

A Correlation Analysis of Service Parameters Driving Passenger Satisfaction Across 16 AAI Airports

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Abstract - In today's highly competitive aviation industry, airports have shifted from basic transport hubs into customer-focused service centres. Managing the traveller's journey across every touchpoint has become essential to modern airport operations. This study evaluates how Airport Service Quality (ASQ) affects passenger satisfaction by examining 32 distinct service parameters. The Airports Council International (ACI) ASQ survey serves as the global benchmarking standard for measuring passenger satisfaction across core operational, commercial, and service touchpoints. This study synthesises passenger feedback collected from 16 major Indian airports managed by the Airports Authority of India (AAI) to assess terminal performance, staff courtesy, hygiene standards, and commercial value.

The empirical findings reveal that Pune International Airport secured the top domestic ranking with a near-perfect passenger satisfaction score of 4.96 out of 5, followed closely by Chennai and Goa. While infrastructure upgrades and expanded terminals have broadly elevated passenger comfort, localised challenges persist during peak travel periods regarding washroom maintenance frequency and retail pricing value. Ultimately, these standardised ASQ metrics not only identify critical areas for targeted infrastructure spending and staff training, but also provide the data required by operators to justify regulatory tariff adjustments during upcoming aeronautical control periods.

Keywords: *Airport Service Quality (ASQ); passenger satisfaction; Airports Authority of India (AAI); Airports Council International (ACI); correlation analysis; service benchmarking.*

Introduction

Airports Council International (ACI), headquartered in Montreal, Canada, is a non-profit organisation whose principal purpose is to advance the interests of airports and to promote professional excellence in airport management and operations. Through its Airport Service Quality (ASQ) programme, ACI provides the aviation industry's leading benchmark for passenger satisfaction, tracking a standardised set of service indicators across member airports worldwide.

The Airport Service Quality (ASQ) programme, administered by Airports Council International since 2006, is the globally accepted measurement instrument for gauging the passenger experience. Its methodology, live intercept surveys conducted

at departure gates across all days of a quarter, eliminates recall bias and captures in-journey perceptions at the moment of truth. AAI's participation in ASQ provides a quarterly diagnostic across 32 service touchpoints, from washroom cleanliness to Wi-Fi quality, generating the granular evidence base on which this paper is founded.

1.1 Overview of the ASQ Survey

- **Purpose:** an international benchmarking programme administered by ACI to measure passenger satisfaction as travellers move through an airport.
- **Scope:** the survey tracks 32 key performance indicators grouped into eight main categories, including check-in, security, access, airport facilities, food and beverage, retail, environment, and arrival services.
- **Governance:** India is a member of ACI; within India, the Airports Authority of India (AAI) oversees implementation of the programme at major airports.
- **Data collection:** ACI provides the sampling plan and survey protocol, while an independent consultant appointed by AAI conducts the fieldwork.

1.2 Major Airports and Regulatory Context

The ASQ survey is mandatory at airports classified as "Major Airports" under the Airports Economic Regulatory Authority (AERA) Act. The Act originally defined a major airport as one handling more than 1.5 million passengers per annum (MPPA); an amendment enacted in August 2019 raised this threshold to 3.5 MPPA to reflect the growth in national air traffic. In addition to the passenger-volume criterion, the Central Government retains the authority to designate any airport as a Major Airport irrespective of its passenger throughput.

1.3 Mission of the ASQ Programme

Drawing on specialised expertise and a leading suite of customer-experience solutions, the ASQ programme supports airport management in improving the customer experience, thereby generating higher levels of passenger satisfaction. ASQ provides guidance, insight, and best-practice benchmarks to the global airport community.

1.4 Customer Experience (CX) in Airport Management

Customer Experience (CX) refers to the overall perception a passenger forms of an airport through the sum of interactions with its services, facilities, and staff, representing the traveller's complete experience

from arrival at the airport to final departure. Because passengers travel for different purposes and hold differing expectations, airport management aims to deliver a smooth, comfortable, and satisfactory experience at every stage of the passenger journey. These interactions occur through airport employees, check-in counters, security checkpoints, information desks, websites, mobile applications, self-service kiosks, retail outlets, and other facilities. Each such interaction constitutes a touchpoint, or "moment of truth," shaping the passenger's overall perception of the airport. A positive customer experience increases passenger satisfaction, loyalty, and trust, while simultaneously strengthening the airport's reputation and operational performance.

1.5 Data Sources and Scope of this Study

This study draws on two official AAI ASQ outputs for Q1 2026: (i) a parameter-wise score sheet reporting all 31 ASQ indicators for 16 AAI airports, comparing Q1 2026 with Q4 2025 (Annexure I), and (ii) a summary sheet reporting each airport's overall ASQ rating and its global ACI rank for the same two quarters. Both datasets are combined and examined using simple correlation statistics to identify which individual service parameters are most closely associated with passenger satisfaction.

1.6 Background of the Study: The ASQ Framework

1.6.1 Origin and Evolution of ASQ

Historically, airport performance was evaluated strictly through operational and technical metrics such as runway capacity, aircraft turnaround times, and baggage-handling speed. As global aviation became more competitive, however, a strategic shift occurred: airports transitioned from basic infrastructure providers into commercial, customer-centric service ecosystems. To standardise the measurement of passenger satisfaction worldwide, ACI launched the ASQ programme in 2006. Today, the ASQ programme is used by more than 400 airports worldwide, making it the premier benchmarking tool in aviation management.

1.6.2 The 32-Parameter Structure

The core strength of the ASQ framework lies in its structured and standardised data-collection method. Surveys are traditionally administered to passengers at the departure gate while their travel experience is still ongoing, which minimises recall bias and ensures accurate feedback on specific touchpoints. These parameters are grouped into the following key service categories:

- **Access and Arrival:** convenience of landside access, parking availability, and cost-to-value ratios.
- **Check-In Efficiency:** waiting times, staff efficiency, and passenger-processing courtesy.
- **Security and Passport Control:** speed of security screening, safety perceptions, and staff behaviour.
- **Wayfinding and Navigation:** clarity of flight-information screens, directional signage, and ease of movement.

- **Terminal Environment and Facilities:** cleanliness of washrooms, comfort of seating areas, ambience, and availability of digital services such as Wi-Fi.
- **Commercial Services:** quality, variety, and perceived value of retail and food-and-beverage outlets.

The ACI ASQ survey programme runs for a full calendar year, with fieldwork conducted quarterly, as summarised in Table 1.

Table 1. ACI ASQ Survey Quarterly Schedule

Quarter	Month 1	Month 2	Month 3
Q1	January	February	March
Q2	April	May	June
Q3	July	August	September
Q4	October	November	December

1.7 ASQ Sampling Criteria

1.7.1 Distribution of the Sampling Criterion

To be eligible, an airport must distribute its fieldwork evenly across all three months of a given quarter: 30% of the sample size in month one, 30% in month two, and 10% in month three.

1.7.2 Weekdays Criterion

To be eligible under the weekdays criterion, an airport must have surveyed at least once during the quarter on each day of the week (Monday to Sunday), collecting at least 30 questionnaires on each of the seven days.

Literature Review

Airport service quality has become a major research area owing to increasing competition among airports and the growing emphasis on passenger experience. Service quality measurement in aviation rests on the SERVQUAL model's five dimensions developed by Parasuraman, Zeithaml, and Berry (1988): tangibles, reliability, responsiveness, assurance, and empathy. This framework laid the theoretical foundation for measuring service quality and has since been widely adapted in airport-specific research.

Fodness and Murray (2007) proposed an airport-specific service-quality framework emphasising functional quality, interaction quality, and the physical service environment, concluding that passenger satisfaction depends on both operational efficiency and the quality of service encounters. Jeon and Kim (2012) found that higher airport service quality significantly improves passenger satisfaction, airport image, and behavioural intentions, including passengers' willingness to revisit and recommend an airport. Bogicevic et al. (2013) reported that waiting time, terminal cleanliness, staff behaviour, and passenger comfort are among the strongest determinants of overall airport satisfaction, while Bezerra and

Gomes (2016) applied Structural Equation Modelling to demonstrate that check-in efficiency, security processes, terminal facilities, and employee service significantly influence passenger satisfaction.

Airports Council International's own ASQ research indicates that improved service quality enhances the passenger experience, strengthens airport competitiveness, and increases non-aeronautical revenue. Drawing on this literature, the present study adopts a multi-dimensional structure of airport user expectations comprising nine dimensions: arrival service, check-in, security, border/passport control, shopping and dining, security hold areas, access to the airport, movement throughout the airport, and cleanliness and safety.

Overall ASQ Performance of the 16 AAI Airports

3.1 Ratings and Rankings: Q1 2026 versus Q4 2025

- **Top performers (Q1 2026):** Pune (4.96), Chennai (4.95), and Goa (4.94) recorded the highest overall ASQ ratings.
- **Lowest performers (Q1 2026):** Amritsar and Port Blair recorded the lowest ratings, at 4.80 each.
- **Overall trend:** the average rating across the 16 AAI airports improved marginally from 4.87 in Q4 2025 to 4.88 in Q1 2026, both well above the ACI world average of 4.37.

Table 2 (below, full width) presents the complete rating and rank comparison for all 16 airports.

Table 2. Overall ASQ Rating and Rank of the 16 AAI Airports (Q1 2026 vs Q4 2025)

S.No	Airport	Code	Q1'26 Rating	Q1'26 Rank	Q4'25 Rating	Q4'25 Rank	Diff.
1	Pune	PNQ	4.96	60	4.96	58	+0.00
2	Chennai	MAA	4.95	61	4.90	71	+0.05
3	Goa	GOI	4.94	65	4.93	63	+0.01
4	Varanasi	VNS	4.90	69	4.90	67	+0.00
5	Trichy	TRZ	4.90	70	4.94	61	-0.04
6	Kolkata	CCU	4.89	72	4.88	72	+0.01
7	Dehradun	DED	4.89	73	4.92	65	-0.03
8	Raipur	RPR	4.88	74	4.87	73	+0.01
9	Coimbatore	CJB	4.88	75	4.84	76	+0.04
10	Calicut	CCJ	4.88	76	4.75	87	+0.13
11	Bhubaneswar	BBI	4.88	77	4.80	84	+0.08
12	Fatma	PAT	4.88	78	4.86	75	+0.02
13	Indore	IDR	4.87	79	4.90	68	-0.03
14	Srinagar	SXR	4.83	81	4.82	80	+0.01
15	Port Blair	IXZ	4.80	83	4.76	86	+0.04
16	Amritsar	ATQ	4.80	84	4.83	79	-0.03

Note. Rank denotes the airport's position in the global ACI ASQ database (a lower rank number indicates a higher global standing). A negative rating difference indicates that the airport's Q1 2026 score fell relative to Q4 2025.

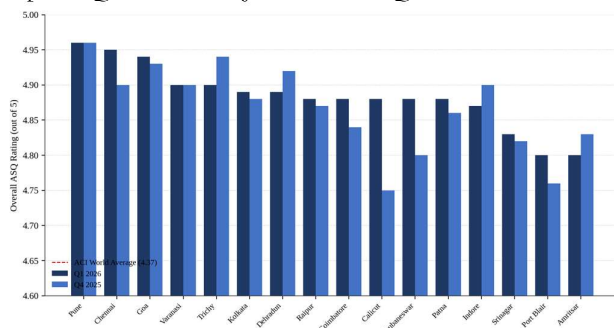


Figure 1. Overall ASQ Rating by Airport, Q1 2026 vs Q4 2025

3.2 Key Insights and Observations

- **Most improved:** Calicut (CCJ) recorded the most significant growth, rising +0.13 in rating (from 4.75 to 4.88), which improved its global rank from 87 to 76.
- **Biggest decline:** Trichy (TRZ) fell -0.04 in rating (from 4.94 to 4.90), causing its global rank to slip from 61 to 70.
- **Stable performance:** Pune (PNQ) and Varanasi (VNS) maintained perfectly steady ratings (+0.00 change).

Correlation Coefficient Analysis

This section applies correlation analysis to the two official AAI ASQ Q1 2026 outputs, the 31-parameter score sheet and the 16-airport rating/rank summary, to identify which individual service parameters are most closely associated with Overall Satisfaction across the 16 AAI airports.

4.1 Methodology

A simple correlation coefficient is a standard statistical measure of the strength and direction of the linear relationship between two variables. This study uses the Pearson correlation coefficient (r), calculated across the 16 AAI airports for Q1 2026, with the independent variables comprising each of the 31 individual ASQ service parameters and the dependent variable being each airport's 'Overall Satisfaction' score.

The Pearson coefficient r ranges from -1 to $+1$. Because the underlying ASQ scores are continuous ratings on a 1–5 scale rather than ranks, Pearson's r is the appropriate measure here. A Spearman rank correlation was also checked as a robustness comparison and produced materially the same ordering of parameters, so Pearson's r is reported throughout. For interpreting the resulting r -values, the conventional bands in Table 3 were applied.

Table 3. Interpretation Bands for the Pearson Correlation Coefficient (r)

r (Abs.)	Interpretation	Meaning
≥ 0.50	Mod.-strong	Meaningful driver in this dataset
0.30 – 0.49	Weak-mod.	Some association; other factors dominate
< 0.30	Negligible	Little to no linear association

Two data-quality notes apply. First, where a parameter does not apply to every airport (e.g., border/passport control applies only where international traffic exists), those airports were excluded using pairwise deletion, and the sample size (n) is reported alongside each coefficient. Second, because Q1 2026 scores cluster tightly near the top of the 1–5 scale, the range of variation available to correlate against is naturally restricted, which compresses the size of all coefficients relative to a more heterogeneous dataset.

Table 4 presents the Pearson correlation coefficient between each of the 31 ASQ service parameters and Overall Satisfaction, calculated across the 16 AAI airports using Q1 2026 scores, ranked from strongest to weakest positive association.

Table 4. Pearson Correlation Coefficients between ASQ Service Parameters and Overall Satisfaction (Q1 2026)

Service Parameter	r	n	Strength
Waiting time at border/passport control	0.646	13	Moderate-Strong
Courtesy/helpfulness of border/passport control staff	0.618	13	Moderate-Strong
Ease of going through security screening	0.612	16	Moderate-Strong
Ease of finding your way	0.581	16	Moderate-Strong
Ease of finding your check-in area	0.561	16	Moderate-Strong
Ease of getting to the airport	0.544	16	Moderate-Strong
Restaurants/bars/cafes	0.525	16	Moderate-Strong
Health safety	0.522	16	Moderate-Strong
Comfort of waiting at gate areas	0.507	16	Moderate-Strong
Availability of charging stations	0.446	16	Weak-Moderate
Ease of making connection with other flights	0.425	11	Weak-Moderate
Cleanliness of washrooms/toilets	0.391	16	Weak-Moderate
Courtesy/helpfulness of airport staff	0.391	16	Weak-Moderate
Shops	0.379	16	Weak-Moderate
Courtesy/helpfulness of shopping and dining staff	0.359	16	Weak-Moderate
Value for money of shops	0.316	16	Weak-Moderate
Availability of washrooms/toilets	0.303	16	Weak-Moderate
Wi-Fi service quality	0.301	16	Weak-Moderate
Waiting time at security screening	0.272	16	Negligible/Weak
Walking distance inside terminal	0.259	16	Negligible/Weak
Signage to access the terminal	0.250	16	Negligible/Weak
Entertainment and leisure options	0.225	16	Negligible/Weak
Cleanliness	0.193	16	Negligible/Weak
Value for money of restaurants/bars/cafes	0.142	16	Negligible/Weak
Courtesy/helpfulness of security staff	0.116	16	Negligible/Weak
Availability of seats at gate areas	0.113	16	Negligible/Weak
Waiting time at check-in	0.045	16	Negligible/Weak
Availability of flight information	0.040	16	Negligible/Weak
Ambience	0.007	16	Negligible/Weak
Courtesy/helpfulness of check-in staff	-0.117	16	Negligible/Weak
Value for money of transport to airport	-0.140	16	Negligible/Weak

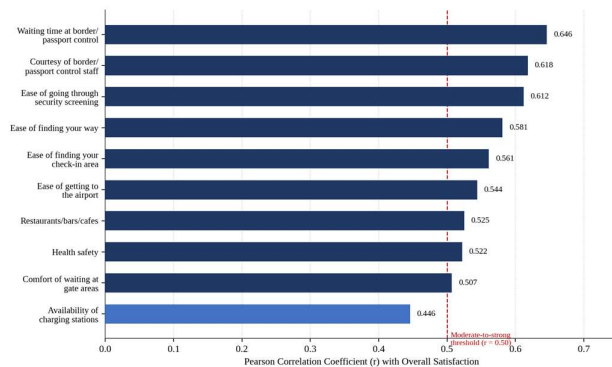


Figure 2. Top Ten ASQ Parameters Ranked by Correlation (r) with Overall Satisfaction

4.3 Top Parameters Correlated with Overall Satisfaction

- **Waiting time at border/passport control (r = 0.646, n = 13):** the single strongest correlate in the dataset, though applicable only to the 13 airports with international/immigration traffic.

- **Courtesy/helpfulness of border/passport control staff (r = 0.618, n = 13):** closely tracks the wait-time parameter above.
- **Ease of going through security screening (r = 0.612, n = 16):** the strongest parameter applicable to all 16 airports without exception.

Immediately behind these three, ease of finding your way (r = 0.581), ease of finding your check-in area (r = 0.561), and ease of getting to the airport (r = 0.544) round out a cluster of core "journey friction" parameters that consistently show the strongest association with how satisfied passengers feel overall.

4.4 Parameters with Unexpectedly Low or Negligible Correlation

Several parameters that might intuitively be expected to matter a great deal to passengers show little to no correlation with Overall Satisfaction in this dataset: ambience (r = 0.007) and availability of flight information (r = 0.040) show almost no linear association at all; waiting time at check-in (r = 0.045) and availability of seats at gate areas (r = 0.113) are similarly negligible; and courtesy/helpfulness of check-in staff (r = -0.117) and value for money of transport to the airport (r = -0.140) show small negative coefficients.

This is not evidence that these parameters do not matter to passengers in an absolute sense; rather, it reflects that nearly every one of the 16 airports already scores these parameters uniformly high (typically 4.6 and above), leaving too little variation across airports for a correlation to register.

4.5 Major Hubs versus Smaller Regional Airports

The 16 AAI airports in this dataset span both larger metro hubs (e.g., Chennai, Kolkata, Pune, and Goa) and smaller regional airports (e.g., Dehradun, Port Blair, Srinagar, and Trichy, among others). Comparing average scores between these two groups on the parameters most correlated with Overall Satisfaction reveals a consistent pattern, summarised in Table 5 (below, full width).

Table 5. Mean ASQ Scores — Larger Hubs versus Smaller Regional Airports

Parameter	Larger Hubs — Mean (SD)	Smaller Regional — Mean (SD)
Ease of going through security screening	4.92 (0.06)	4.84 (0.14)
Ease of finding your way	4.92 (0.05)	4.83 (0.17)
Ease of finding your check-in area	4.93 (0.06)	4.86 (0.12)
Waiting time at border/passport control	4.94 (0.08)	4.79 (0.29)
Overall Satisfaction	4.94 (0.03)	4.87 (0.03)

Larger hubs not only score marginally higher on average across these core parameters, but also exhibit noticeably less variability (lower standard deviation), consistent with more standardised processes and more consistent staffing at higher-volume airports. Smaller regional airports show wider score dispersion, particularly for border/passport control (SD = 0.29 versus 0.08 at hubs), indicating a more inconsistent passenger experience at this touchpoint from airport to airport.

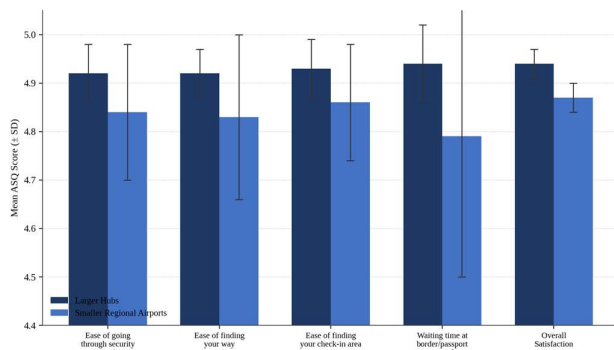


Figure 3. Mean ASQ Scores with Standard Deviation — Larger Hubs versus Smaller Regional Airports

Discussion and Managerial Implications

The correlation results, taken together, tell a consistent operational story about what drives passenger satisfaction at these Indian airports.

5.1 Key Findings

- **Passengers weight the functional, high-friction parts of the journey most heavily.** Security screening, wayfinding, check-in, and airport access show the strongest correlation with Overall Satisfaction. This is consistent with established service-quality research (Bogicevic et al., 2013; Bezerra & Gomes, 2016) identifying waiting time, terminal cleanliness, and process efficiency as principal determinants of overall airport satisfaction.
- **Passengers appear to "satisfice" on amenity parameters once a baseline is met.** Ambience, Wi-Fi, flight-information availability, and seating show negligible correlation not because passengers do not value them, but because nearly all 16 airports already clear a high baseline on these dimensions.
- **Border/passport control is a high-leverage but narrow-scope lever.** It shows the single strongest correlation in the dataset, yet applies only to airports with meaningful international traffic, and shows by far the widest score variability between hubs and regional airports.
- **Scale appears to correlate with consistency, not just quality.** Larger hubs score only marginally higher on average than smaller regional airports on the top-correlated parameters, but show meaningfully less variability.

5.2 Capital Expenditure Prioritisation

Based strictly on the strength of correlation with Overall Satisfaction observed in this dataset, capital and operational expenditure would be expected to generate the greatest marginal improvement in passenger satisfaction if directed toward the following priorities:

- **Security screening throughput and staffing** — additional lanes, staff training, and queue-management technology at airports currently scoring below the 4.8–4.9 range.
- **Wayfinding and signage systems** — clearer digital and physical signage, particularly at regional airports.
- **Border/passport control process standardisation** at international-traffic airports — the single highest-leverage investment available.

- **Landside access and transport value-for-money** — parking, kerbside design, and public-transport connectivity ($r = 0.544$).

By contrast, further investment in ambience, Wi-Fi, or entertainment and leisure amenities is unlikely to move the Overall Satisfaction needle much further, given the current near-ceiling scores across nearly every airport in the sample. These are better framed as maintenance priorities rather than growth priorities in future capital-planning cycles.

Conclusion and Actionable Recommendations

This analysis applied simple Pearson correlation coefficients to the Q1 2026 ASQ Departure Survey results for 16 AAI airports to identify which of 31 individual service parameters are most closely associated with Overall Satisfaction. The results show that satisfaction at Indian airports is driven predominantly by the functional “process” parameters of the passenger journey, security screening, wayfinding, check-in, airport access, and, where applicable, border/passport control, rather than by ambience or amenity-related parameters, which show negligible correlation largely because they are already rated uniformly high across nearly every airport in the sample.

On the basis of these findings, four data-driven recommendations are proposed for AAI and individual airport authorities:

- **Prioritise security screening and border/passport control process investment first.** These parameters show the strongest and most consistent correlation with Overall Satisfaction.
- **Treat wayfinding and check-in findability as a low-cost, high-return improvement.** These correlate more strongly with satisfaction than most commercial or amenity investments.
- **Use consistency, not just average score, as a KPI for regional airports.** AAI should track variability alongside the average ASQ rating.
- **Reallocate marginal spend away from near-ceiling amenity parameters.** Continued investment here should be sized to maintain the current baseline.

As with any correlational analysis, these findings describe association rather than proven causation, and are based on a single quarter's cross-section of 16 airports. Future work extending this analysis across multiple quarters, and disaggregating by international versus domestic traffic, would help confirm whether these relationships hold over time.

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