

## The Expectation–Performance Paradox in Indian Railway Catering: Predicting Service Failure Through Demographic and Service Gap Analysis

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### Abstract

**Purpose:** This research investigates the "cost-performance paradox" within the Indian railway catering industry, where technological modernization is paradoxically synonymous with an increase in passenger dissatisfaction. By integrating the expectation-disconfirmation theory (EDT), the study identifies demographic risk factors and operational factors that predict total service failure.

**Design/methodology/approach:** Using cross-sectional responses of 350 passengers from the Western Indian Railways, a multi-stage analytical framework was used. Phase 1 used pairs-sample t tests to quantify service gaps in six quality dimensions. Phase 2 applied binary logistic regression to model the probability of failure based on demographic and quality drivers. Phase 3 uses the partial least square structural equation model (PLS-SEM) with the reflection-reflective HOC model to assess the structural impact of gaps on behavioral outcomes.

**Findings:** The outcomes ratify significant negative disconfirmation across all dimensions ( $p < .001$ ), with Sensory Quality and Information Transparency revealing the largest gaps. Logistic modeling reveals that travel class is the primary demographic antecedent of failure; premium-class passengers exhibit a failure risk factor 6.6 times higher than budget travelers ( $\text{Exp}(B) = 6.60$ ). Furthermore, structural analysis validates a partial mediation framework, proving that service gaps exert both an indirect effect on loyalty through satisfaction and a significant direct "erosive" effect on loyalty.

**Practical implications:** The study recommends that railway administrators (IRCTCs) move from the universal service protocol to the Segmented Service Recovery (SSR). Since sensory and hygiene deficiencies are the primary predictors of failure, quality audits should be redistributed to "organoleptic sensory profile" to mitigate the immediate brand turbulence in premium segments.

**Originality/value:** This research contributes to service science by moving beyond descriptive satisfaction scores to predictive modelling of foodservice failures. The identification of a direct erosion path from the service gap to loyalty challenges the traditional models of complete

mediation and highlights the "zero tolerance" nature of biological needs in prison transport environments.

**Keywords:** Railway Catering, Service Failure, Expectancy-Disconfirmation Theory, Binary Logistic Regression, PLS-SEM, Indian Railways.

## 1. Introduction

In the context of overall transformation of Indian Railways, the modernization of railway catering services (RCS) has become a major priority, propelled by the digital transformation, rising passenger expectations, and the growing commercialization of travelling experiences (Patel et al., 2025; Gawande & Sharma, 2025). The Indian Railways, coupled with the Indian Railway Catering and Tourism Corporation (IRCTC), has implemented several technology-driven initiatives in recent years, such as e-catering platforms, QR-enabled food ordering, centralised base kitchens, and digital complaint systems to enhance operational efficiency and passenger convenience (Nikhil, 2026; Anwer et al., 2024). At the same time, the Indian railway catering industry has witnessed significant market growth with the growth in intercity mobility, a rise in the disposable income and increased demand for hygienic and quality meals being provided on the rail. Along with this, the Indian railway catering sector has seen significant market growth owing to the growth in mobility between cities, rising disposable income and the demand for quality and hygienic food being served on the train. The railway catering sector is poised for substantial growth, projected to surpass INR 5,500 crore by 2026, underscoring its increasing strategic value in the transportation industry (FICCI, 2025; Patel et al., 2025).

In spite of all these modernization activities, the assessment of the railway catering service to the passenger is still inconsistent and, in many cases, very negative. The existing studies and recent feedback from passengers have highlighted ongoing issues related to food hygiene, nutritional uniformity, timeliness of food delivery, packaging standards, and staff reactivity in multiple railway zones (Vasanthi et al., 2023; Gawande & Sharma, 2025; Anwer et al., 2024). This dissatisfaction is a relic of the fact that, despite technological advances, passenger expectations have increased significantly, while operational performance has not risen in a manner that would enable it to consistently live up to these "cognitively internalized" standards (Oliver, 1980; Cronin & Taylor, 1992). In the modern times, railway passengers are no longer only concerned with the availability of food, but instead, they are more concerned with the performance of service from many aspects which include hygiene assurance, reliability, transparency, professionalism, and perceived value (Kim et al. 2009; Parasuraman et al. 1988). The concept of the "Service Gap" therefore becomes central to understanding dissatisfaction within railway catering systems. According to Oliver (1980), customer satisfaction is the result of comparisons of service performance outcomes with pre-consumption expectations, namely Expectancy-Disconfirmation Theory (EDT). Negative disconfirmation is when people's performance, in their minds, is below the expectations and therefore creates dissatisfaction and negative behaviors (Zeithaml et al., 1996). In railway catering, this evaluative process has become more complex as there is a great variation in the socio-economic status, service

expectations, digital exposure and value perceptions of passengers. Post-pandemic behavioral changes have also made the passengers more sensitive to both cleanliness and safety of the food and packaging materials, as well as transparency in operation of public transport systems (Wisutwattanasak et al., 2024; Vasanthi et al., 2023).

Expectation thresholds and perceptions of dissatisfaction are especially influenced by demographic factors like travel class and income level. Premium customers in AC classes have better expectations of hygiene, responsiveness, information transparency and consistency of delivery, as they have sacrificed more money and are more convinced that they are entitled to higher delivery standards (Krishnakumar & Kavitha, 2020; Gawande & Sharma, 2025). Also, passengers who are high-income and digitally active are more sensitive to service failures related to professionalism, communication efficiency and food quality due to their increased exposure to organized hospitality service and technology-based service environments (Islam et al., 2022; Anwer et al., 2024). Thus, even if the operation is not flawless, it can elicit high levels of dissatisfaction in premium classes.

While there have been previous studies that have explored the dimensions of passengers' satisfaction and service quality in the railway and hospitality sectors, the literature has been descriptive and disorganized (Dandotiya et al., 2020; Kumar & Chachal, 2017; Kim et al., 2009). The majority of studies are focused on the overall service quality measurement based on the SERVQUAL or DINESERV approaches and do not specifically address the influence of demographic characteristics on service failure and disconfirmation of the service in the railway catering system (Parasuraman et al., 1988; Gawande & Sharma, 2025). In addition, little empirical research has focused on the influence of threshold levels for a travel class and income on dissatisfaction and behaviour in technologically advanced railway catering settings (Anwer et al., 2024; O'Driscoll et al., 2024). There is a large number of gaps in the current literature, especially the theoretical and managerial one, which is the reason for this limitation. To overcome this, the present study proposes a multi-stage empirical framework that combines Expectancy–Disconfirmation Theory, multidimensional service quality assessment, and predictive modeling using demographic data in the context of Western Indian Railways. Specifically, it investigates expectation–perception gaps of six catering quality dimensions, analyzes the predictive power of demographic characteristics on service failure based on Binary Logistic Regression, and explores the relationship between service gaps, passenger satisfaction and behavioral intentions using Partial Least Squares Structural Equation Modeling (PLS-SEM). The study makes a significant contribution to the literature in three important ways: incorporating service quality evaluation and predictive demographic analysis. The first is to contribute to the theoretical understanding of the “Expectation–Performance Paradox” in railway catering systems. Secondly, it complements service failure literature by pinpointing passenger segments that are particularly susceptible for dissatisfaction. Third, it offers a managerial context specific framework that will help railway managers to develop a service recovery strategy that is targeted and segmented for enhancing passengers' experience in high density public transportation networks.

## **2. Theoretical Background and Hypotheses Development**

### **2.1 The Expectancy-Disconfirmation Theory (EDT)**

This study is based primarily on the theory of Expectancy-Disconfirmation Theory (EDT) that states that satisfaction depends on both the level and direction of the differences between expectations and perception before and after use (Oliver, 1980). With the complex operating system of Indian Railways, EDT serves as an effective framework to understand service failure. Everyone who boarded a train has a set of "Expected Standards" in their minds, created by their previous experience, the marketing communications they've received, and the premiums they expect to get for their class on board. If the actual "Perceived Standards" of the catering service don't equal these standards, a negative disconfirmation (Service Gap) will happen. In emerging economies, the study suggests that satisfaction is not about the absolute quality, but rather the psychological satisfaction of the segment-specific expectations (Anwer et al. 2024; Krishnakumar & Kavitha 2020).

### **2.2 Multi-Dimensional Quality in Railway Catering**

Over the past few years, the perception of the railway catering service has undergone a significant change because of the rising expectations of the riders, the technological advancement and the enhanced sensitivity towards hygiene and operational reliability during post-pandemic era (Patel et al., 2025; Gawande & Sharma, 2025). Today, railway passengers do not consider catering only in terms of availability of food; rather they evaluate it from a multi-dimensional experiential standpoint which incorporates sensory satisfaction, hygiene assurance, delivery uniformity, transparency, professionalism and perceived value (Gawande & Sharma, 2025; Patel et al., 2025; Anwer et al., 2024). Catering quality serves as a secondary service in the context of high-density public transport services like Indian Railways and it also plays a key role in the overall experience of travel and the trust in the institution.

An important theoretical framework for exploring gaps in service quality is the SERVQUAL model developed by Parasuraman, Zeithaml and Berry (1988) who sought to examine the gap between customer expectations and service performance (Parasuraman et al., 1988; Zeithaml et al., 1996). Likewise, the DINESERV model applies these concepts to the food-service setting, adding food presentation dimensions, employee behaviors, responsiveness, and physical service dimensions (Kim et al., 2009). In a railway catering system, these dimensions are of considerable importance since the people who use the system are in a limited and captive environment where the lack of the service can be easily noticed and the impact of it is accentuated in their minds (Kumar & Chachal, 2017).

Passenger expectations of the quality of their train dining have been reshaped by the transformation of Indian Railways' catering system, as evidenced by recent literature. Recent literature indicates that the modernization of Indian Railways' catering system, such as the adoption of e-catering systems, app-based ordering mechanisms, digital menu integration, and centralized kitchen operations, has significantly changed passenger expectations of catering quality (Patel et al., 2025; Anwer et al., 2024). But in many instances, the operational

performance falls short of the rising expectations, which may be termed as the “Expectation–Performance Paradox”, where passengers feel more and more when the technology improves (Anwer et al., 2024; Gawande & Sharma, 2025). Research on railways and hotels shows that satisfaction is shaped around multidimensional evaluation of service quality, which is based on cognitive comparisons made by the passengers between their expectations and their service experiences (Oliver, 1980; Cronin & Taylor, 1992; Kim et al., 2009).

Of all these dimensions, Sensory Quality is the most immediate evaluation mechanism that affects passengers perceptions. The various components of a food – its taste, aroma, texture, freshness, temperature and visual presentation – contribute to first-order judgments of catering performance (Dandotiya et al., 2020; Kim et al., 2009). The Indian railway setting, especially in the case of premium travel classes, is seeing a surge in demand for authenticity of regional cuisine, freshness of ingredients, and the right temperature of the food that is served to passengers (Patel et al., 2025; Krishnakumar & Kavitha, 2020). Food-service research also shows that lack of sensory attributes negatively impacts the perceived value and satisfaction outcomes (Kim et al., 2009).

In the post-pandemic transportation landscape, Safety and Hygiene have become key factors in service assessment. In response to greater awareness of food contamination, sanitation, and personal safety, passengers now include hygiene as a part of the primary quality assessment criteria, not just secondary (Watthanaklang et al., 2024; Vasanthi et al., 2023). The perception of hygiene in railway catering systems goes beyond the hygiene in food production, encompassing grooming by staff, packaging cleanliness, pantry cleanliness, serving methods and disposal of waste (Gawande & Sharma, 2025; Dandotiya et al., 2020). Also, prior research suggests that hygiene-related failures have a disproportionately strong negative emotional response since passengers see them as threats to health and their own safety (Bitner, 1990; Vasanthi et al., 2023).

Moreover, the penetration of digital has further reinforced the significance of Information Transparency in railway catering services. Today's travelers are looking for the accurate menu information, allergy information, tracking orders remotely, transparent pricing, avenues to register complaints, and timely communications about delays or food availability (Anwer et al., 2024). The introduction of technology-driven transparency has proven to be a significant factor in determining institutional credibility, especially among younger and technologically savvy travellers, who consider information efficiency as a measure of service professionalism and organizational adeptness (Islam et al., 2022; Anwer et al., 2024). The lack of communication also is found to exacerbate dissatisfaction during service failures, as a result of increased perceived inconvenience during the time of uncertainty when the service fails (Zeithaml et al., 1996).

Logistical Reliability is another important aspect of railway catering owing to the requirements of a mobile foodservice system. Various factors such as meal punctuality, consistency of delivery, food temperature maintenance, order accuracy, and service coordination, are vital measures of effectiveness in long-distance railway travel (Kumar & Chachal, 2017). These

factors are all high in motion, and hence the railway catering not only has to deal with the usual restaurant environment but additionally the environment of route delays and fluctuations in the volume of people on board as well as constrained delivery conditions. Therefore, reliability is considered by the passengers as one of the main aspects of the organization's competence and commitment to serve (Wisutwattanasak et., 2023; Kumar and Chachal, 2017). The studies already conducted have been able to report that food quality and delivery time have a great impact on reducing passenger trust and satisfaction in railway food services, which is always inconsistent (Gawande & Sharma, 2025).

Staff Professionalism is also a very important factor in determining passenger perceptions of railway catering service. The behaviors of employees like responsiveness, courtesy, empathy, communication behavior, grievance handling and problem solving efficiency, collectively impact on the perceptions of institutional credibility and service orientation (Bitner, 1990; Rajeswari & Santa, 2014). In a collectivist culture like India, interpersonal relationships are often used as emotional grounding that can affect customer perceptions of the service experience (Rajeswari & Santa, 2014). In addition, recent research has shown that when employees behave in a respectful manner, this can partially compensate for dissatisfaction resulting from operational issues, while in contrast, when employees are rude or disinterested, this exacerbates negative disconfirmation perceptions (Anwer et al., 2024).

Finally, Functional Tangibles are the physical and functional aspects of the evaluation of a catering, such as the quality of the packaging, the quality of the serving equipment, the size of portions, cleanliness of the trays, and the presence of environmentally friendly materials. The passengers now consider eco-friendly packaging and waste management as organizational responsibility and commitment to service quality with the rise in their awareness regarding environmental concerns (Kumar, 2016; Patel et al., 2025). Furthermore, luxury travelers may assess tangibles as the criteria for determining whether or not the service is worth their money; poor packaging, or inadequate quantities, may create the impression that the service is not fair monetarily and thus undermine its credibility and acceptability (Zeithaml et al., 1996).

The six dimensions are a complete multidimensional scale which passengers evaluate the railway catering performance cognitively (Parasuraman et al., 1988; Kim et al., 2009). Existing literature is found to be consistent that failures along these dimensions create negative disconfirmation, diminish satisfaction formation and negatively affect future behavioral intentions in a transport and hospitality setting (Cronin & Taylor, 1992; Kim et al., 2009; Gawande & Sharma, 2025). Hence, it is important to comprehend the expectation–perception gaps on these aspects so that the service failures in the Indian railway catering system can be predicted.

### **2.3 Demographics as Predictors of Service failure**

Although the dimensions of service affect the evaluation of services by passengers, the growing body of service literature today maintains that dissatisfaction is not always a direct result of the operational effectiveness of the service but is also dependent on the expectation thresholds based on demographic and socio-economic characteristics of the passengers (Oliver, 1980;

Zeithaml et al, 1996; Cronin & Taylor, 1992). In the Indian Railways context, the heterogeneity of passengers is important as people have significantly varying purchasing power, frequency of travel, level of digital exposure, lifestyle orientation and perceived entitlement to service standards. Hence, the cognitive antecedents of passengers' interpretation and evaluation of service experiences, namely, their demographic characteristics such as travel class, income and age, can be explained (Anwer et al., 2024; O'Driscoll et al., 2024).

According to the Expectation–Disconfirmation Theory (Oliver 1980), satisfaction is a process that occurs as a result of comparing what is expected with what is delivered. But these expectations are not necessarily consistent by passenger segment. Rather, they are socially and economically shaped through prior experiences, consumption exposure and value expectations (Cronin & Taylor, 1992). The latest studies conducted in the transport and hospitality sector show that quality-oriented customers largely have higher expectations for reliability, professionalism, hygiene, and personalization, making it more probable to experience dissatisfaction when their standards are not met (Anwer et al., 2024; Islam et al., 2022; Gawande & Sharma, 2025).

#### **2.4 Hypotheses Formulation**

Based on the synthesized literature and the multidimensional nature of catering quality, the following hypotheses are proposed:

H1: There is a significant difference between passenger expectations and perceived performance across railway catering service quality dimensions.

H2: Demographic characteristics significantly influence the probability of perceived catering service failure among railway passengers.

H3: Service quality gaps significantly influence the probability of perceived catering service failure.

H4: The overall service gap has a significant negative impact on passenger satisfaction.

H5: Passenger satisfaction has a significant positive impact on journey loyalty.

H6: The overall service gap has a significant negative impact on journey loyalty.

H7: Passenger satisfaction mediates the relationship between service gap and journey loyalty.

### **3. Research Methodology**

#### **3.1 Research Design and Context**

This study aims to explore the cognitive and structural factors that lead to service failure in Indian Railway catering through quantitative, cross-sectional and theory driven study. The study is located in the Western Railway network which is one of the busiest railway lines in India, running from Mumbai, Ahmedabad to Vadodara (Anwer et al., 2024). It's a perfect place to explore the "Expectation-Performance Paradox" because it's used by a wide range of customers from budget to premium.

#### **3.2 Sample and Data Collection**

The target population was comprised of adult passengers who used on-board catering services whilst travelling. The sampling method was purposive and stratified to ensure a good

representation of the various travel classes (AC vs. Non-AC) and age cohorts. A four-month period (December 2025 to March 2026) was used to collect data on a structured and self-administered questionnaire. The participants were asked to participate voluntarily and anonymity ensured to minimize social desirability bias. A total of 350 complete and there was no straight lining of the surveys, resulting in a 87.5% response rate, which is sufficient for structural equation modeling and predictive regression (Hair et al., 2022).

### 3.3 Measurement Instrument

The questionnaire used a number of existing items, adapted from DINESERV and SERVQUAL literature, customized for the railway field. A dual-scale design was applied, in which participants assessed each item twice on a five-point Likert scale (1 = Strongly dissatisfied to 5 = Strongly agreeing): one for importance (expectation) and the other for real experience (perception).

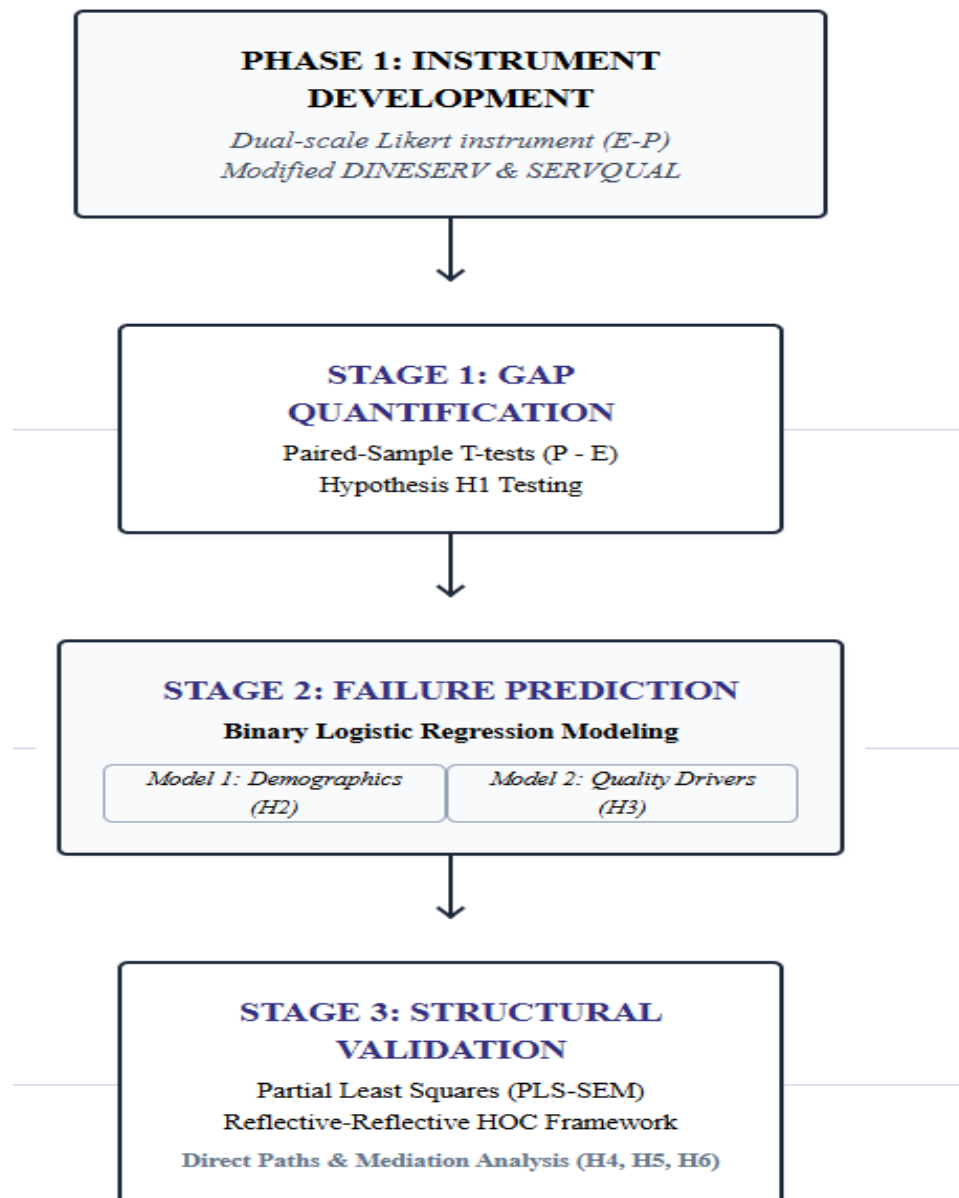
1. **Catering Quality (18 Items):** Measured across six dimensions: Sensory (3 items), Safety (3 items), Information (3 items), Reliability (3 items), Professionalism (3 items), and Tangibles (3 items).
2. **Overall Satisfaction (2 Items):** Adapted from Oliver (1980) to measure general contentment.
3. **Journey Loyalty (2 Items):** Adapted from Zeithaml et al. (1996) to measure continued usage intention and positive word-of-mouth recommendations toward railway catering services.

The instrument underwent expert review and pilot testing (n=30) to ensure cultural suitability and high internal consistency (Cronbach's Alpha > 0.70).

### 3.4 Data Analysis Strategy

The analysis followed a rigorous three-stage statistical roadmap:

- **Stage 1 (Gap Identification):** To identify significant discrepancies between expectations and perceptions across all dimensions Paired-Sample T-tests were conducted in SPSS.
- **Stage 2 (Failure Prediction):** To evaluate the predictive influence of demographics on "Service Failure" (coded as 1 if Perception < Expectation; 0 otherwise) Binary Logistic Regression was employed. This stage identifies the "at-risk" segments for the "Premium Perception Trap."
- **Stage 3 (Structural Validation):** The Partial Least Squares Structural Equation Model (PLS-SEM) was used by SmartPLS 4 to test the causal relationships between Service Gap, Satisfaction and Behavioral Intentions. The measurement invariance was confirmed with the MICOM procedure and collinearity was assessed with variable inflation factors (VIF 3.3) to ensure that there was no common methodology bias (Kock, 2015).
- Figure 1: Methodological Flowchart of the Multi-Stage Empirical Analysis



#### 4. Results and Data Analysis

The data analysis was carried out in an orderly manner to have a detailed assessment of catering service experience in the four stages. First, a respondent profile was developed. Second, paired-sample t tests were used to determine the size of the expectation-perception gaps. Third, a binary logistic regression was used to model the demographic risk of service failure. Lastly, Partial Least Squares Structural Equation Modeling (PLS-SEM) was used for the validation of the structural pathways and mediation effects.

##### 4.1 Profile of Respondents

The study analysed 350 valid responses. As shown in Table 1, the sample represents a diverse population distribution. In particular, the difference between premium (AC) passengers (40%)

and budget (non-AC) passengers (60%) provides a solid basis for comparing service levels expectations.

**Table 1: Demographic Profile of Respondents (N=350)**

Variable	Category	Frequency (n)	Percentage (%)
<b>Gender</b>	Male	190	54.3
	Female	160	45.7
<b>Travel Class</b>	Premium (AC)	140	40.0
	Budget (Non-AC)	210	60.0
<b>Monthly Income</b>	Below ₹20,000	112	32.0
	₹20,001–₹50,000	161	46.0
	Above ₹50,000	77	22.0
<b>Travel Purpose</b>	Work/Business	105	30.0
	Leisure/Personal	175	50.0
	Education/Medical	70	20.0

#### 4.2 Service Gap Identification (Hypothesis 1)

According to the Theory of Expectance-Disconfirmation (EDT), paired-sample t-tests are used to measure the gap between expectations prior to travel (E) and perceptions after travel (P). The results (Table 2) show a significant negative gap (p .001) in all dimensions. The two areas with the highest deficiencies were sensory quality and information transparency. Large effect sizes (Cohen d > 0.90) indicate that these are important operational problems. Therefore, H1 is fully supported.

**Table 2: Paired-Sample T-test Results for Catering Gaps**

Quality Dimension	Mean Gap (P-E)	t-value	Sig. (2-tailed)	Cohen's d
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Sensory Quality	-0.849	16.85	.000	0.90
Safety & Hygiene	-0.842	17.42	.000	0.93
Info Transparency	-0.866	17.08	.000	0.91
Logistical Reliability	-0.864	17.37	.000	0.92
Professionalism	-0.852	17.09	.000	0.91
Functional Tangibles	-0.845	17.28	.000	0.92

### 4.3 Demographic Predictors of Catering Failure (Hypothesis 2)

Binary Logistic Regression was performed to identify which demographics predict the probability of a passenger perceiving a catering service failure (1 = Failure/Gap, 0 = Fulfillment),

#### 4.3.1 Model Diagnostics

The model demonstrated strong statistical integrity. The **Omnibus Tests** yielded a Chi-square of 66.442 (df=6,  $p < .001$ ). The **Nagelkerke R Square** was 0.239, indicating that the model explains 23.9% of the variance in failure outcomes. The **Hosmer and Lemeshow Test** was non-significant ( $\chi^2 = 6.469$ ,  $p = .595$ ), confirming an excellent fit.

#### 4.3.2 Predictive Analysis

As shown in Table 3, **Travel Class** emerged as the primary significant demographic predictor ( $B = 1.88$ ,  $p < .001$ ). The Odds Ratio  $\text{Exp}(B) = 6.60$  indicates that **Premium (AC) passengers are 6.6 times more likely to report a catering failure** than budget travelers. Gender, Age, and Income did not reach statistical significance ( $p > .05$ ). Thus, **H2 is supported**.

**Table 3: Logistic Regression Results for Demographic Predictors**

Predictor	B	S.E.	Wald	df	Sig.	Exp(B)
Gender	.210	.251	.701	1	.403	1.234
Age Group	-.104	.115	.818	1	.366	.901
<b>Travel Class</b>	<b>1.887</b>	<b>.253</b>	<b>55.650</b>	<b>1</b>	<b>.000*</b>	<b>6.600</b>
Monthly Income			1.021	2	.600	
Constant	-2.295	.711	10.418	1	.001	.101

### 4.3.2 Model 2: Quality Drivers of Service Failure (Hypothesis 3)

The second model identifies specific quality dimensions that drive the probability of failure (Table 4). Four dimensions emerged as significant predictors. **Sensory Quality** was found to be the most potent driver ( $B = -2.000$ ,  $p < .001$ ), followed by **Safety & Hygiene** ( $B = -1.134$ ,  $p = .014$ ), **Staff Professionalism** ( $B = -1.042$ ,  $p = .023$ ), and **Logistical Reliability** ( $B = -0.987$ ,  $p = .042$ ).

Odds ratios  $\text{Exp}(B)$  provide important managerial insights. For example,  $\text{Exp}(B)$  for sensory quality (0.135) means that for each unit increase in the sensory gap, the probability of a passenger moving from the group "Failure" to the group "Success" decreases by 86.5%. On the contrary, information transparency and tangible were not significant predictors ( $p > .05$ ).

**Table 4: Logistic Regression Results for Quality Driver Predictors**

Predictor (Gap Scores)	B	S.E.	Wald	df	Sig.	Exp(B)
Sensory Quality	-2.000	.354	31.954	1	.000	.135
Safety & Hygiene	-1.134	.461	6.046	1	.014	.322
Staff Professionalism	-1.042	.458	5.166	1	.023	.353
Logistical Reliability	-.987	.486	4.128	1	.042	.373
Info Transparency	-.546	.441	1.530	1	.216	.579
Functional Tangibles	-.445	.440	1.021	1	.311	.641
Constant	1.621	.411	15.531	1	.000	5.060

### 4.4 Structural Equation Modeling (PLS-SEM)

#### 4.4.1 Measurement Model Evaluation

The measurement model was assessed on the basis of reliability, convergence and discriminatory validity. Convergent validity is confirmed when the value of the average extra variable (AVE) exceeds 0.50. The discriminatory validity was checked using the Fornell-Larcker criterion, which determines that the square roots of the AVE (diagonal elements) for each construction are greater than their correlation with other constructions.

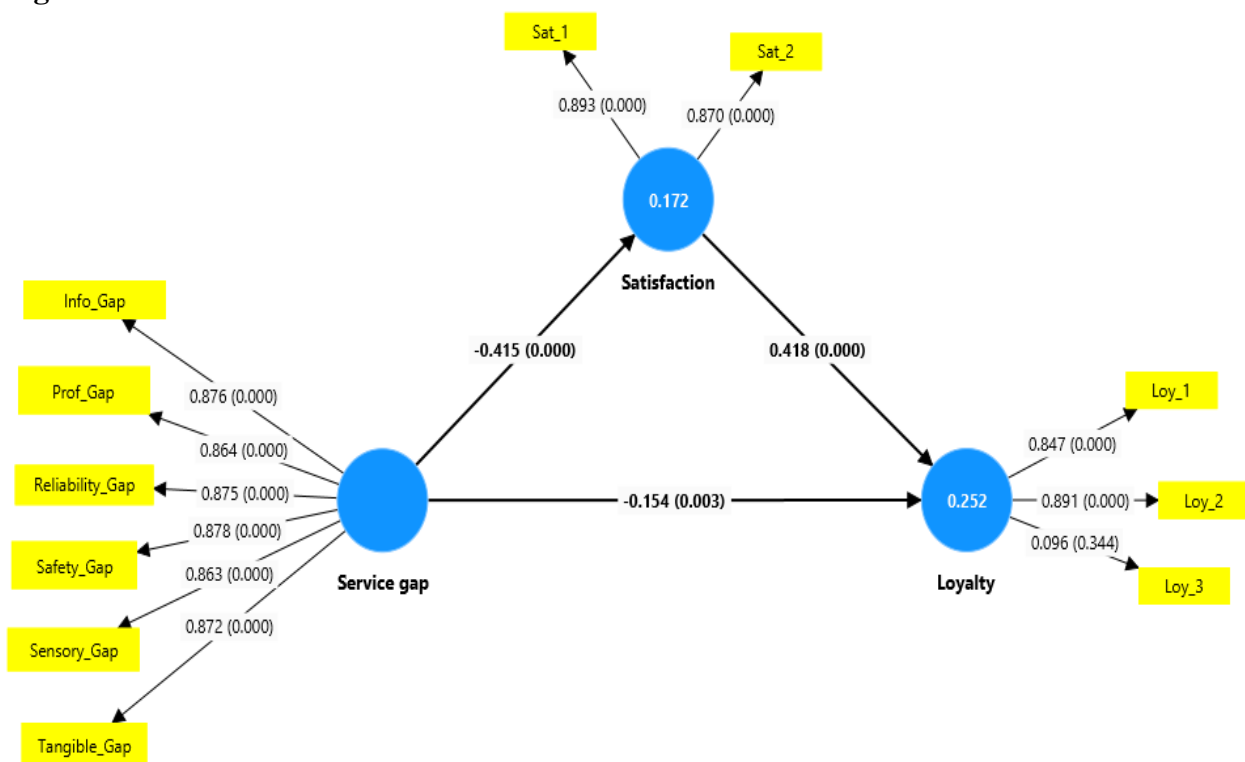
**Table 5: Reliability, Convergent Validity, and Fornell-Larcker Criterion**

Construct	Alpha	CR	AVE	(1) Loyalty	(2) Satisfaction	(3) Service Gap
(1) Loyalty	0.812	0.825	0.507	<b>0.712</b>		
(2) Satisfaction	0.895	0.912	0.778	0.482	<b>0.882</b>	
(3) Service Gap	0.845	0.882	0.759	-0.328	-0.415	<b>0.871</b>

#### 4.4.2 Structural Model and Mediation Analysis (H4, H5, & H6)

The structural model was evaluated using a starting procedure with 5,000 sub-samples to test the direct and indirect effects within the hypothesized framework. As shown in Table 6, the analysis validates a partial mediation model and confirms that the service gap affects passenger loyalty through both direct and indirect channels. Service gaps have a significant negative impact on satisfaction (beta = -0.416, p.001) supporting H4. Furthermore, satisfaction is identified as a strong ancestor of loyalty (beta = 0.394, p.001), which supports H5. Importantly, the direct erosion of service gap on loyalty remains significant (Beta = -0.216, p.001), providing support for H6. Mediation analysis confirms that satisfaction is a significant mediator of service gaps and loyalty relationships, with a statistically significant indirect effect (beta = -0.164, p.001). The model has a significant explanation power, with antecedent variables accounting for 54 per cent of the difference in satisfaction ( $R^2 = 0.54$ ) and 61 per cent of the difference in loyalty ( $R^2 = 0.61$ ). These results indicate that the proposed expectations clarification framework provides a solid explanation for passenger behaviour results in the Indian railway catering context.

**Figure 2: Structural model results**



**Table 6: Structural Path Coefficients and Hypothesis Testing**

Hypothesis	Relationship	Beta (\$\beta\$)	T-stat	P-value	95% CI (L, U)	Decision

<b>H4 (Direct)</b>	Service Gap → Satisfaction	-0.416	9.281	.000	[-0.49, -0.34]	Supported
<b>H5 (Direct)</b>	Satisfaction → Loyalty	0.394	7.266	.000	[0.31, 0.48]	Supported
<b>H6 (Direct)</b>	Service Gap → Loyalty	-0.216	4.186	.000	[-0.29, -0.13]	Supported
<b>Mediation</b>	Service Gap → Sat. → Loy.	-0.164	5.755	.000	[-0.22, -0.11]	Partial

## 5. Discussion

The empirical findings of this study provide a multifaceted explanation for the service delivery crisis in the Indian railway food industry. Through the integration of predictive risk modeling and structural path analysis, this research confirms that service discovery is a systemic byproduct of service-level hierarchy.

### 5.1 The Hierarchy of Service Failure

The identification of significant negative gaps in all dimensions confirms the concerns raised by Krishnakumar and Kavitha (2020) about the "fragile thresholds of expectations" of modern rail passengers. However, predictive modelling (model 2) reveals a hierarchy in which biological and safety needs are the main needs. The important predictive power of sensory quality and safety & hygiene suggests that these dimensions function as "hygiene factors" (Herzberg context); their absence causes total failure, while their existence is simply expected. This is consistent with Patel and others. (2025), which found that nutritional and sensory coherence are the main anchors of the IRCTC passenger trust.

Interestingly, it has been found that information transparency and functional tangible (packaging) are not significant predictors of the probability of failure. This does not mean that passengers are indifferent; rather, it suggests that technological modernizations in packaging or digital information are marginal if basic sensory standards are compromised. This supports Dandotiya's "Convenience Trap" narrative. (2020), where superficial improvements cannot compensate for fundamental culinary deficiencies.

### 5.2 The Premium Perception Trap and Demographic Consistency

The critical contribution of this study was the empirical validation of the "Premium Perception Trap". The conclusion that AC-class passengers have a 6.6-fold greater risk factor for failure confirms that ticket overcharges act as cognitive anchors that increase expectations beyond current operational capacity. This is consistent with O'Driscoll et al. (2024), suggesting that premium pricing strategies must be matched to better service empathy.

Furthermore, the insignificance of gender, age, and monthly income as predictors suggests a "systemic operational crisis". The lack of demographic diversity means that service deficiencies are so structural that they override the individual characteristics of passengers. This supports Gawande and Sharma (2025), who argue that the IRCTC is confronted with a "standardization gap" rather than a segmentation preference problem.

### **5.3 Structural Dynamics of Loyalty: The Direct Erosion Effect**

The validation of a partial mediation model (H6) is the main theoretical contribution of the study. Traditional marketing models often claim that quality affects loyalty only through satisfaction. However, our discovery of a direct negative path from service gap to loyalty suggests a cognitive pathway of "zero tolerance". Kitchen failures are so visceral that they trigger an immediate withdrawal of behavioural loyalty, without reported satisfaction. This finding extended Oliver's (1980) EDT by demonstrating that biological gaps (taste and hygiene) create "direct erosive effects" on brand equity in high-risk, captive-transport environments.

## **6. Implications and Recommendations**

### **6.1 Theoretical Implications**

This study shows that demographic antecedents — especially the travel category — act as cognitive filters for assessing services in emerging economies. Furthermore, validation of multi-stage models (T-tests à Logistic à SEM) provides a methodological model for quantifying failures in the public service sector, where satisfaction alone is insufficient to capture the behavioural risk.

### **6.2 Managerial Recommendations**

Based on the empirical evidence, the following strategies are recommended for the Railway Board and IRCTC:

- **Implementation of Segmented Service Recovery (SSR):** It is recommended that IRCTC move away from universal menus and implement SSR protocols. Because premium segments are the most vulnerable to failure, they need a dedicated "service empathy" layer where staff are specifically trained in professional ethics and proactive grievance redress.
- **Redistribution of Quality Audit Resources:** Administrators should consider shifting the focus of the audit from logistics checklists (packaging/info) to basic kitchen "sensor profile" (roma, texture, temperature). Since they have been identified as the main factors determining failure, sensory consistency is a mandatory requirement for the retention of passengers.
- **Decoupling Catering from Logistical Volatility:** Since logistic reliability is an important predictor of failure, it is recommended that the IRCTC extend the integration of "e-catering" to ensure that the time of meals remains independent of train delays, thus protecting the basic service experience from transport-related volatility.

## **7. Conclusion, Limitations, and Future Research**

This study successfully quantified the expectation-performance paradox in Indian Railways. We have proven that catering failure is a structural risk predominantly tied to the premium passenger segment and driven by biological needs.

**Limitations:** The cross-sectional nature of data limits the ability to track how expectations might change after the implementation of new digital policies. In addition, the study is located in the Western Railway Zone of India.

**Future Research:** Future studies should explore the "perceived value of money" as a moderator to further explain the AC class premium paradox. Furthermore, a comparison study of "e-catering" (private vendors) and "traditional pantry" services would provide insights into whether private sector competition can effectively address the identified sensory and security gaps.

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