibility, Reliability, Responsiveness, Assurance, Empathy

1. Introduction

The Pradhan Mantri Ujjwala Yojana (PMUY), launched in 2016, primarily targets Below Poverty Line (BPL) families by providing subsidized Liquefied Petroleum Gas (LPG) connections, aiming to reduce the health and environmental hazards associated with traditional biomass-based cooking methods (Ministry of Petroleum and Natural Gas, 2016). The study by Agarwal et al., 2023 examines the impact of PMUY on social inclusion in India. Among the states benefiting from PMUY, Uttar Pradesh, the most populous state in India, has experienced substantial coverage, with millions of families transitioning to cleaner cooking alternatives. The effectiveness of LPG distribution under PMUY, however, hinges on

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several critical service quality parameters, including the timeliness of cylinder delivery, ease of refill processes, affordability, and overall consumer satisfaction (Jain et al., 2018). The study by Kalli et. al., 2022 analyzes the adoption rates and refill patterns of LPG under the PMUY scheme, focusing on factors such as accessibility, awareness, and the socio-economic characteristics influencing LPG usage in rural Odisha. It highlights challenges like low refill rates despite high initial adoption, indicating continued reliance on traditional fuels. The authors suggest policy measures to enhance LPG consumption among rural households, emphasizing the importance of awareness campaigns and improved subsidy programs. Evaluating these parameters is essential to understanding the program's impact and sustainability, as well as identifying areas requiring policy enhancements to achieve universal energy access, particularly in rural and semi-urban regions. Additionally, the patterns of LPG consumption among PMUY beneficiaries provide insights into the socioeconomic challenges, behavioral tendencies, and infrastructural constraints that influence the adoption and sustained use of LPG. This study aims to explore these key dimensions within the context of Uttar Pradesh, offering a comprehensive analysis of service quality parameters and LPG consumption patterns under PMUY. The findings will assess the scheme's effectiveness based on accessibility, affordability, and sustained usage of LPG among beneficiary households. Key aspects such as Tangibility, Reliability, Responsiveness, Assurance, and Empathy measured through 5-point Likert agreeableness scores along with annual consumption of LPG, will be examined to understand their role in fostering LPG adoption and continued utilization. Furthermore, the research will investigate the socio-economic and demographic factors affecting LPG consumption, highlighting the extent to which PMUY has reached marginalized communities. By integrating quantitative data with qualitative insights, this analysis provides a nuanced perspective on how PMUY has influenced cooking fuel choices, outlining both the achievements and challenges in enhancing energy equity in the region. Indian Knowledge Systems (IKS) refers to the comprehensive and diverse knowledge systems developed and nurtured in the Indian subcontinent over centuries. These systems encompass traditional knowledge in various domains such as science, technology, medicine, arts, and social organization, deeply rooted in India's cultural and philosophical heritage." (Indian National Science Academy, 2018). This research evaluates the impact of Indian Knowledge System (IKS) perspective on service quality emphasizing a holistic approach, drawing from ancient Indian philosophies that prioritize customer well-being, ethical conduct, and a deep understanding of individual needs to ensure exceptional service delivery.

2. Review of Literature

The Pradhan Mantri Ujjwala Yojana (PMUY), launched in 2016, represents a landmark initiative by the Indian government to enhance access to clean cooking fuels, particularly liquefied petroleum gas (LPG), among economically disadvantaged households. Aimed at reducing reliance on polluting traditional fuels like firewood and cow dung, PMUY has provided over 80 million LPG connections, significantly improving access to cleaner energy alternatives for rural households (Ranjan & Singh, 2020). Now, under PMUY, the number of LPG connections have reached over 100 million. However, despite widespread adoption, challenges remain in sustaining LPG consumption amongst PMUY beneficiaries. Factors such as high refill costs, lack of awareness about health benefits, and logistical barriers significantly impede the program's long-term efficacy (Kar et al., 2019). Furthermore, disparities in LPG adoption due to socioeconomic factors such as caste, income, and education have highlighted the need for targeted interventions to bridge the gaps in accessibility and usage (Khanwilkar et al., 2021). These complexities underscore the importance of integrating policy enhancements to ensure equitable access, improve refill affordability, and foster awareness of clean energy's long-term health and environmental benefits. Service quality plays a crucial role in ensuring the **success and sustainability of PMUY**, as the adoption and continued use of LPG depend on consumer perceptions of tangibility, **reliability, responsiveness, assurance, and empathy**. The **SERVQUAL model** developed by Parasuraman, Zeithaml, and Berry (1988) provides a relevant framework to assess these aspects in LPG distribution.

2.1 Service Quality Parameters of PMUY:

The **SERVQUAL model** evaluates service quality based on five key dimensions:

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- **Tangibility** (physical facilities, equipment, and appearance of personnel)
- **Reliability** (ability to perform the promised service dependably and accurately)
- **Responsiveness** (willingness to help customers and provide prompt service)
- **Assurance** (knowledge and courtesy of employees and their ability to inspire trust)
- **Empathy** (caring and individualized attention to customers)

This model, truly reflects the Indian Knowledge System, has been applied extensively in public service delivery, and is particularly useful in assessing government welfare schemes like **PMUY** where user experience plays a significant role in scheme adoption.

2.2 LPG Consumption Trends Among PMUY Beneficiaries

Although PMUY has significantly increased LPG access, several studies indicate that actual LPG consumption remains suboptimal. Kar et al. (2019) analyzed LPG sales data in rural Karnataka and found that PMUY beneficiaries had significantly lower LPG consumption rates compared to general consumers. This suggests that initial adoption does not necessarily translate to sustained usage. Gill-Wiehl, Brown, and Smith (2020) employed a difference-in-differences approach to assess LPG adoption and found that while the probability of obtaining an LPG connection increased by 3.3%–3.6%, PMUY households consumed 7.4 kg less LPG per year compared to non-PMUY users. Similarly, Ranjan and Singh (2020) reported that a substantial number of PMUY beneficiaries stopped refilling their LPG cylinders due to financial constraints, contributing to 43.2 million inactive connections by 2019. Research suggests that **PMUY has significantly increased LPG penetration**, but sustained usage remains an issue. A study by **Giri & Afsana (2022)** found that **only 50-60% of PMUY beneficiaries regularly use LPG, with many reverting to traditional fuels.**

2.3 Socioeconomic and Demographic Influences on LPG Consumption

Several factors influence LPG adoption and continued usage. Education, household income, and access to alternative fuels such as kerosene play a crucial role in determining the sustainability of LPG use (Swain & Mishra, 2020). Research by Asharaf and Tol (2024) shows that Scheduled Caste households benefit significantly from PMUY, whereas Scheduled Tribe households face greater challenges in adopting and sustaining LPG use. Khanwilkar et al. (2021) examined the impact of LPG adoption in forest-dependent communities and found that while 90% of LPG users continued to collect firewood, the time spent collecting firewood gradually decreased over time. Cabiyo, Ray, and Levine (2020) further explored the "refill gap," emphasizing that women often lack financial autonomy and access to mobile phones required for refilling LPG, which delays timely purchases.

2.4 Assessment of Service Quality Dimensions in LPG Distribution

Tangibility in LPG distribution includes **cylinder quality, storage safety, and distribution infrastructure**. Studies indicate that **poor maintenance of LPG cylinders, lack of proper storage in rural households, and inadequate distribution networks** are major concerns (Sharma et al., 2023). Reliability refers to **consistent availability** of LPG cylinders and **timely refilling services**. While PMUY has improved accessibility, research highlights **supply chain inefficiencies** leading to delays in cylinder delivery. Government agencies and private distributors play a key role in responding to customer concerns. Studies suggest that **lack of awareness about complaint mechanisms** and **delayed grievance redressal** impact consumer satisfaction. Consumer trust in LPG safety and government initiatives is critical for sustained adoption. Research by Bhattacharya et al. (2021) shows that **safety training programs and awareness campaigns significantly improve trust** and LPG adoption rates. PMUY aims to **empower rural women**, but studies show challenges such as **difficulty in refilling cylinders due to cost concerns** and **lack of distributor presence in remote areas** (Khanwilkar et al., 2021).

2.5 Policy Implications and Recommendations

For PMUY to achieve its intended impact, policy adjustments are necessary. Mani et al. (2020) argue that sustained LPG usage must be integrated with broader rural development efforts, such as employment guarantees and improved cash flow mechanisms for rural households. Additionally, Kalli,

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Jena, and Managi (2022) emphasize the need for targeted awareness campaigns, self-help group (SHG) interventions, and village-level accessibility improvements to enhance LPG adoption.

The literature suggests that while PMUY has successfully increased LPG access, challenges remain in ensuring consistent usage. Issues such as service quality, affordability, awareness, and socio-economic barriers hinder the transition to clean cooking fuels. Future policy modifications should focus on improving refill affordability, increasing awareness, and addressing distribution inefficiencies to enhance the program's long-term success.

3. Results and Discussion

The results of this study provide a comprehensive analysis of service quality parameters and the consumption patterns of Liquefied Petroleum Gas (LPG) distributed through the Pradhan Mantri Ujjwala Yojana (PMUY) in Uttar Pradesh. The findings are structured to evaluate the effectiveness of the scheme in terms of accessibility, affordability, and sustained usage of LPG among beneficiary households. Key service quality parameters, including Tangibility, Reliability, Responsiveness, Assurance, and Empathy measured through 5-point Likert agreeableness scores along with annual consumption of LPG, are assessed to understand their impact on the adoption and continued utilization of LPG. Furthermore, the discussion explores the socio-economic and demographic factors influencing LPG consumption, highlighting the scheme's reach among marginalized communities. By synthesizing quantitative data with qualitative insights, the analysis offers a nuanced understanding of how PMUY has shaped cooking fuel choices, addressing both achievements and challenges in enhancing energy equity in the region.

Table-1: Mean, SD, and ANOVA of Agreeableness Scores on Some Service Quality Parameters, and Consumption of LPG Distributed through Pradhan Mantri Ujjwala Yojana (PMUY) Across Different Castes in Uttar Pradesh.

		N	Mean	Std. Deviation	F-value
Tangibility	General	36	3.96 ^{A}	0.86	2.718*
	SC	72	4.11 ^{B}	0.78	
	ST	43	3.71 ^{A}	0.66	
	OBC	241	3.85 ^{A}	0.83	
Reliability	General	36	2.46	0.57	1.428 ^{NS}
	SC	72	2.65	0.61	
	ST	43	2.48	0.40	
	OBC	241	2.51	0.57	
Responsiveness	General	36	2.91	0.70	0.322 ^{NS}
	SC	72	2.89	0.53	
	ST	43	2.89	0.58	
	OBC	241	2.95	0.58	
Assurance	General	36	3.19	0.79	0.121 ^{NS}
	SC	72	3.22	0.67	
	ST	43	3.24	0.63	
	OBC	241	3.18	0.70	
Empathy	General	36	2.13	0.38	0.783 ^{NS}

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	SC	72	2.20	0.57	
	ST	43	2.08	0.35	
	OBC	241	2.14	0.44	
Annual LPG Consumption (Kg.)	General	36	92.58 ^{D}	29.88	2.946*
	SC	72	53.96 ^{E}	19.65	
	ST	43	52.54 ^{E}	24.11	
	OBC	241	89.46 ^{D}	24.43	

N.B:- (1) * - *Significant (P<0.05), and NS – Not Significant (P>0.05) at 5% Level of computed F-values in ANOVA (Analysis of Variance).*
(2) *Similar superscript over the means of different castes of beneficiaries across the parameters indicates their similarities at 5% level obtained through Duncan's Multiple Range Test (DMRT).*

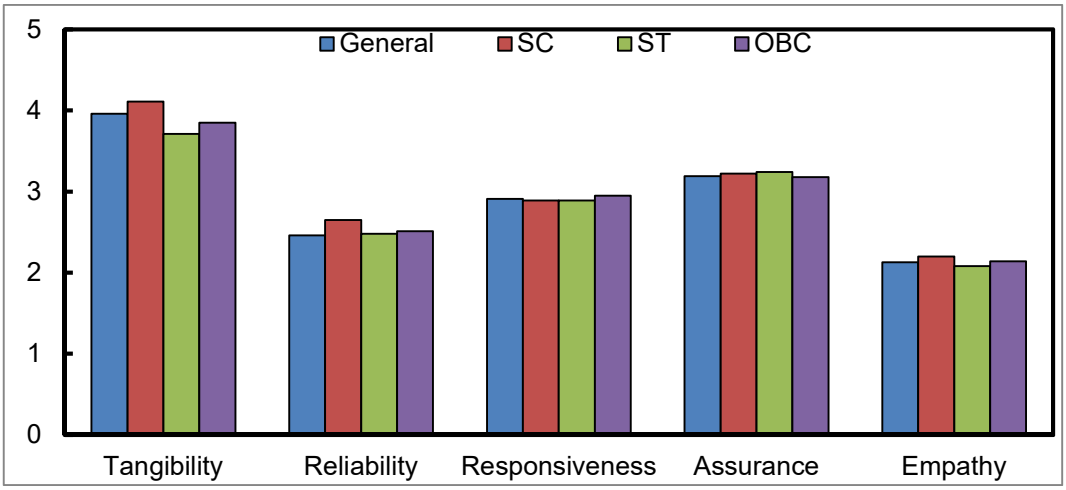


Figure-1: Mean of Some Service Quality Parameters of Agreeableness Score on LPG Distribution through Pradhan Mantri Ujjwala Yojana (PMUY) Beneficiaries Across Different Castes in Uttar Pradesh.

The Table-1 and Figure-1 highlight the mean scores, standard deviations, and ANOVA results for agreeableness of beneficiaries from different castes in Uttar Pradesh on some service quality parameters i.e. Tangibility, Reliability, Responsiveness, Assurance, Empathy, and Annual LPG Consumption under the Pradhan Mantri Ujjwala Yojana (PMUY). In case of Tangibility, significant differences ($F = 2.718$, $p < 0.05$) were observed across castes. SC beneficiaries scored the highest (4.11), indicating better perceptions of physical facilities, equipment, and materials provided. Conversely, ST beneficiaries scored the lowest (3.71), with similarities in perceptions are noted among General, ST, and OBC groups (superscript A) highlighting areas of concern. But in case of Reliability, Responsiveness, Assurance, and Empathy, exhibited no statistically significant differences ($p > 0.05$) in agreeableness among castes. Reliability scores were consistently low across castes, ranging from 2.46 to 2.65, indicating a lack of confidence in the consistency and dependability of services. Beneficiaries showed nearly identical scores (~2.9) on Responsiveness, reflecting average perceptions of service providers' willingness to assist. Scores were moderate (3.18–3.24) on Assurance, suggesting a stable but unremarkable sense of trust in service providers. Uniformly low scores (2.08–2.20) on Empathy imply a lack of personalized attention or care for beneficiaries' needs. Lastly in case of LPG consumption in Kg, significant differences ($F = 2.946$, $p < 0.05$) were observed across castes. General caste beneficiaries scored the highest (92.58) similar to OBC (89.46) with superscript "A", indicating more consumption. Conversely, ST beneficiaries use the lowest (52.54), in similarities with SC (53.96) having superscript "B".

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Table-2: Mean, SD, and ANOVA of Agreeableness Scores on Some Service Quality Parameters, and Consumption of LPG Distributed through Pradhan Mantri Ujjwala Yojana (PMUY) Across Different Family Sizes in Uttar Pradesh.

		N	Mean	Std. Deviation	F-value
Tangibility	Small Family	167	3.78 A	0.79	2.952*
	Medium Family	116	3.99 B	0.72	
	Large Family	109	3.97 B	0.91	
Reliability	Small Family	167	2.41 C	0.56	7.887*
	Medium Family	116	2.55 D	0.53	
	Large Family	109	2.68 D	0.58	
Responsiveness	Small Family	167	2.95	0.58	1.180 NS
	Medium Family	116	2.97	0.56	
	Large Family	109	2.86	0.60	
Assurance	Small Family	167	3.23	0.67	0.417 NS
	Medium Family	116	3.18	0.73	
	Large Family	109	3.16	0.70	
Empathy	Small Family	167	2.13	0.41	0.072 NS
	Medium Family	116	2.14	0.46	
	Large Family	109	2.16	0.50	
Annual LPG Consumption (Kg.)	Small Family	167	55.38 E	26.35	6.717*
	Medium Family	116	79.52 F	20.02	
	Large Family	109	99.40 G	23.94	

N.B:- (1) * - *Significant (P<0.05), and NS – Not Significant (P>0.05) at 5% Level of computed F-values in ANOVA (Analysis of Variance).*

(2) *Similar superscript over the means of different family sizes of beneficiaries across the parameters indicates their similarities at 5% level obtained through Duncan's Multiple Range Test (DMRT).*

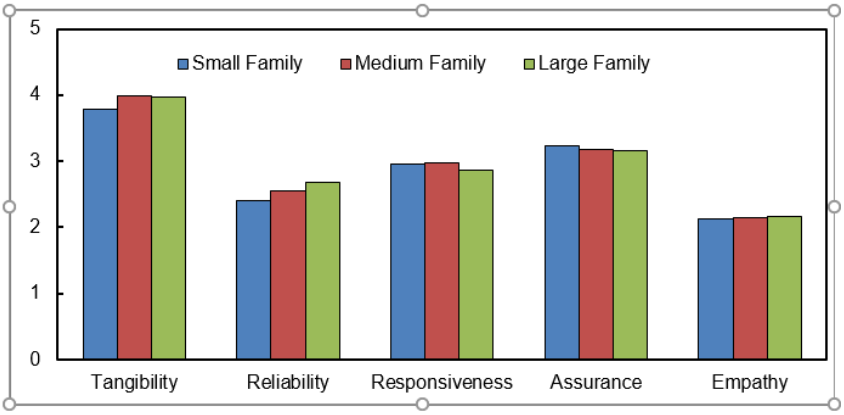


Figure-2: Mean Agreeableness Score of Some Service Quality Parameters on LPG Distribution through Pradhan Mantri Ujjwala Yojana (PMUY) Beneficiaries Across Different Family Sizes in Uttar Pradesh.

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The analysis in Table-2 and Figure-2 evaluates the **agreeableness scores** of PMUY beneficiaries across family sizes on said **service quality parameters** in Uttar Pradesh. In case of **Tangibility, s**ignificant differences (F-value = 2.952, $p < 0.05$) are observed. **Medium and Large families** share a higher mean score (3.99, 3.97 superscript "B") compared to **Small families** (3.78 superscript "A"), indicating better perception of tangible aspects among larger households. Similarly, for **Reliability, s**ignificant variation (F-value = 7.887, $p < 0.05$) is noted. Larger and medium families rate Reliability higher (mean = 2.68 and 2.55 superscript "D"), surpassing small (2.41 superscript "C"). This suggests enhanced trust in service reliability for larger households. But for **Responsiveness, Assurance, and Empathy, n**o significant differences are found across family sizes (F-values: 1.180, 0.417, 0.072, all $p > 0.05$). Perceptions of these parameters are consistent across family types, indicating uniform service quality in these dimensions. Again, **Annual LPG Consumption varies across household sizes** (F-value = 6.717, $p < 0.05$). **Large families** exhibit higher LPG consumption (99.40 kg superscript "G") compared to small and medium families (55.38 kg, 79.52 kg superscript "E" and "F" respectively), likely due to greater household needs.

Table-3: Mean, SD, and ANOVA of Agreeableness Scores on Some Service Quality Parameters, and Consumption of LPG Distributed through Pradhan Mantri Ujjwala Yojana (PMUY) Across Different Principal Occupations in Uttar Pradesh.

		N	Mean	Std. Deviation	F-value
Tangibility	Business	41	3.84 ^{B}	0.93	3.222*
	Serive (Pvt)	69	3.87 ^{B}	0.78	
	Service (Govt)	32	4.19 ^{A}	0.79	
	Agriculture	188	3.93 ^{B}	0.85	
	Labour	62	3.69 ^{B}	0.59	
Reliability	Business	41	2.49 ^{E}	0.60	3.974*
	Serive (Pvt)	69	2.60 ^{D}	0.56	
	Service (Govt)	32	2.81 ^{D}	0.49	
	Agriculture	188	2.52 ^{E}	0.59	
	Labour	62	2.35 ^{C}	0.43	
Responsiveness	Business	41	2.84	0.49	1.408 ^{NS}
	Serive (Pvt)	69	3.03	0.58	
	Service (Govt)	32	3.07	0.60	
	Agriculture	188	2.91	0.59	
	Labour	62	2.87	0.58	
Assurance	Business	41	3.15	0.65	0.521 ^{NS}
	Serive (Pvt)	69	3.24	0.67	
	Service (Govt)	32	3.33	0.68	
	Agriculture	188	3.19	0.72	
	Labour	62	3.15	0.70	
Empathy	Business	41	2.07	0.34	1.158 ^{NS}
	Serive (Pvt)	69	2.17	0.55	

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	Service (Govt)	32	2.05	0.27	
	Agriculture	188	2.14	0.44	
	Labour	62	2.22	0.49	
Annual LPG Consumption (Kg.)	Business	41	102.24 G	20.53	6.997*
	Serive (Pvt)	69	96.56 G	19.29	
	Service (Govt)	32	103.66 G	31.44	
	Agriculture	188	52.54 H	22.16	
	Labour	62	44.02 H	27.92	

N.B:- (1) * - *Significant (P<0.05), and NS – Not Significant (P>0.05) at 5% Level of computed F-values in ANOVA (Analysis of Variance).*
(2) *Similar superscript over the means of different occupations of beneficiaries across the parameters indicates their similarities at 5% level obtained through Duncan's Multiple Range Test (DMRT).*

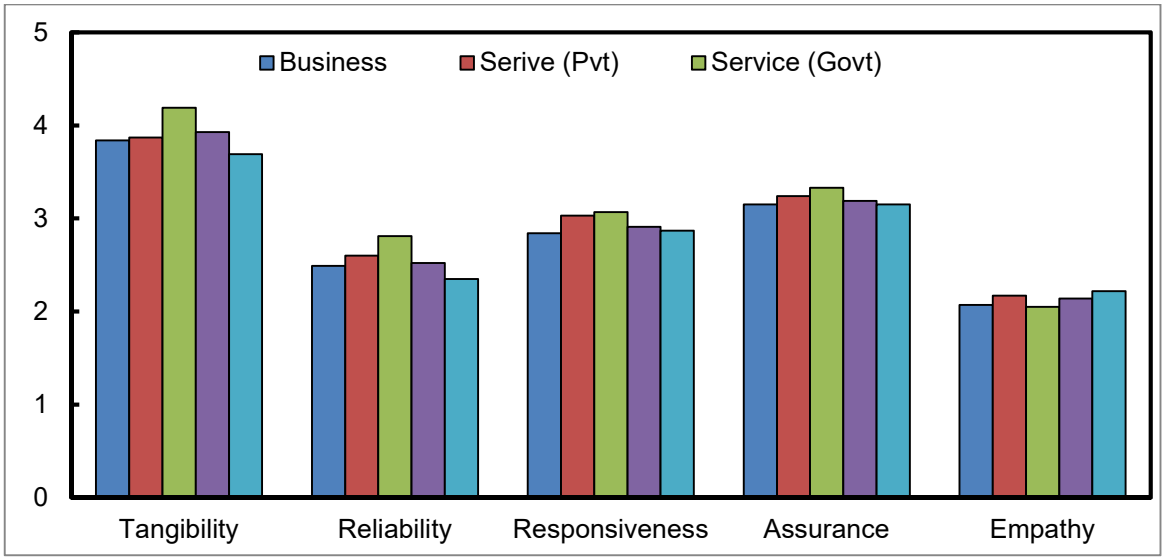


Figure-3: Mean Agreeableness Score of Some Service Quality Parameters on LPG Distribution through Pradhan Mantri Ujjwala Yojana (PMUY) Beneficiaries Across Different Primary Occupations in Uttar Pradesh.

The analysis in Table-3 and Figure-3 evaluates the **agreeableness scores** of PMUY beneficiaries across primary occupation on said **service quality parameters** in Uttar Pradesh. For Tangibility, Government service beneficiaries (Mean: 4.19 superscript "A") outperformed others, reflecting superior infrastructure or product quality. Other groups, including agriculture, private service, and business occupations, demonstrated comparable but lower levels of satisfaction, while laborers lagged behind (superscript "B". In case of Reliability, across occupations, scores were generally low, with government service recipients achieving slightly higher reliability perceptions (Mean: 2.81 superscript "D"), while laborers reported the lowest (Mean: 2.35 superscript "C"). This signals widespread dissatisfaction with service dependability. Responsiveness, Assurance, and Empathy exhibited no significant occupational differences, highlighting a consistent perception across all groups, albeit with moderate ratings (below 3.5). However, Government service, Businessmen, and private service beneficiaries consumed significantly more LPG (Means: 138.45, 102.24, and 96.56 kg superscript "G"), indicating higher purchasing capacity or greater availability. Conversely, laborers and agriculturists consumed the least

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(Means: 44.02 and 52.54 kg superscript "H"), pointing to accessibility challenges or affordability constraints.

Table-4: Mean, SD, and ANOVA of Agreeableness Scores on Some Service Quality Parameters, and Consumption of LPG Distributed through Pradhan Mantri Ujjwala Yojana (PMUY) Across Different Types of Dwelling Houses in Uttar Pradesh.

		N	Mean	Std. Deviation	F-value
Tangibility	Kuchha	59	3.61 ^{A}	0.66	1.179*
	Pucca	231	4.06 ^{B}	0.81	
	Semi Pucca	102	3.67 ^{A}	0.82	
Reliability	Kuchha	59	2.32 ^{C}	0.34	8.565*
	Pucca	231	2.62 ^{D}	0.60	
	Semi Pucca	102	2.44 ^{C}	0.55	
Responsiveness	Kuchha	59	2.84	0.48	1.994 ^{NS}
	Pucca	231	2.98	0.58	
	Semi Pucca	102	2.87	0.62	
Assurance	Kuchha	59	3.12	0.66	0.476 ^{NS}
	Pucca	231	3.26	0.70	
	Semi Pucca	102	3.19	0.70	
Empathy	Kuchha	59	2.16	0.38	0.353 ^{NS}
	Pucca	231	2.15	0.50	
	Semi Pucca	102	2.11	0.37	
Annual LPG Consumption (Kg.)	Kuchha	59	44.73 ^{E}	34.91	10.470*
	Pucca	231	101.10 ^{G}	21.22	
	Semi Pucca	102	73.84 ^{F}	20.30	

N.B:- (1) * - *Significant (P<0.05), and NS – Not Significant (P>0.05) at 5% Level of computed F-values in ANOVA (Analysis of Variance).*

(2) *Similar superscript over the means of different types of houses of beneficiaries across the parameters indicates their similarities at 5% level obtained through Duncan's Multiple Range Test (DMRT).*

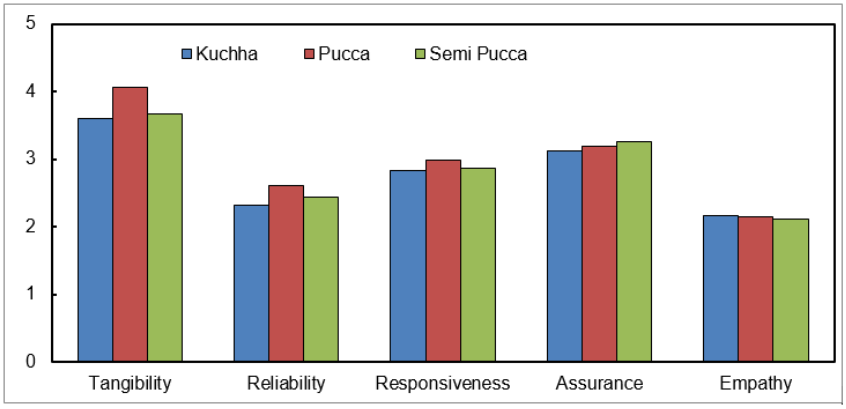


Figure-4: Mean Agreeableness Score of Some Service Quality Parameters on LPG Distribution through Pradhan Mantri Ujjwala Yojana (PMUY) Beneficiaries Across Different Types of Dwelling Houses in Uttar Pradesh.

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The analysis in Table-4 and Figure-4 evaluates the **agreeableness scores** of PMUY beneficiaries across primary occupation on said **service quality parameters** in Uttar Pradesh. Towards Tangibility, beneficiaries residing in **pucca houses** reported the **highest mean score (4.06 superscript "B")**, significantly different from those in **kuchha (3.61)** and **semi-pucca houses (3.67)** with superscript "A". The F-value (1.179*) confirms **statistical significance** at the 5% level, underlining that beneficiaries in well-built houses perceive better tangible service quality. In case of **Reliability, t**he mean scores exhibit a clear hierarchy with **pucca houses (2.62 superscript "D")** outperformed **semi-pucca (2.44)** and **kuchha (2.32)** with superscript "C". The significant F-value (8.565*) suggests that dwelling type greatly impacts beneficiaries' perception of the reliability of LPG distribution services. The scores for responsiveness show only marginal differences across dwelling types (**pucca: 2.98, semi-pucca: 2.87, kuchha: 2.84**). The **non-significant F-value (1.994 NS)** indicates no substantial variation in perceived responsiveness based on housing type. Similarly, assurance scores are closely grouped, with beneficiaries in **pucca houses** reporting slightly higher scores (**3.26**) than those in semi-**pucca (3.19)** and **kuchha (3.12)** houses. The **F-value (0.476 NS)** suggests that perceptions of assurance are unaffected by housing type. Scores towards Empathy are nearly identical across all dwelling types (**kuchha: 2.16, pucca: 2.15, semi-pucca: 2.11**). With a **non-significant F-value (0.353 NS)**, this parameter appears universally low and consistent across beneficiaries. Annual LPG consumption shows significant differences, with beneficiaries in **pucca houses consuming the highest (101.10 kg superscript "G")**, followed by **semi-pucca (73.84 kg superscript "F")** and **kuchha houses (44.73 kg superscript "E")**. The *F-value (10.470*)* highlights that housing type significantly influences annual LPG consumption, possibly due to lifestyle and usage patterns.

4. Summary and Conclusions

The analysis reveals stark contrasts in service quality perceptions among PMUY beneficiaries, with Tangibility as the only parameter showing significant caste-based variation. SC beneficiaries expressed higher satisfaction with tangible aspects, while ST beneficiaries indicated room for improvement. Conversely, Reliability, Responsiveness, Assurance, and Empathy consistently received low scores across castes, particularly for empathy, highlighting systemic deficiencies. Despite perceptual differences, stable LPG consumption suggests uniform usage patterns unaffected by service quality parameters. Family size emerged as a pivotal factor, influencing perceptions of tangibility, reliability, and LPG consumption. Larger families, benefiting from frequent interactions, reported greater satisfaction with tangible aspects and reliability, reflecting alignment between the program and their needs. However, softer service dimensions like responsiveness and empathy remained unchanged across groups, signifying a lack of customer engagement efforts. The findings also underscore disparities across occupational groups and dwelling types. Government beneficiaries valued tangibility but found reliability lacking. Beneficiaries in pucca houses reported higher satisfaction with tangibility and reliability due to better accessibility and trustworthiness of services, whereas responsiveness, assurance, and empathy remained uniformly mediocre. Economic and accessibility divides, mirrored in LPG consumption patterns, further highlight systemic inequalities. In conclusion, while infrastructural and tangible strengths cater well to certain groups, pervasive reliability issues and lackluster engagement efforts undermine overall satisfaction.

Addressing these gaps, especially in empathy and responsiveness which comes from IKS, is essential to enhancing service quality and equity among beneficiaries.

The Indian Knowledge System (IKS) emphasizes customer-centric service quality through values, traditions, and philosophies rooted in ancient wisdom. Here's how it can enhance customer service:

1. **Ethical Engagement**: Principles from texts like the *Arthashastra* promote integrity and transparency in dealings, building customer trust and loyalty.
2. **Personalization**: The Guru-Shishya model inspires tailored services by understanding individual needs, fostering deeper customer satisfaction.

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3. **Empathy and Compassion**: Concepts like *Ahimsa* (non-violence) encourage kindness in interactions, leading to a positive customer experience.
4. **Holistic Approach**: Practices like Ayurveda emphasize balance and well-being, which can inspire organizations to focus on holistic customer care.
5. **Value of Relationships**: *Vasudhaiva Kutumbakam* (the world as one family) highlights the importance of long-term relationships over transactional interactions.
6. **Sustainability**: Aligning with nature and harmony, businesses can adopt eco-friendly practices to resonate with socially conscious customers.

IKS frameworks can guide organizations to cultivate meaningful and high-quality customer experiences. If you'd like to explore applications in a specific industry, let me know!

Disclosure statement

No potential conflict of interest is reported by the authors.

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