



Enhancing Passenger Satisfaction Through SERQUAL and Perceived Value: Insights from Indian Railway Food Services

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Abstract. The quality of food service plays a crucial role in shaping passenger experiences and satisfaction in railway catering services. This study analyzes the dimensions of service quality affecting perceived value and passenger satisfaction in Indian railway catering. Further specifically, it considers the service parts, namely, reliability, responsiveness, tangibility, assurance, empathy, that SERVQUAL construct has in affecting the overall perception of the service and passenger satisfaction. The sample of 293 respondents was collected at three major railway stations (Surat, Vadodara, Ahmedabad) along three major long distance trains in the Gujarat station. By Structural Equation Modelling (SEM), it also confirms that the five SERVQUAL dimensions are highly relevant for the passenger's perceived value that in turn mediates the association between the same dimensions searched by the passenger satisfaction. So, among the factors that it has an enormous impact on perceived value we have service consistency, staff attentiveness of staff, food presentation, and lastly hygiene. These findings also highlight the need to fulfil all these measures to achieve high food quality, rapid and courteous service and to keep hygiene standards, which aim to please passengers and gain their loyalty. Finally, this thesis offers valuable ideas for improvement of the service to customers and the operational efficiency of catering service providers of railway. These studies could help on planning strategic interventions aiming at enhancing overall the passenger experience, in general and food service in railway domain in particular.

Keywords: Passenger satisfaction, perceived value, SERVQUAL, and Railway food quality.

1. Introduction

In the competitive environment of railway catering services, customer satisfaction is essential to cultivate brand loyalty and facilitate potential long-term development for business [1]. The food service is one of the sectors where passengers determine their perception based on the quality of their experience and the level of satisfaction [2]. With the changing trends in travelers where they are more conscious of the food quality provided, sanitation, and employee diligence, it is crucial to make amendments and improve the service quality to guarantee an excellent experience for the customers [3]. The SERVQUAL model, one of the most used frameworks for evaluating service quality, provides a systematic approach by examining the multidimensional nature of service quality [4].

In railway catering, the specified dimensions are important as tangible dimensions (food presentation, hygiene, etc.) and intangible dimensions (staff demeanor, service reliability, etc.) impact the perceived value of the service [5]. Catering is a challenging and an opportunity sector for Indian railways. Indian Railway Catering and Tourism Corporation (IRCTC) is the catering service provider of about 23 million passengers daily (Indian Railway Catering and Tourism Corporation Annual Reports 2022) on the Indian Railways which makes it among the second largest catering service provider globally [6]. The firm's extensive operations also create a challenge for process related to client satisfaction.

It is the perceived value that is being regarded as the central factor in bridging the service quality and customer satisfaction in the railway catering context. The perceptions of higher service quality, which entail food quality and efficient service delivery by the airline will lead to higher satisfaction and loyalty of passengers [7]. The conceptualization of a product in service contexts encompasses both tangible and intangible dimensions. Tangible elements refer to the physical attributes such as the freshness and hygienic condition of the product, while intangible aspects pertain to the perceived trust in its quality and the assurance of safety for consumption [8]. A review of contemporary literature suggests that when consumers perceive an enhanced value—arising from both product integrity and service quality—their overall satisfaction tends to improve. This heightened satisfaction not only influences immediate behavioral outcomes, such as repeat purchases, but also fosters long-term loyalty through positive word-of-mouth advocacy [9,10].

A significant number of studies have focused on the relationship between service quality and customer satisfaction [11,12] the role of perceived value as a mediator of this relationship, especially in the context of railway catering services, remains largely unexplored. The Indian railway catering market, especially the offerings by IRCTC, presents a unique scenario that has not been extensively studied in terms of perceived value. Among the population segments, the customer base differs widely, from low-cost passengers to premium travellers, making it difficult to understand service quality perception and valuation across different types of passengers [13]. According to a recent report, IRCTC's catering segment contributed significantly to its overall revenue, increasing by 29% year-on-year to ₹96.35 crore in Q3 FY24 [14]. This development of progress highlights the importance of understanding the factors that influence both customer satisfaction and perceived values of railway catering services. These things are essential for companies like IRCTC to accelerate growth and cater to changing customers' needs.

The study also seeks answers to the question of how the dimensions of SERVQUAL (tangibles, reliability, responsiveness, assurance, and empathy) affect perceived value in railway catering. Secondly, we aim to examine how perception of value impacts customer satisfaction in the context of railway catering service. The third objective was to study the mediation effect of the

which food service quality can be enhanced for increased satisfaction of passengers in railway services through practical solutions.

2. Theoretical Background

This study bridges the nexus between service quality, perceived value, and passenger satisfaction under the context of railway food services. Based on the SERVQUAL model [4] and the Expectancy-Disconfirmation Theory [15] the theoretical foundation of this research presents the recognized references of service quality and customer satisfaction evaluation.

2.1.1 SERVQUAL Model

SERVQUAL model defines the quality of service using the five critical dimensions which are observed in the participants and is used to assess the railway food service perceived by the users and if it aligns with the user's expectations.

Reliability for Railway food services is seen as making quality food service to passenger pass with no slippage as a product and as a service and at a constant quality standard [2]. Responsiveness is defined as staff willingness to respond immediately as a passenger needs, such as accommodating dietary restriction or preference for meals that provided great value service satisfaction [10]. It then focused on satisfactorily arranging competent, showing respect and courtesy to staff in the organization for increasing confidence in the food safety and quality in the minds of passengers. Hygiene certifications and other such labels on safety standards become more transparent with the addition of transparency to communication. Hygiene, presentation and a good service environment will determine first day visit and customers' impression about passengers first impression [16]. Finally, empathy is defined as the understanding and attendance to the specific needs of passengers through the food offering, and such kind of service that will create overwhelming emotional bond that will enhance the whole dining experience (Sheth et al., 2020).

2.1.2 Expectancy-Disconfirmation Theory

The foundational work of Oliver [15] establishes customer satisfaction as resulting from the disparity between perceived service performance and prior expectations. In railway dining contexts, passengers experience three distinct satisfaction outcomes: (i) dissatisfaction when services fail to meet expectations (service failure), (ii) neutral satisfaction when expectations are merely met, and (iii) heightened satisfaction when services surpass expectations (service delight) [4]. This underscores the operational imperative for catering providers to systematically align service delivery with passengers' expectation thresholds, whether formed through previous travel experiences or external benchmarks (Sulek & Hensley, 2020).

Perceived value – conceptualized as the consumer's evaluation of received benefits relative to incurred sacrifices (monetary, temporal, or effort-based) [17]– serves as a critical mediator. Railway catering assessments typically focus on three core dimensions: (a) sensory and nutritional quality of food, (b) verifiable hygiene standards, and (c) staff responsiveness to dietary requests [10]. When these elements collectively achieve positive disconfirmation, they generate measurable increases in both perceived value and satisfaction levels [8].

This is increased service, which is another description of an increased service and the extent this service satisfies the customer and most importantly effects the customer's emotional or mental

response to experiencing the offered service. It indicates that since passengers are likely to recommend the service to others, attachment toward the service provider or their behavioral risk are affected on passengers' repurchase intentions and their satisfaction with the service provider [15].

2.2 Research hypotheses development

2.2.1 SERVQUAL and Perceived value Relationship

Dimensions of service quality (SERVQUAL) have received considerable attention in terms of its direct effect on perceived value, particularly in the context of passenger services [10,18]. Tangibles such as dining area hygiene and food appearance, significantly impact passengers' perceptions of service quality [8]. The perception of value among long-distance train passengers in India is heavily influenced by the food's quality, which includes its taste, cleanliness, and presentation [5].

According to Wisutwattanasak et al. [19], tangibles affect immediate quality perceptions and create a basis for a satisfactory service experience. Studies have shown that clean food, neatly displayed food, and a good atmosphere affect customers' perceptions of food outlets, especially in unique situations such as in the train environment [20]. According to Miranda et al. [21], passengers value services significantly when restaurants have clean areas, and meals are delivered on time. This also resonates here, as it found that presentation and flavor matter most in determining pleasure and, thus, perceived value [2].

Other dimensions of SERVQUAL like assurance, reliability, and empathy have also shown to be significant determinants of perceived value. According to Nguyen-Phuoc et al., [22], assurance is based on consistency and reliability, which ensures passenger trust, while empathy, which focuses on connecting with passengers and catering to their needs, is important for making the experience value-based and personalized [10].

2.2.2 SEVQUAL and Satisfaction Relationship:

While the SERVQUAL dimensions do not have to perfectly align with the service process, their gradual development within a specific industry leads to enhanced customer satisfaction [23]. The evaluation of passenger satisfaction encompasses various aspects of the experience, including food quality, service efficiency, and ambiance throughout the journey. The researcher proved that enhancement in these aspects is associated with high contentment and positive behavioral intentions [7]. In this respect, the findings are consistent with Ojha [24], who argued that customers' level of satisfaction is significantly affected if the level of service delivery matches or exceeds the travelers' expectations, which ultimately leads to brand loyalty and better customer image.

The study found that food quality, and meal presentation in particular, had a statistically significant positive relationship with passenger satisfaction and is thus important to the SERVQUAL framework [20]. Factors such as the fresh availability of food, courtesy of staff, and effective grievance redressed mechanisms enhance satisfaction in IRCTC food restaurants, which had been established by [5,19]. These observations are consistent with the conclusions drawn by previous studies, which highlight that a diverse menu and the ability to customize offerings play a crucial role in meeting the varied dietary expectations of travellers [25].

Yang et al. [26] demonstrated that prompt service, effective management of food-related complaints, etc. can contribute to increased passenger satisfaction. These results support the findings of [13], indicating the importance of reliability and responsiveness in shaping customer perceptions. As a result, prompt service, fast assistance and dependable scheduling and such related areas are directly linked with higher satisfaction.

2.2.3 Perceived Value, Customer Satisfaction, and Mediation Role

In railway catering services, perceived value is the critical domain of customer satisfaction as it represents the passengers' ability to identify benefits that are higher than the expectations [10]. Perceived value has three dimensions: functional value or an evaluation of how food is, for example, in terms of quality, on-time delivery, and hygiene; emotional value, including comfort level and trust in food safety; and social value, related to, for instance, cultural alignment and eco-friendly practices. All of them together improve the satisfaction of customers leading to re-patronage [27,19].

Alongside tangible traits, perceived value encompasses intangible advantages as well. Studies suggest that food loyalty is strongly influenced by emotional comfort and a sense of trust in food safety [28]. Perceived value is substantially shaped by overall experience, including food quality, service efficiency, and ambiance. Ambient atmosphere and fulfillment are the most common factors driving high levels of satisfaction in the train environments [7]. Moreover, perceived value acts as a mediator that reinforces the influence of service quality dimensions on customer satisfaction. According to [29], cleanliness, quality of food container, and prompt delivery time contribute to the perceived value and satisfaction level. It is found that when high quality meals and reliable service are correlated to customer satisfaction, loyalty is generated resulting in positive feedback between satisfaction and loyalty [26].

Perceived value strengthens the relationship of food-related service quality on satisfaction that contributes a significant role in their overall efficiency of services [30]. The findings indicate that perceived value leads to satisfaction and as an intermediary, strengthen the link between service quality and satisfaction, further boosting patrons' satisfaction as well as their loyalty [31]. According to the literature review above, this study proposes the following hypotheses:

H1: The reliability of food service quality has a positive impact on perceived value in railway catering service.

H2: Responsiveness of railway catering service has a positive impact on perceived value of customers.

H3: Assurance in the quality of food service has a positive effect on perceived value in railway catering service.

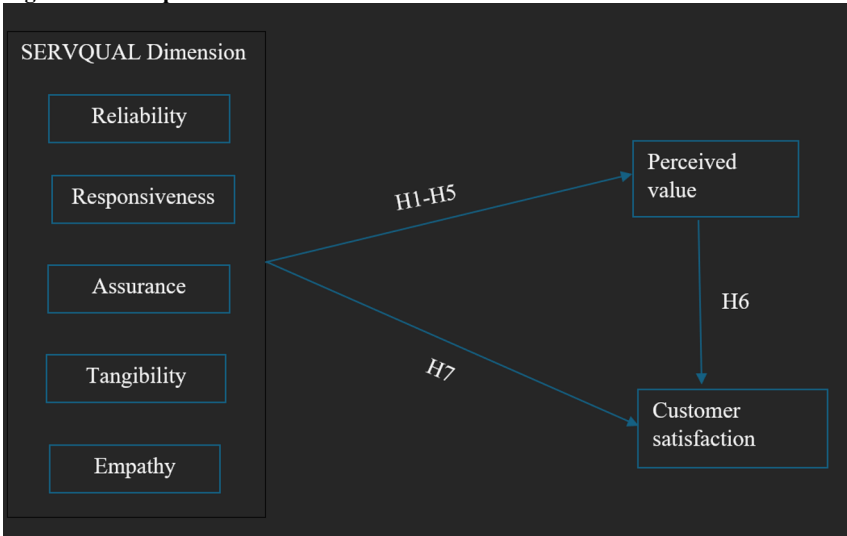
H4 Tangibles in the quality of food service has a positive effect on perceived value in railway catering service.

H5: Empathy of the quality of food service positively influence perceived value in railway catering service.

H6: Perceived value has a positive effect on customer satisfaction in railway catering services.

H7: Perceived value act as mediator in the relationship between food service quality and customer satisfaction in railway catering services.

Figure 1: Conceptual framework



3. Research Design

This study uses a cross-sectional survey design to identify the relationship between SERVQUAL dimensions, perceived value, and the satisfaction of passengers regarding railway food quality. Three prominent trains—Paschim Express, Golden Temple Mail, and Kerala Sampark Kranti—were selected based on their stoppages at key Gujarat stations like Surat, Vadodara, and Ahmedabad, to ensure access to a different passenger demographic.

3.1 Sampling Technique

This study employed a purposive sampling method focused on passengers consuming meals provided by railway catering services. The sample represented a diversity of socio-economic backgrounds and types of journeys to ensure comprehensive representation of a range of factors. Participants were selected during their travel on the designated routes, focusing on both pre-booked and onboard meal consumers.

3.2 Data Collection

The data collection on board was carried out during significant train stoppage intervals and following mealtimes to ensure optimal participation while minimizing disruptions to passengers' routines. The extended delays of the chosen trains at Gujarat stations provided ample opportunity for engagement. Individuals engaged with passengers directly and utilized a structured survey that required approximately 5–7 minutes to finish. To foster engagement, passengers were assured of confidentiality and the academic aspect of the study.

3.3 Measurement Instruments

A comprehensive questionnaire was created for this investigation, using validated measures from the literature to cover key constructs. The SERVQUAL dimensions defined by Parasuraman et

al. [4] were applied to assess railway food service quality. A perceived value items were adapted from Zeithaml [17] study items. For measuring dependent variable customer satisfaction items were adapted from Oliver [15] and modified in current study context. Participants assessed variables on a Likert scale from 1 (Strongly agree) to 5 (Strongly disagree). The questionnaire was tested with 30 passengers to assess clarity, reliability, and validity, and required adjustments were made.

3.4 Data Analysis

Passenger demographics and perceptions of food service quality were described using descriptive statistics. In the first, to identify the latent structure of constructs an Exploratory Factor Analysis (EFA) was performed, while in the second Confirmatory Factor Analysis (CFA) was used to assess measurement model. To address the direct relationships between SERVQUAL dimensions, perceived value, passenger satisfaction, structural Equation Modeling (SEM) was used. Moreover, mediation analysis was conducted to check the mediation role of perceived value in SERVQUAL dimensions-passenger satisfaction relationship using Bias confidence interval method with 2000 bootstrapping sample.

4. Statistical Analysis and Results

4.1 Characteristics of Respondents: The profile of the passenger (N=293) revealed that the majority were male (59.40%) and aged 26-35 years (37.70%). The undergraduate degree holders make largest group with 47.20%, and 36.90% had a monthly income of ₹20,001–₹50,000. In terms of travel frequency, 43.70% traveled 2-3 times a month, and the main purpose of travel was for work or business (49.40%), followed by leisure (32.20%) and education (18.40%).

Table 1: Profile of Survey Participants (N=293)

Attribute	Category	Count (n)	Percentage (%)
Gender	Male	174	59.40%
	Female	119	40.60%
Age Group	Below 25 years	52	17.80%
	26–35 years	110	37.70%
	36–45 years	85	29.10%
	Above 45 years	45	15.40%
Education Level	High School or Below	36	12.30%

	Postgraduate	90	30.80%
	Professional Degree	29	9.80%
Monthly Income	Below ₹20,000	53	18.20%
	₹20,001–₹50,000	108	36.90%
	₹50,001–₹1,00,000	93	31.80%
	Above ₹1,00,000	42	14.20%
Travel Frequency	Once a month or less	85	29.10%
	2–3 times a month	128	43.70%
	Weekly	80	27.20%
Purpose of Travel	Work/Business	145	49.40%
	Leisure	94	32.20%
	Education	54	18.40%

4.2 Data cleaning and assumption testing

4.2.1 Missing Values: Out of 320 distributed questionnaires, 300 responses were returned. Missing data for two or three constructs were addressed by substituting the mean of the respective series. After removing incomplete responses, a total of 293 responses were finalized for data analysis.

4.2.2 Normality: Kurtosis and skewness were used to analyze the collected data for outliers and normality, referencing Hair et al. [32] for interpretation. The skewness and kurtosis values, as shown in Table 2, are between +2 and -2, indicating they do not exceed the cutoff threshold. Additionally, the standard deviations for all items being greater than 0.5 confirm that the data are normally distributed.

4.2.3 Linearity and Multicollinearity: We examined the associations among the observed variables for linearity, as SEM posits linear relationships among constructs. Scatterplots were examined, and correlation matrices were assessed to confirm that relationships were linear (Refer annexure figure 4).

Multicollinearity occurs when two or more independent variables are highly correlated in a regression model. The current study used the Variance Inflation Factor (VIF) to assess multicollinearity. The observed VIF values, shown in Table 2, are below the threshold value of 3.3, as indicated by Kock [33], indicating no multicollinearity issues.

4.3 Exploratory Factor Analysis: EFA was used to validate the SERVQUAL framework and other theoretical constructs' factor structure. EFA's main goal was to analyse construct dimensionality, determine factor loadings for each item, and guarantee that measured items match theoretical dimensions. Before factor analysis, the Kaiser-Meyer-Olkin (KMO) test showed sample adequacy with a statistic of 0.850, exceeding the required threshold of 0.60. The EFA was suitable because Bartlett's test of sphericity was significant at 1%. Promax rotation principal component analysis was used for EFA. Based on Eigenvalues surpassing 1, seven components were selected, accounting for 77.89% of variation and showing significant explanatory power.

Table 2: Descriptives, Scale Items and Factor Loadings

Constructs	Items	Loadings	Mean	Standard deviations	Skewness	Kurtosis	VIF values
Reliability	RE1	.793	1.98	1.061	1.190	.892	2.240
	RE2	.810	2.15	1.072	1.159	1.007	

	RE3	.820	2.09	1.057	1.092	.778	
Responsiveness	RS1	.801	2.12	.986	.930	.519	2.667
	RS2	.765	2.13	1.164	1.207	.836	
	RS3	.779	1.90	1.033	1.339	1.300	
	RS4	.743	2.06	1.050	1.104	.812	
Assurance	AS1	.701	2.22	1.185	.825	-.191	2.362
	AS2	.801	2.12	1.241	1.075	.208	
	AS3	.711	1.97	1.189	1.254	.612	
	AS4	.788	2.11	1.117	.955	.184	
Empathy	EM1	.785	2.14	1.120	1.056	.486	2.555
	EM2	.725	2.24	1.061	.972	.514	
	EM3	.731	2.09	1.163	1.306	.931	
	EM4	.762	2.13	1.152	1.035	.320	
Tangibility	TA1	.727	2.21	1.148	1.055	.442	2.401
	TA2	.762	2.13	1.018	.982	.551	
	TA3	.768	2.15	1.083	.942	.209	
Perceived value	PV1	.848	2.29	1.063	.854	.168	-
	PV2	.862	2.45	1.147	.706	-.092	
	PV3	.856	2.42	1.052	.675	.016	
Customer satisfaction	CS1	.743	2.09	1.154	1.205	.751	-
	CS2	.772	2.19	1.144	1.106	.607	

CS 3	.705	2.06	1.066	1.351	1.382	
CS 4	.739	2.15	1.092	1.313	1.223	

Source: Primary survey

4.4 Confirmatory factor analysis

The CFA results demonstrated a strong model fit, affirming the reliability and validity of the constructs' measurements. The normed chi square (χ^2/DF) of 1.500 for 381.081 with 254 degrees of freedom is within the acceptable range ($1 < \chi^2/DF < 3$), and so it means this model fit to robust. The value of the Goodness-of-Fit Index (GFI) was within the suggested range of 0.9 and higher at 0.910. Additionally, NFI (0.934), CFI (0.977), and TLI (0.973) were above 0.90, which means that the model has excellent fit. Furthermore, the Root Mean Square Error of Approximation (RMSEA) shows 0.041 which is lower than 0.05 threshold is the sign of a good fit. The indices entertain together to indicate the strength of the measurement model [34].

Interdunes was done through proving the internal corresponding and reliability of the data by Cronbach's alpha and Composite Reliability (CR), and the convergent and discriminant validity by Average Variance Extracted (AVE) and Maximum shared Variance (MSV). The summary of the model output appears in Table 3 where CR is greater than 0.70, alpha is greater than 0.70, AVE is greater than 0.50 and MSV is less than AVE. As a result, the SEM analysis so to speak, is based on measurement model that so reliable and so valid that it could satisfy the necessary statistical requirements on which a SEM analysis should rest [35].

Figure 2: Measurement model using CFA

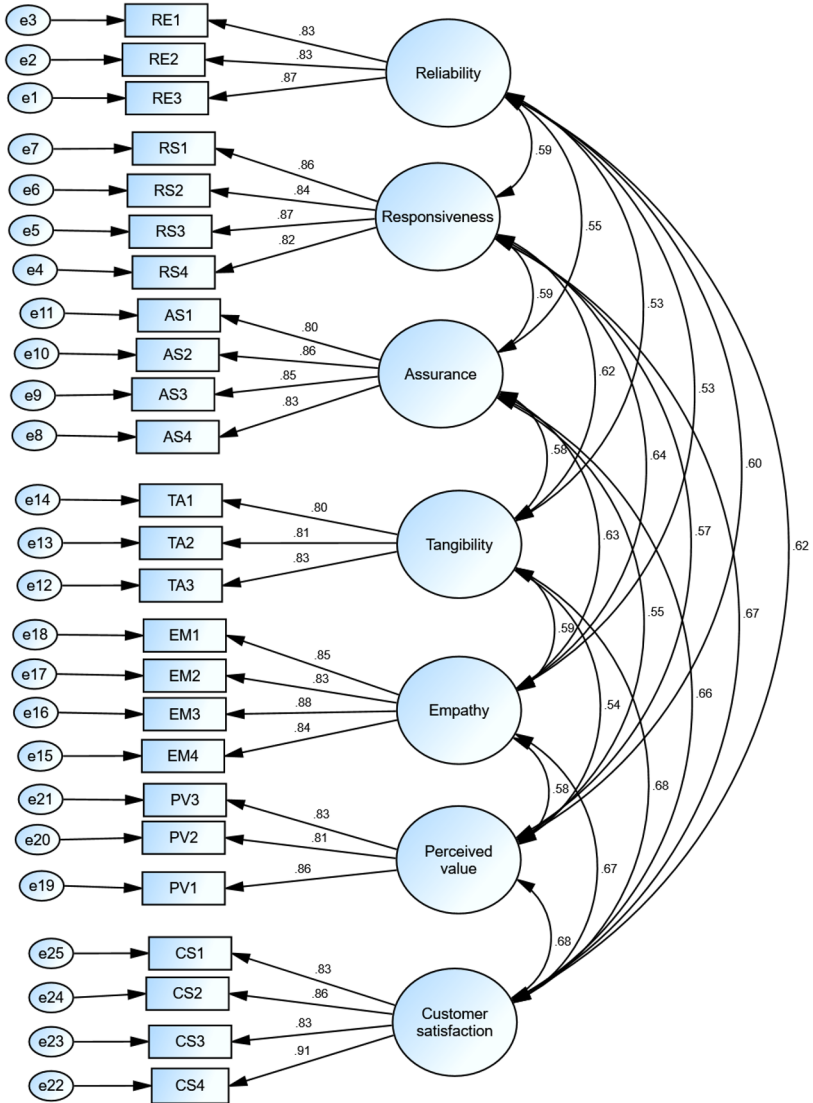


Table 3. Reliability, Validity and Correlation

Construct	Alpha	C R	A V E	M SV	Relia bility	Responsi veness	Assur ance	Tangi bility	Emp athy	Perce ived Value	Custo mer Satisfa ction
Reliability	0.852	0.879	0.707	0.385	1						
Responsiveness	0.910	0.912	0.721	0.449	.589*	1					
Assurance	0.902	0.903	0.699	0.435	.548*	.587**	1				
Tangibility	0.851	0.853	0.660	0.463	.529*	.624**	.580*	1			
Empathy	0.913	0.913	0.773	0.446	.526*	.637**	.628*	.586**	1		
Perceived Value	0.873	0.874	0.699	0.457	.597*	.566**	.548*	.538**	.577*	1	
Customer Satisfaction	0.917	0.918	0.736	0.462	.620*	.670**	.660*	.680**	.668*	.676*	1

** : Correlation significant at the 0.01 level (2-tailed).

4.5 Hypotheses testing using SEM model

SEM was utilized to analyze the relationships of SERVQUAL dimensions with perceived value and customer satisfaction. Maximum Likelihood Estimation (MLE) was employed due to its robustness and suitability for complex models [36]. The hypothesis testing included standardized regression weights (β), critical ratios (CR/T), p-values, and standard errors (SE). Hypotheses were supported if p-values were below 0.05 and T-values exceeded 1.96.

Results shown in Table 4 suggest that reliability positively influences perceived value, bearing $\beta = 0.370$, $p = 0.000$, $T = 5.840$. H1 is supported since $p < 0.05$ and $T > 1.96$. Likewise, H2 is supported as the responsiveness has very significant positive relationship with perceived value ($\beta = 0.310$, $p = 0.000$, $t = 5.033$). This further revealed further that perceived value significantly effects on the basis of assurance ($\beta = 0.224$, $p = 0.000$, $T = 3.731$), H3 is confirmed. Additionally, tangibility demonstrates a positive influence on perceived value, with $\beta = 0.272$, $p = 0.000$, $T = 4.276$, supporting H4. Likewise, empathy significantly affects perceived value ($\beta = 0.294$, $p = 0.000$, $T = 4.823$), confirming H5.

Finally, perceived value exerts a positive and significant effect on customer satisfaction, as evidenced by $\beta = 0.312$, $p = 0.000$, $T = 3.826$, thus supporting H6.

Explained Variance

The coefficient of determination (R^2) for perceived value is 0.442, indicating that the SERVQUAL dimensions account for 44.2% of the variance in perceived value. Based on the β values, reliability emerges as the strongest predictor of perceived value, followed by responsiveness and empathy.

For customer satisfaction, the R^2 value is 0.701, signifying that perceived value and servqual dimensions explains 70% of the variance in customer satisfaction

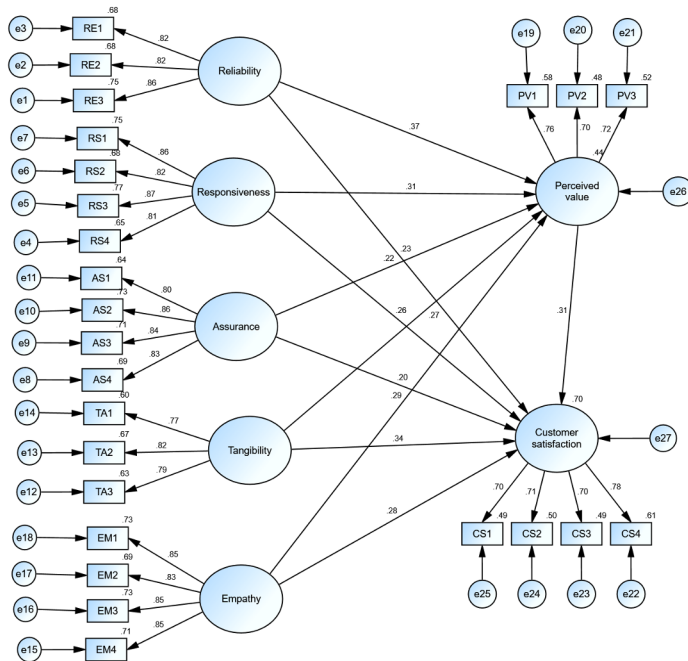


Table 4: Hypothesis results

Hypothesis	Path	S.E.	C.R./T	P	(β)	Decision
H1	Reliability → Perceived value	.044	5.840	0.000	0.370	Supported
H2	Responsiveness → Perceived value	.047	5.033	0.000	0.310	Supported
H3	Assurance → Perceived value	.041	3.731	0.000	0.224	Supported

H4	Tangibility \square Perceived value	.047	4.276	0.000	0.272	Supported
H5	Empathy \square Perceived value	.040	4.823	0.000	0.294	Supported
H6	Perceived value \square Customer satisfaction	.080	3.826	0.000	0.312	Supported

Mediation Analysis

Mediation analysis was used to investigate perceived value as mediator between the SERVQUAL dimensions and customer satisfaction. The bias-corrected confidence intervals (BC) method, utilising lower and upper bounds (LB-UB) at a 95% confidence level, with the application of 2,000 bootstrapping samples was utilized. Following the guidelines established by Baron and Kenny [37] and further supported by the bootstrapping approach of Preacher and Hayes (2008), we evaluated the total, direct, and indirect effects using a bootstrapping procedure with 2,000 resamples. Mediation is deemed significant when both the direct and indirect effects are statistically significant ($p < 0.05$).

Table 5: mediation results (Indirect path)

Relationship	Standardized Indirect Effect	LB & UB	β	Total Effect	Mediation role
Empathy \rightarrow Perceived Value \rightarrow Customer Satisfaction	0.091**	0.020 - 0.224	0.278**	0.369**	Partial
Tangibility \rightarrow Perceived Value \rightarrow Customer Satisfaction	0.085**	0.016 - 0.210	0.342**	0.426**	Partial
Assurance \rightarrow Perceived Value \rightarrow Customer Satisfaction	0.070*	0.006 - 0.187	0.203*	0.273*	Partial
Responsiveness \rightarrow Perceived Value \rightarrow Customer Satisfaction	0.097**	0.029 - 0.232	0.264**	0.361**	Partial

Reliability → Perceived Value → Customer Satisfaction	0.115***	0.047 - 0.241	0.231***	0.346***	Partial
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Note: *** = $p < 0.000$, ** = $p < 0.01$, * = $p < 0.05$

The result conclusion based on the Table 5 confirmed that perceived value has a partial mediation role towards the relationship between service quality dimensions with customer satisfaction. Empathy had a direct effect of 0.278 ($p < 0.05$) and an indirect effect of 0.091 ($p < 0.05$) resulting in a total effect of 0.369, which supported partial mediation. Similarly, the direct effect of tangibility was 0.342 ($p < 0.05$) while the indirect effect was 0.085 ($p < 0.05$) were found to have a total effect of 0.426, providing evidence for partial mediation.

Moreover, assurance shows a direct effect of 0.203 ($p < 0.05$) and an indirect effect of 0.070 ($p < 0.05$), resulting in a total effect of 0.273 and confirming mediation. Direct effect of the responsiveness is 0.264 ($p < 0.05$); the indirect effect from the responsiveness is 0.097 ($p < 0.05$) lead us to total effect of 0.361, and it is having the mediating role of perceived value. Finally, we found a direct effect of 0.231 ($p < 0.05$) and an indirect effect of 0.115 ($p < 0.05$), resulting in a total effect of 0.346 for reliability as well, displaying partial mediation. Direct and indirect effects in all the relationship paths were significantly ($p < 0.05$) so that perceived value partially mediates this relationship even when perceived value was included as mediator.

5. Discussion

This study examines the relationship between SERVQUAL-measured service quality dimensions and customer satisfaction, leveraging SEM to validate their impact. Results confirm that perceived value is significantly influenced by all five SERVQUAL dimensions (reliability, responsiveness, assurance, tangibles, and empathy), consistent with prior literature [19,38]. Notably, reliability emerges as the most critical predictor, underscoring the importance of consistent service delivery and promise fulfillment—a finding aligned with established theories in service quality management [4,38].

To contextualize these findings, the study explores Indian Railways, where passenger satisfaction hinges on operational reliability metrics (e.g., punctuality) and staff behavior. Empirical evidence suggests that delays and poor staff conduct directly undermine perceived reliability [2], mirroring global trends in transport service research. This linkage reinforces reliability’s dominance in SERVQUAL frameworks, particularly in infrastructure-dependent sectors.

The results further proved that responsiveness exhibited strong effects, underscoring the importance of staff attentiveness and personalized service. For instance, delays in addressing dietary requests or grievances—common pain points in Indian Railway—can diminish perceived value [2]. This result mirrors that proactive service recovery enhances passenger evaluations in transit contexts [39]. Empathy or personalized information provision of staff significantly affects the perceived value provided. If catering staff can recognise each passenger's preferences, dietary requirements and comfort needs, they can establish an emotional connection to the service. This customised interaction layer can improve the customer’s impression of a service that is designed specifically for them, increasing the perceived value of the service [41, 42].

The findings also highlighted positive and significant role of assurance on perceived value and satisfaction. The assurance was reflected in the competence, politeness, and professionalism of

service staff. Such professionalism strengthens passenger confidence, particularly regarding food hygiene and safety standards, a crucial consideration in travel-related dining services [42, 43]. Although tangibility is not as important as other dimensions in creating value perception, but its impact is positive. It indicates service companies rely on physical cues in building customer expectation and satisfaction of service offerings [44]. Cleanliness and physical facilities are found to have a significant influence in the decisions of quality of services provided to the customers of Indian Railways [10, 42].

Results provide evidence that perceived value is a partial mediator of each element of service quality's relationship with customer satisfaction. Before conducting the evaluation of satisfaction, it first evaluates whether the customers are satisfied with the received service. Hence, it effectively reinforces the mediating role of perceived value in relation to service quality and customer satisfaction [40].

In essence the study confirmed that intangibles and tangibles elements both significantly contributing to perceived value towards products and services which finally leads to customer satisfaction. A strategic focus on ensuring service reliability, boosting staff efficiency through training, strengthening assurance mechanisms, improving aesthetic presentation, and fostering compassionate engagement can significantly enhance passenger satisfaction. These recommendations provide actionable insights for IRCTC and other transport operators seeking to elevate service quality in high-demand, large-scale transit systems.

Managerial Implications

The results of this research provide valuable insights for railway food service managers, highlighting the importance of improving dimensions of service quality to maximize perceived value and satisfaction of passengers. Since reliability has the strongest impact on perceived value and satisfaction, service providers must ensure consistency in food quality, prompt delivery, and hygiene standards to gain consumer trust and loyalty. Service delivery inconsistencies can be reduced through standardized operating procedures and stringent quality controls.

Passengers' experience revolves around responsiveness and empathy. Service managers should train staff to anticipate customer needs, address dietary preferences, and provide prompt assistance, as these factors significantly enhance perceived value. This enables the restaurant industry to regularly access informational insights that can be used to optimise operational performance. Moreover, creating a culture where employees feel one-on-one motivation to treat passengers well can contribute significantly towards overall satisfaction.

Assurance and trust are essential elements in service delivery, with employee competence and professionalism serving as pivotal factors influencing passenger confidence in food safety and service quality. Managers should focus on staff training programs to enhance food safety awareness, customer service etiquette, and transparent communication of hygiene certifications to reinforce passenger confidence.

Customer perceptions are greatly influenced by tangible aspects of service, including its physical features. The presentation and package of food and the hygiene of railway catering must be in accordance with the standards expected by the passengers. The industry must also conduct regular inspections and comply with food safety guidelines to ensure consistent service standards.

Perceived value serves as a crucial mediator between service quality and passenger satisfaction, highlighting the importance of a comprehensive value approach in service design.

However, digital innovations including mobile ordering and real-time service tracking can be integrated by service providers to offer convenience to customers and perceived control over the experience with regards to dining.

Therefore, continuous evaluation of SERVQUAL dimensions is important to keep service

enhance based on data and satisfaction expectations changes. Focused improvements that boost reliability and increase responsiveness, especially through assurance, tangibility and empathy can bring lasting satisfaction and loyalty to railway catering service's passengers, providing the railway catering services a competitive advantage.

Limitations and Future Research Directions

The current study contributes significantly to dimensions of services quality and passenger satisfaction in the Indian Railways, though some limitations are there. The sample size was adequate to satisfy the purposes of the paper but if we are to generalize the results to the broader population of all passengers covering the full railway network, the sample may not be representative. This cross-sectional dataset does not consider longitudinal data. Future research could perhaps employ longitudinal study designs to see how perceptions of service quality change and influence passenger satisfaction in the long run.

In this study, selected service quality dimensions were only examined; Further studies may develop a broader range of factors, such as ticket services, on-time performance or food quality, to build a more overall interpretation of passenger satisfaction. Moreover, although this research investigated perceived value as a mediator, other demographic characteristics—namely age, socio-economic status, and education—could offer additional insights into satisfaction determinants. Lastly, qualitative information could be obtained through interviews or focus groups, providing more context on the passenger experience and their perception on cargo space use, complementing the quantitative results and enabling a fuller interpretation of the findings.

6. Conclusion

The findings of the study indicate that service quality dimensions—reliability, responsiveness, assurance, tangibility, and empathy—play a significant role in perceived value and result in increased customer satisfaction. These results strengthen the broader service quality literature by showing that improvements in these dimensions result in increased (direct and indirect) passenger contentment. Additionally, the partial mediation of perceived value provides more profound interpretations for the ways in which the customers evaluate the service attributes prior to making a judgment about overall satisfaction.

On a practical side, this means a guideline for railways operators to improve their processes, making sure the improvements in key dimensions of quality do result in higher perceived value for the customer and improved satisfaction. Moreover, study provides a potential basis for further researches especially relating to the dynamic interaction between service quality, perceived value and customer loyalty in transportation context.

References:

1. Ranjan, R.K., Thapar, N., Siddiqui, S.A., Painoli, A.K.: Assessing the service quality attributes affecting the satisfaction of the Northern Railway passengers: an Empirical study. *Journal of New Business Ventures*. 1, 110–124 (2020). <https://doi.org/10.1177/2632962x20961052>.
2. Dandotiya, R., Aggarwal, P., Gopal, R.: Impact of food and beverage quality on passenger satisfaction in Indian railways. *International Journal of Customer Relationship Marketing and Management*. 11, 37–52 (2020). <https://doi.org/10.4018/ijcrmm.2020040103>.
3. Kumar S, Chachal N. Measuring Customers Satisfaction and Service Quality in Indian Railway Catering and Tourism Corporation Food Outlets: A Study of Uttar Pradesh (India). *AVAHAN: A Journal on Hospitality & Tourism*. 2017 Jan 1;5(1).
4. Parasuraman, A., Zeithaml, V.A., Berry, L.L.: SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing*. 64, 12–40 (1988).

5. Kumar, D.A.A.: Hospitality & Public Health - A Case Study of Indian Railway Catering and Tourism Corporation (IRCTC). *International Journal of Social Science and Economics Invention*. 2, (2016). <https://doi.org/10.23958/ijssci/vol02-i10/02>.
6. Indian Railway Catering and Tourism Corporation Limited: Indian Railway Catering and Tourism Corporation Limited 24th Annual Report 2022-23. (2023). <https://www.irctc.com/annual-report.html>
7. Liu, S., Putro, U.S.: Passenger Service Satisfaction Evaluation of Jakarta-Bandung High-Speed Railway. *European Journal of Business Management and Research*. 9, 115–126 (2024). <https://doi.org/10.24018/ejbmr.2024.9.4.2432>
8. Kandampully, J., Zhang, T., Jaakkola, E.: Customer experience management in hospitality: a literature synthesis, new understanding, and research agenda. *International Journal of Contemporary Hospitality Management*. (2018).
9. Mittal, V., Han, K., Frennea, C., Blut, M., Shaik, M., Bosukonda, N., Sridhar, S.: Customer satisfaction, loyalty behaviors, and firm financial performance: what 40 years of research tells us. *Marketing Letters*. 34, 171–187 (2023). <https://doi.org/10.1007/s11002-023-09671-w>
10. Vasanthi, M.G., Soundrarajan, V., Nawaz, N., Gajendran, V., Parayitam, S.: Passenger satisfaction with cleanliness and other service quality dimensions and gender as a moderator: Evidence from Indian Railways. *Cogent Business & Management*. 10, (2023). <https://doi.org/10.1080/23311975.2023.2183568>
11. Chavadi, C.A., Menon, S.R., Sirothiya, M.: Measuring service Quality Perceptions of Indian e-retailers: An evaluative study. *Metamorphosis*. 18, 92–102 (2019). <https://doi.org/10.1177/0972622519886232>
12. Zygiaris, S., Hameed, Z., Alsubaie, M.A., Rehman, S.U.: Service quality and customer satisfaction in the post pandemic world: A study of Saudi auto care industry. *Frontiers in Psychology*. 13, (2022). <https://doi.org/10.3389/fpsyg.2022.842141>
13. Rajeswari V, Kumari S. Satisfaction and service quality in Indian Railways-A study on passenger perspective. *IOSR Journal of Economics and Finance*. 2014;4(1):58-66.
14. BrandEquity, E.: IRCTC posts 14 pc rise in Q3 net profit at INR 341 crore, <https://brandequity.economicstimes.indiatimes.com/news/business-of-brands/irctc-posts-14-pc-rise-in-q3-net-profit-at-inr-341-crore/118171627>, (2025)
15. Oliver, R.L.: A cognitive model of the antecedents and consequences of satisfaction decisions. Sage Publications, Inc. (1980). <https://doi.org/10.2307/3150499>
16. AMEENUDHEEN, K., GAFOOR, K.: Service quality measurement of IRCTC with special reference to Kanjikkode Division. *International Journal of Creative Research Thoughts (IJCRT)*. 9, (2021). Available from: <https://ijcrt.org/papers/IJCRT2105060.pdf>
17. Zeithaml, V.A.: Consumer Perceptions of Price, Quality, and Value: A Means-End Model and Synthesis of evidence. *Journal of Marketing*. 52, 2 (1988). <https://doi.org/10.2307/1251446>
18. Slack, N.J., Singh, G., Ali, J., Lata, R., Mudaliar, K., Swamy, Y.: Influence of fast-food restaurant service quality and its dimensions on customer perceived value, satisfaction and behavioural intentions. *British Food Journal*. 123, 1324–1344 (2020). <https://doi.org/10.1108/bfj-09-2020-0771>
19. Wisutwattanasak, P., Champahom, T., Jomnonkwao, S., Aryuyo, F., Se, C., Ratanavaraha, V.: Examining the impact of service quality on passengers' intentions to utilize rail transport in the Post-Pandemic Era: An Integrated Approach of SERVQUAL and Health Belief model. *Behavioral Sciences*. 13, 789 (2023). <https://doi.org/10.3390/bs13100789>
20. Palupi, I.R., Darmawan, N.A., Prawiningdyah, Y.: The effect of service and food quality on customer satisfaction in Indonesian train catering. *International Journal of Academic Research in Business and Social Sciences*. 10, (2020). <https://doi.org/10.6007/ijarbss/v10-i13/6891>
21. Miranda, S., Tavares, P., Queiró, R.: Perceived service quality and customer satisfaction: A fuzzy set QCA approach in the railway sector. *Journal of Business Research*. 89, 371–377 (2017). <https://doi.org/10.1016/j.jbusres.2017.12.040>

22. Nguyen-Phuoc, D.Q., Tran, A.T.P., Van Nguyen, T., Le, P.T., Su, D.N.: Investigating the complexity of perceived service quality and perceived safety and security in building loyalty among bus passengers in Vietnam – A PLS-SEM approach. *Transport Policy*. 101, 162–173 (2020). <https://doi.org/10.1016/j.tranpol.2020.12.010>
23. Al-Tit, A.A.: The effect of service and food quality on customer satisfaction and hence customer retention. *Asian Social Science*. 11, (2015). <https://doi.org/10.5539/ass.v11n23p129>
24. Ojha, M.K.: Quality of service delivery at railway platforms: A case of Allahabad junction railway station. *Case Studies on Transport Policy*. 8, 1087–1095 (2020). <https://doi.org/10.1016/j.cstp.2020.07.012>
25. Tanuj Mathur TM, Anviti Gupta AG. The impact of dining atmospherics and perceived food quality on customers' re-patronage intention-in fast casual restaurants (2019).
26. Yang, J., Shiwakoti, N., Tay, R.: Passengers' Perception of Satisfaction and Its Relationship with Travel Experience Attributes: Results from an Australian Survey. *Sustainability*. 15, 6645 (2023). <https://doi.org/10.3390/su15086645>
27. Sirothiya, M., Chavadi, C.: Role of Compressed Biogas to Assess the Effects of Perceived Value on Customer Satisfaction and Customer Loyalty. *BIMTECH Business Perspective*. 1, 72–89 (2020).
28. Wang, E.S.-T., Lin, H.-C., Tsai, M.-C.: Effect of institutional trust on consumers' health and safety perceptions and repurchase intention for traceable fresh food. *Foods*. 10, 2898 (2021). <https://doi.org/10.3390/foods10122898>
29. Ibrahim, A., M. Sc., Borhan, M., Ph.D., Md. Yusoff, N., Ph.D., Ismail, A., Ph.D., Department of Civil Engineering, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia: Rail-based public transport service Quality and User Satisfaction - A literature review. (2020).
30. Kainth, J., Verma, H.V.: Perceived value and brand loyalty in fine dining service. *International Journal of Service Science Management Engineering and Technology*. 4, 1–12 (2013). <https://doi.org/10.4018/jssmet.2013010101>
31. Keshavarz, Y., Jamshidi, D.: Service quality evaluation and the mediating role of perceived value and customer satisfaction in customer loyalty. *International Journal of Tourism Cities*. 4, 220–244 (2018). <https://doi.org/10.1108/ijtc-09-2017-0044>
32. Hair Jr JF, Black WC, Babin BJ, Anderson RE. *Multivariate data analysis*. In: *Multivariate data analysis 2010* (pp. 785–785).
33. Kock, N. (2015, April). *WarpPLS 5.0 user manual*.
34. Hu, L., Bentler, P.M.: Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. (1999). <https://doi.org/10.1080/10705519909540118>.
35. Fornell, C., Larcker, D.F.: Evaluating Structural Equation Models with Unobservable Variables and Measurement Error. *Journal of Marketing Research*. 18, 39–50 (1981). <https://doi.org/10.1177/002224378101800104>
36. Blunch NJ. *Introduction to structural equation modeling using IBM SPSS statistics and AMOS*. 2nd ed. Sage; 2013.
37. Baron, R.M., Jr., Kenny, D.A., University of Connecticut: *The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, strategic, and Statistical considerations*. American Psychological Association, Inc. (1986).
38. De Oña, J.: The role of involvement with public transport in the relationship between service quality, satisfaction and behavioral intentions. *Transportation Research Part A Policy and Practice*. 142, 296–318 (2020). <https://doi.org/10.1016/j.tra.2020.11.006>
39. Gannon, M., Taheri, B., Thompson, J., Rahimi, R., Okumus, B.: Investigating the effects of service recovery strategies on consumer forgiveness and post-trust in the food delivery sector. *International Journal of Hospitality Management*. 107, 103341 (2022). <https://doi.org/10.1016/j.ijhm.2022.103341>
40. Hapsari, R., Clemes, M., Dean, D.: The Mediating Role of Perceived Value on the Relationship

between Service Quality and Customer Satisfaction: Evidence from Indonesian Airline Passengers. *Procedia Economics and Finance*. 35, 388–395 (2016). [https://doi.org/10.1016/s2212-5671\(16\)00048-4](https://doi.org/10.1016/s2212-5671(16)00048-4)

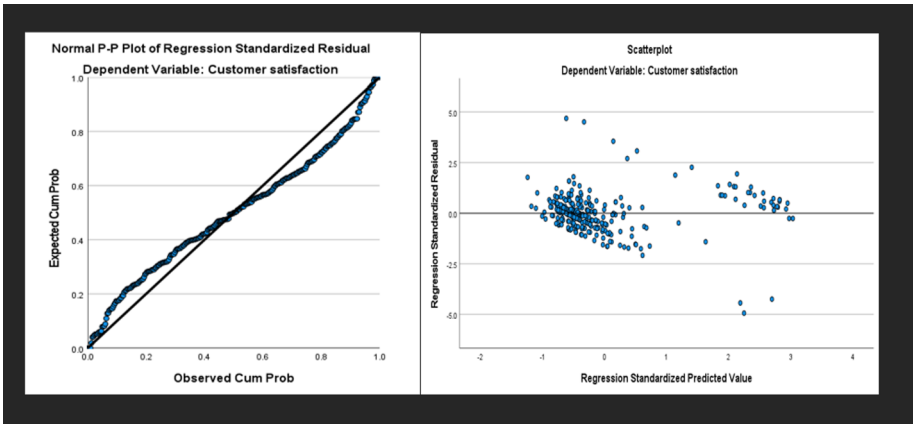
41. Bo, X., Terabe, S., Yaginuma, H., Tanaka, K., Uno, H.: Analysis of relationship between railway satisfaction and delay tolerance. *Case Studies on Transport Policy*. 18, 101306 (2024). <https://doi.org/10.1016/j.cstp.2024.101306>
42. Singh Hundal, B., Kumar, V.: Assessing the Service Quality of Northern Railway by using SERVQUAL Model. (2015).
43. Eboli, L., Mazzulla, G.: Structural Equation Modelling for Analysing Passengers' Perceptions about Railway Services. *Procedia - Social and Behavioral Sciences*. 54, 96–106 (2012). <https://doi.org/10.1016/j.sbspro.2012.09.729>

Annexure:**Table A:** Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
1	11.760	47.038	47.038	11.760	47.038	47.038
2	1.672	6.688	53.726	1.672	6.688	53.726
3	1.436	5.743	59.470	1.436	5.743	59.470
4	1.362	5.448	64.918	1.362	5.448	64.918
5	1.156	4.625	69.543	1.156	4.625	69.543
6	1.074	4.297	73.840	1.074	4.297	73.840
7	1.013	4.052	77.892	1.013	4.052	77.892
8	.505	2.021	79.913			
9	.468	1.872	81.785			
10	.432	1.727	83.512			
11	.409	1.635	85.147			
12	.392	1.568	86.715			
13	.374	1.495	88.210			
14	.356	1.425	89.636			
15	.328	1.312	90.947			
16	.311	1.244	92.191			
17	.301	1.205	93.396			
18	.292	1.169	94.566			
19	.260	1.041	95.606			
20	.236	.942	96.548			
21	.207	.827	97.376			
22	.192	.768	98.144			
23	.177	.709	98.852			
24	.154	.615	99.467			
25	.133	.533	100.000			

Extraction Method: Principal Component Analysis.

Figure 4: Scatter plot for Customer satisfaction



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