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Evaluation of Domestic Airport Service Quality in Nepal

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Abstract

This study aims to assess the service quality of domestic airports in Nepal by focusing on passenger expectations and experiences. The Airport Service Quality (ASQ) dimensions developed by the Airports Council International (ACI) were used to analyse perceived service quality. Through confirmatory factor analysis, 15 key determinants of passenger satisfaction were identified under six ASQ dimensions. The study also examines the relationship between these service quality dimensions and overall passenger satisfaction, while identifying superior and inferior services at each airport. The findings are intended to assist policy-makers and airport managers improve the quality of airport services by understanding the needs and expectations of airport users.

Keywords: domestic airports; Airport Service Quality; passenger satisfaction; ASQ dimensions; confirmatory factor analysis

1. Introduction

Air transport is a vital mode of transportation for the rapid and safe transport of goods and people. In Nepal, the mountainous terrain, isolated settlements, poor road connectivity, and frequent blockages, favour air transport. The recent surge in domestic air passenger traffic in Nepal presents a critical challenge to the country's aviation industry. From 2007 to 2020, the volume of domestic passengers at Tribhuvan International Airport (TIA) tripled in just 11 years (CAAN, 2020). However, this rapid growth has outpaced the expansion of aviation infrastructure, leading to capacity constraints and frequent delays during peak hours. Notably, TIA has been criticised for its poor service quality, ranking as the second-worst airport in Asia (The Daily Star, 2018). The condition of domestic airports is even more concerning, as they many operate with only minimum infrastructure and facilities.

In response to these challenges, the Civil Aviation Authority of Nepal (CAAN) has committed to investing Rs. 335 billion over the next five years to improve the country's airport infrastructure (The Himalayan Times, 2020). In addition to the Pokhara Regional International Airport (PRIA) and Gautam Buddha International Airport (GBIA), CAAN has proposed upgrading Terai airports (Biratnagar, Nepalgunj, Dhangadhi, and Mahendranagar) into regional hubs. Similarly, hilly and mountainous airports are set to be upgraded to accommodate 40-seater aircraft (Himalayan News Service, 2020). Despite these efforts, the quality of airport service has been largely overlooked. Poor service delivery has resulted in the underutilisation of existing airports, causing significant financial losses. As of 2020, 19 airports in Nepal are non-operational, and three-quarters of the operational ones operate at a loss (CAAN, 2020).

Although the financial struggles and service challenges of Nepal's airports have been widely discussed, there has been limited research on the factors linked to this underperformance. Prior studies have primarily focused on service quality at TIA (Phuyal & Joshi, 2018), specific airlines such as Himalayan Airlines (Jamkatel, 2018), and domestic airline services in general (Devkota et al., 2020), leaving a gap in research specifically addressing service quality across domestic airports in Nepal.

ASQ has become a key global indicator of airport performance (Bezerra & Gomes, 2016). The quality of service perceived by passengers directly influences airport demand. Passenger satisfaction can be achieved by providing optimal services that meet customer expectations while avoiding attributes that are not valued by passengers. Understanding customer feedback and accurately assessing customer expectations can help improve service delivery at every stage of customer interactions.

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This study evaluates the service quality and passenger satisfaction at Nepalese domestic airports. By identifying the deficiencies and strengths in service provision, the findings will help guide improvements in the country's aviation sector, support sustainable growth, and enhance the experience for both new and returning passengers.

2. Theoretical Background

With the ever-increasing passenger volume in the air transport sector, there is high competition among airports and airline service providers. Consequently, passengers demand higher air service levels. Passengers are the end users of an airport, and the type of traveller, trip purpose, and circumstances determine their expectations from the airport (Fodness & Murray, 2007). Airport customers are diverse and include passengers, airlines, employees, concessionaires, tenants, and others. This study focuses on passengers–as users of airport facilities and services. Passenger behaviour and expectations of airport experience depend on the type of traveller, the purpose of the trip, and the circumstances. Thus, airport authorities need to assess customer expectations and perceptions of airport service quality at individual airports, as well as identify and prioritise service areas requiring managerial attention and action to ensure and improve service quality and customer satisfaction. ASQ is the key to increasing passenger satisfaction and improving business performance.

In their study on passengers' expectations regarding airport service quality, (Fodness & Murray, 2007) employed in-depth interviews, and focus groups, and analysed comments from the airport's website. These qualitative methods led to the identification of 65 themes related to airport service quality. The conceptual framework they developed includes three main dimensions: servicescape, interaction, and service. The study concluded that passengers' expectations of airport service quality are a complex, hierarchical construct encompassing three essential dimensions: servicescape (which includes spatial layout and functionality, ambient conditions, signs, and symbols), service personnel, and services.

A global index was introduced by (Correia et al., 2008) to assess the service level of various operational components at the airport. The evaluation of the overall LOS included factors such as curbside, ticket counter, baggage deposit, security screening, departure lounge, circulation areas, concessions, walking distance, orientation, and total time. Passengers' views of the Incheon International Airport airline were explored by (Han et al., 2012), focusing on the significance of service quality attributes like image and accessibility, atmosphere, food and beverage services, and facility dimensions. Atmosphere and food and beverage services were the strongest predictors of overall satisfaction.

Similarly, (Bogicevic et al., 2013) highlighted that key airport service elements include staff, baggage, shopping cleanliness, and dining options. Additionally, they noted that security checks, signage, adequate seating, Wi-Fi, check-in time, and Internet kiosks are other important considerations. Likewise, (Chonsalasin et al., 2021) developed a model for measuring Thai domestic airport quality using confirmatory factor analysis (CFA) to identify passenger expectations. The model was developed using the ACI service quality dimensions.

Few studies have been conducted on service factors concerning Nepalese airports and airlines. (Phuyal & Joshi, 2018) examined the significance of service quality at TIA, applying Service Quality (SERVQUAL), consisting of five key factors (airport access, airport service and facilities, airport restaurants, and airport dining) as variables. The findings found that many travellers were dissatisfied with various aspects of their experience. The issues highlighted were luggage security, long waiting times at the airport, unwelcoming staff, slow handling of lost luggage, and insufficient visa information. These were identified as the main services that international travelers expected the airport to offer.

Similarly, (Jamkatel, 2018) studied customer satisfaction with Himalaya Airlines, inspecting the factors that influence it. The study considered ticket prices, airport services, employee conduct, flight dependability, and in-flight services as independent variables. It concluded that customer satisfaction levels were high, but recommended placing more emphasis on ticket pricing. The impact of service quality was studied by (Devkota et al., 2020) on customer satisfaction with domestic airlines in Nepal. This research identified a strong connection between customer satisfaction and factors- tangibility, reliability, responsiveness, empathy, and assurance. Security and punctual flights emerged as the primary factors affecting airline choice.

As highlighted above, various studies on passenger satisfaction have been conducted internationally and on airlines at the domestic level to determine influential service quality attributes. However, the cause, factors underperforming, and strongholds of Nepalese domestic airports have not yet been determined. The study of passenger satisfaction with domestic airports helps to better understand airport service-deficient sectors and strengthens them for sustainable passenger growth to attract new and repeat passengers. This study aims to determine the influential service aspects of domestic passengers and measure the service quality of Nepalese domestic airports by assessing overall passenger satisfaction.

ACI manages a quarterly survey on airport service quality by handing out self-completed questionnaires to passengers. This survey program provides research tools and management information to assist airports in better understanding customers' desires for their products and services. Conducted every quarter, the survey assesses passenger satisfaction based on the airport service evaluation. Each partaking airport is compared and ranked, serving as a renowned benchmarking means worldwide.

The ACI service quality is comprised of eight categories: access, check-in, passport control, security, navigation, facilities, environment, and arrival services. These groups encompass 33 questions about airport services and facilities as shown in Table 1. While the 33 parameters recognised by ACI cover all aspects of international airport services, they may not be relevant to domestic airports. Variables like PC1, PC2, AS2, AS3, AF9, AF10, AF11, and WA4 were omitted because of their absence from all domestic airports.

Table 1 Airport service quality metrics by ACI

Access		Check-in	
AC1	Ground transportation to/from the airport	CI1	Waiting time in check-in queue/line
AC2	Parking facilities	CI2	Efficiency of check-in staff
AC3	Value for money of parking facilities	CI3	Courtesy, helpfulness of check-in staff
AC4	Availability of baggage carts/trolleys	Security	
Passport / personal ID control		SE1	Courtesy and helpfulness of Security staff
PC1	Waiting time at passport/personal ID inspection	SE2	Thoroughness of security inspection
PC2	Courtesy and helpfulness of inspection staff	SE3	Waiting time at security inspection
Finding your way		SE4	Feeling of being safe and secure
WA1	Ease of finding your way through the airport	Airport facilities	
WA2	Flight information screens	AF1	Courtesy, helpfulness of airport staff
WA3	Walking distance inside the terminal	AF2	Restaurant/Eating facilities
WA4	Ease of making connections with other flights	AF3	Value for money of restaurant/eating facilities
Airport environment		AF4	Availability of bank/ATM facilities/money changers
AE1	Cleanliness of airport terminal	AF5	Internet access/Wi-fi
AE2	Ambience of the airport	AF6	Availability of washrooms/toilets
Arrivals services		AF7	Cleanliness of washrooms/toilets
AS1	Speed of baggage delivery service	AF8	Comfort of waiting/gate areas
AS2	Arrivals passport and visa inspection	AF9	Shopping facilities
AS3	Customs inspection	AF10	Value for money of shopping facilities
Overall satisfaction		AF11	Business/Executive lounges
	Overall satisfaction with the airport		

3. Methodology

3.1 Study Area

This study focuses on Nepal's domestic airports. Of the 54 airports in the country, 19 are currently nonoperational, leaving only 35 airports in a functional state. Among these, 10 airports—including Ramechhap, Chaurjahari, Lamidanda, Sanfebagar, Thamkharka, Doti, Baitadi, Bajhang, Manmaya Khotang, and Dang—do not offer any scheduled flights, while Rajbiraj Airport has recently resumed operations. As a result, only 24 airports are actively operating in Nepal (CAAN, 2020). Many non-scheduled airports are located in the hilly and Himalayan regions; some operate only during the summer, while others handle a limited number of charter flights. (ICAO, 1991) classifies airports with short-field runways and limited by space, restricted terrain, or both as stolports. Thus, the stolports and airports that were out of operation were omitted from the study. The analysis focuses on remaining 12 key airports including TIA domestic, PKR (Pokhara), BHW (Bhairahawa), BIR (Biratnagar), KEP (Nepalgunj), BHR (Bharatpur), BDP (Bhadrapur), DHI (Dhangadhi), SIF (Simara), JNK (Janakpur), SKH (Surkhet), and TUM (Tumlingtar).

3.3 Data Collection

From the 12 selected airports, 405 valid surveys (exceeding the initial target of 384) were collected. Convenience sampling was used, and passengers with at least one prior flight to their respective airports completed the questionnaire. The surveys were conducted in the pre-departure waiting areas. Moreover, the added benefit of the survey at waiting lounges was that the respondents already had the opportunity to experience airport services and processes. Since the survey was administered by the interviewer after confirming the participants' eligibility and interest, a 100% response rate was achieved.

The survey consisted of two sections. The first section contained passenger socio-demographic and flight characteristics, such as age, gender, education, airline, destination airport, purpose of trip, and trip frequency. The second section presented questions regarding airport service quality.

Adapted from the ACI survey format, the questionnaire survey consisted of the eight subjects stated above. Because of their absence from all domestic airports, variables such as passport ID checks, shopping facilities and their value, executive lounges, ease of connectivity for flights, arrival visa inspection, and customs inspection were omitted. After omitting the unfit variables from the ACI survey list, 25 variables related to airport service quality were identified and used for the survey.

The survey was conducted from January 20 to 29, 2023. The fieldwork covered the operating hours of the study airports to maximise the heterogeneity of departing passengers and replicate the true distribution of departing commuters. Passengers were asked to indicate their perceptions based on their experiences using individual airport services and facilities during the past 12 months. Passengers rated their satisfaction on a five-point Likert scale (1 = strongly dissatisfied to 5 = strongly satisfied), based on their past airport experiences. Passengers were required to complete a three–page survey questionnaire. The survey took approximately 10 minutes for each user and was completely anonymous and voluntary.

3.4 Data Analysis

The purpose of this quantitative study is to design, implement, and test an objective approach for measuring passenger expectations of airport service quality. The data was analysed in three steps: In step 1, CFA was conducted employing maximum likelihood (ML) estimation, a statistical method used to estimate the parameters of a model by maximising the likelihood function, for parameter estimation through SPSS AMOS v23 to establish the validity and reliability of the constructs and observed variables indicating airport services. In step 2, the second-order CFA tested the relationship between the first-order and higher-order constructs of overall passenger satisfaction. In step 3, the identified significant observable variables and constructs are used to compute the overall passenger satisfaction for each airport. The computed overall satisfaction results were then compared to rank service quality performance.

4. RESULT

The dataset was screened for poor quality and missing data. Invalid responses were checked. To test for answers that might lie outside the acceptable range, the minimum and maximum values were checked using SPSS. Descriptive data of the surveyed participants showed that the majority of respondents 70.4% (n=285) were male. Likewise, 156 (38.5%) travellers were between the age of 26-34. Similarly, 34.1% (n=138) reported flying more than 5 times in a year. Motorcycles were the most common mode of access 31.9% (n=129). 43.5% (n=176) arrived 30-45 minutes before departure. Buddha Air was the preferred airline (69.1%, n = 280).

4.1 Evaluation of Significant ASQ Dimensions - First-Order CFA

The first-order CFA comprised exogenous latent variables in six domains: access (AC), check-in/arrival (CI), security (SE), way-finding (WF), facilities (AF), and environment (AE), in conjunction with the observed variables given by the questionnaire.

The initial model showed poor fit indices: ($x2/df = 4.452$, RMR = 0.116, GFI = 0.812, AGFI = 0.765, PGFI = 0.649, TLI = 0.753, CFI = 0.786, and RMSEA = 0.92). GFI, AGFI, TLI, and CFI were < 0.9, whereas RMSEA and RMR were >0.08. In addition, multiple observed variables (e.g. WA2-->WF = 0.189, AC4-->AC = 0.371, AF4-->AF = 0.383, AF5-->AF = 0.384, etc.) fell below the 0.5 threshold factor loadings, which indicated weak construct representation as shown in Table 2. Likewise, the discrepancy between the variables was very high, such as e21-->e22 = 119.569, e17-->e18 = 55.537, e6-->e23 = 22.281, and e1-->e13 = 32.737.

Table 2 Standardised Regression Weights of Initial First-Order CFA

Observed Variable		Latent Factor	Estimate	Observed Variable		Latent Factor	Estimate
AC4	<---	AC	0.371	WA1	<---	WF	0.861
AC3	<---	AC	0.571	CI1	<---	CI	0.763
AC2	<---	AC	0.712	AF8	<---	AF	0.706
AC1	<---	AC	0.553	AF7	<---	AF	0.698

Observed Variable		Latent Factor	Estimate	Observed Variable		Latent Factor	Estimate
CI4	<---	CI	0.467	AF6	<---	AF	0.698
CI3	<---	CI	0.82	AF5	<---	AF	0.384
CI2	<---	CI	0.864	AF4	<---	AF	0.383
SE4	<---	SE	0.665	AF3	<---	AF	0.418
SE3	<---	SE	0.761	AF2	<---	AF	0.424
SE2	<---	SE	0.696	AF1	<---	AF	0.44
SE1	<---	SE	0.805	AE2	<---	AE	0.795
WA3	<---	WF	0.696	AE1	<---	AE	0.794
WA2	<---	WF	0.189				

The initial model with all variables failed to achieve good overall fitness. Thus, modifications were made by removing the observed variables (AC3, AC4, CI4, WF2, AF1, AF2, AF3, AF4, and AF5) with low standardised estimates (<0.5). Similarly, the covariance of error terms based on modification indices was created between the covariance of the observed variables (MI > 15). An examination of the modification indices revealed a few changes in the model. By treating the covariance between the listed variables, such as (e6 – e15, e8 – e10, and e9 – e10), the discrepancy was reduced significantly, thus improving the model fit. The model was retested, and the final model was found to have good fitness. Figure 1 shows a graphical representation of the CFA, the final calculated model and the results presented in the tables below.

For access (AC), the standardised regression weights were 0.71 for AC1 and 0.52 for AC2. The squared loadings were 0.51 and 0.27, respectively. The standardised regression weights and squared loadings for other exogenous latent variables are shown in Figure 1. Covariance ranged from 0.08 - 0.92.

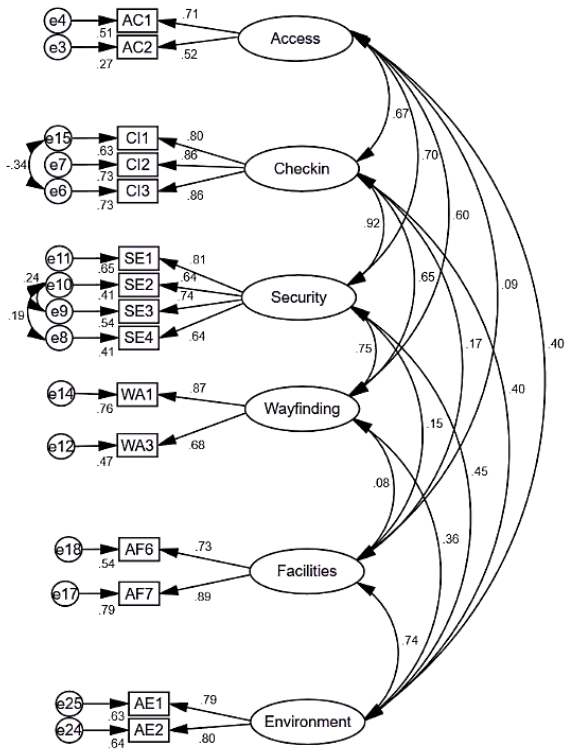

Figure 1 Graphical Representation of the Final First-Order CFA Model

Construct reliability was evaluated using Cronbach's alpha and composite reliability. The Cronbach alpha for each construct, as shown in Table 3, was found to be over the required limit of 0.70 (Hair et al., 2010) except for AC, which was 0.625. Similarly, the composite reliability (CR) ranged from 0.634 to 0.875. All constructs had values above 0.7 (Fornell & Larcker, 1981), except for AC. The convergent validity of scale items was assessed using the average variance extracted (AVE) (Fornell & Larcker, 1981). The average variance-extracted values were above the threshold of 0.50 (Henseler et al., 2015). The convergent validity of the construct is still acceptable if the AVE exceeds 0.4 and the composite reliability exceeds 0.6 (Fornell & Larcker, 1981). Therefore, the scales used in this study had the required construct reliability and convergent validity.

Discriminant validity was assessed using the Fornell & Larcker (1981) criterion. The square root of the AVE for each construct, as displayed in the diagonals, exceeded the inter-construct correlations, as shown in Table 4. The diagonal values were 0.697, 0.837, 0.711, 0.784, 0.814, and 0.795. The correlation coefficients between AC and the other factors (CI, SE, WA, AF, and AE) were 0.669, 0.601, 0.603, 0.088, and 0.398, respectively. The correlations between the other variables are shown in Table 4. Another test for discriminant validity was to determine whether the MSV was less than the AVE. Because all values of AVE are greater than MSV, discriminant validity was established.

Table 3: Reliability and Convergent Validity of First-Order CFA

Variables/ Constructs	Items	Standardised Factor Loadings	Cronbach Alpha	CR	AVE	MSV
AC	AC1	0.712	0.625	0.634	0.486	0.491
	AC2	0.516				
	AC3	Removed				
	AC4	Removed				
CI	CI1	0.796	0.853	0.875	0.857	0.853
	CI2	0.856				
	CI3	0.856				
	CI4	Removed				
SE	SE1	0.807	0.826	0.802	0.762	0.853
	SE2	0.644				
	SE3	0.737				
	SE4	0.642				
WA	WA1	0.873	0.748	0.759	0.615	0.556
	WA2	Removed				
	WA3	0.684				
AF	AF1	Removed	0.786	0.796	0.663	0.549
	AF2	Removed				
	AF3	Removed				
	AF4	Removed				
	AF5	Removed				
	AF6	0.734				
	AF7	0.887				
	AF8	Removed				
AE	AE1	0.791	0.774	0.774	0.631	0.549
	AE2	0.798				

CR = Composite Reliability, AVE = Average Variance Extracted, MSV = Maximum Shared Variance

Table 4 Discriminant Validity Table for First-Order CFA

	AC	CI	SE	WF	AF	AE
AC	**0.697**					
CI	0.669***	**0.837**				
SE	0.601***	0.824***	**0.711**			
WA	0.603***	0.651***	0.706***	**0.784**		
AF	0.088	0.168**	0.154*	0.079	**0.814**	
AE	0.398***	0.401***	0.453***	0.356***	0.741***	**0.795**

The six-factor CFA model (AC, CI, SE, WA, AF, and AE) results showed that the revised model had good fit statistics, as detailed in Table 5, including a chi-square (x2) of 143.612 and a degree of freedom of 72 at a probability level of 0.000.

To test the absolute fit of the model, RMSEA, GFI, AGFI, and CMIN/df were checked. The Root Mean Square Error of Approximation (RMSEA) was 0.05, a value less than 0.08 (Hu & Bentler, 1998) Further, the Goodness of Fit Index (GFI) was 0.954, a value above 0.9; the Adjusted Goodness of Fit Index (AGFI) was 0.924, a value above 0.9; and the Chi-square X2/df was 1.995, thus emphasising the "Absolute Fit" of the model.

Additionally, the relative fit indices interpreted using the Normed Fit Index (NFI), Relative Fit Index (RFI), Incremental Fit Index (IFI), Tucker Lewis Index (TLI), and Comparative Fit Index (CFI) were 0.951, 0.928, 0.975, 0.963, and 0.974, respectively. As all values were above 0.9, the model was deemed a good fit (Bentler, 1990).

The Parsimonious Normed Fit Index (PNFI), Parsimonious Comparative Fit Index (PCFI), Parsimonious Goodness of Fit Index (PGFI), and PCLOSE, which constitute the parsimonious fit, had results of 0.652, 0.668, 0.573, and 0.504, respectively. As all values exceeded 0.5, the model had a good fit.

Furthermore, the SRMR was 0.047 and RMR was 0.046, values less than 0.08 (Hu & Bentler, 1998). Thus, the model test statistics showed that the first-order model had a good fit.

The interrelationship between the observed and latent variables was assessed using goodness-of-fit indices and reliability. Out of the 25 selected observed variables, only 15 were significant under the six latent constructs. The significant factors determined were "ground transportation to and from the airport" (AC1) and "parking facilities" (AC2) under access (AC), "waiting time in check-in line" (CI1), "efficiency of check-in staff" (CI2), and "courtesy of check-in staff" (CI3) under check-in/arrival services (CI), all security services - "courtesy of security staff" (SE1), "thoroughness of security inspection" (SE2), "waiting time at security inspection" (SE3), and "feeling of being safe" (SE4), "ease of finding a way through the airport" (WA1) and "walking distance inside the terminal" (WA3) under way-finding service quality, "availability of washrooms" (AF6) and "cleanliness of washrooms" (AF7) under airport facilities (AF) and, "cleanliness of airport" (AE1) and "ambience of airport" (AE2) under environment service.

Table 5 Model Fit Statistics Result for First-Order CFA

Statistic Measurement	Test Indices	Test Standard	Result	Model Fit Verification
Absolute Fit Increment	RMSEA	<=0.08	0.05	Good Fit
	GFI	>=0.9	0.954	Good Fit
	AGFI	>=0.9	0.924	Good Fit
	CMIN/df	3-5	1.995	Good Fit
Incremental Fit Increment	NFI	>=0.9	0.951	Good Fit
	RFI	>=0.9	0.928	Good Fit
	IFI	>=0.9	0.975	Good Fit
	TLI	>=0.9	0.963	Good Fit
	CFI	>=0.9	0.974	Good Fit
Parsimonious Fit Measurement	PNFI	>=0.5	0.652	Good Fit
	PCFI	>=0.5	0.668	Good Fit
	PGFI	>=0.5	0.573	Good Fit
	PCLOSE	>=0.5	0.504	Good Fit
Other	SRMR	<=.08	0.047	Good Fit
	RMR	<=.08	0.046	Good Fit

4.2 Effect of ASQ Dimensions on Overall Satisfaction: Second-Order CFA

The second-order CFA comprised endogenous latent variables, which refer to the overall service quality expectations in conjunction with the exogenous latent variables in the six service quality dimensions. The effect of airport service quality dimensions on overall passenger satisfaction was validated by second-order CFA as shown in Figure 2.

The second-order CFA model results in Table 6 showed that the model had good fit statistics, including a chi-square (x2) of 303.752 and degrees of freedom of 81 at a probability level of 0.000. The Root Mean Square Error of Approximation (RMSEA) was 0.083, the Goodness of Fit Index (GFI) was 0.917, the Adjusted Goodness of Fit Index (AGFI) was 0.878, and the Chi-square X2/df was 3.75, a value less than 5 (Wheaton, 1987). NFI, RFI, IFI, TLI, and CFI values were 0.895, 0.865, 0.921, 0.897, and 0.920, respectively. PNFI, PCFI, and PGFI had results of 0.671, 0.71, and 0.619, respectively. As most of the indices were well within the range and a few had a close fit, it can be said that the model was a good fit and hence accepted.

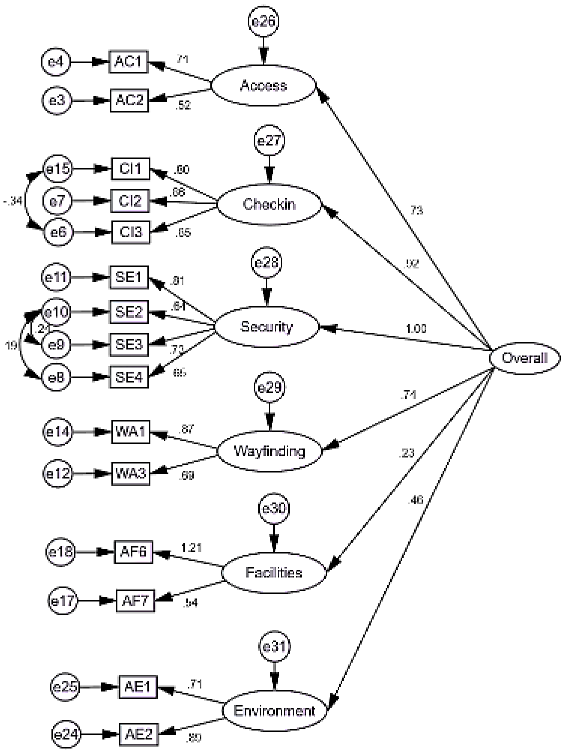

Figure 2 Effect of ASQ Dimensions on Overall Passenger Satisfaction

Table 6 Model Fit Statistics Result for Second-Order CFA

Statistic Measurement	Test Indices	Test Standard	Result	Model Fit Verification
Absolute Fit Increment	RMSEA	<=0.08	0.083	Close Fit
	GFI	>=0.9	0.917	Good Fit
	AGFI	>=0.9	0.878	Close Fit
	CMIN/df	<2, 3-5	3.75	Good Fit
Incremental Fit Increment	NFI	>=0.9	0.895	Close Fit
	RFI	>=0.9	0.865	Close Fit
	IFI	>=0.9	0.921	Good Fit
	TLI	>=0.9	0.897	Close Fit
	CFI	>=0.9	0.92	Good Fit
Parsimonious Fit Measurement	PNFI	>=0.5	0.671	Good Fit
	PCFI	>=0.5	0.71	Good Fit
	PGFI	>=0.5	0.619	Good Fit
Other	SRMR	<=.08	0.0826	Close Fit
	RMR	<=.08	0.087	Close Fit

The regression weights of the ASQ dimensions on passenger satisfaction were analysed, and the results are listed in Table 7. The regression weights and P values for the relationship between ASQ dimensions and overall passenger satisfaction indicated that access, check-in, security, and way-finding had a significant effect on overall passenger satisfaction. However, airport facilities and environment were significant but represented low overall passenger satisfaction. The standardised regression weight shows that when overall satisfaction increases by one standard deviation, access increases by 0.732, and vice versa. Similarly, this increases every construct.

The findings suggest that all exogenous variables, including access, check-in, security, wayfinding, facilities, and environment, significantly impact passengers' overall satisfaction levels and collectively shape their perceptions of airport quality. In addition, the importance of each domain for improving efficiency can be determined by considering the weights of the elements obtained. For instance, based on the standard component weight of the second-order CFA, security (0.998) emerged as the most crucial factor, indicating the need for airport policymakers to prioritise its enhancement. Specifically, within the security domain, emphasis should be placed on areas such as the "courtesy and helpfulness of security staff" (0.81), as this variable holds high importance to passengers as per first-order CFA, aligning with previous research findings by (Chonsalasin et al., 2021) in Thailand.

Table 7 Regression Weights: ASQ - Satisfaction Model

Effect on the ASQ variable			Standardised Regression Weights	P	Label
Satisfaction	<---	Access	0.732	***	
Satisfaction	<---	Check-in	0.918	***	
Satisfaction	<---	Security	0.998	***	
Satisfaction	<---	Wayfinding	0.739	***	
Satisfaction	<---	Airport Facilities	0.226	0.025	
Satisfaction	<---	Airport Environment	0.463	***	

In summary, these results confirmed the appropriateness of the proposed model. This result has managerial implications for airport operators, as passengers are satisfied mainly by airport-specific factors, and any improvement in airport access, check-in, security, and way-finding service parameters would result in a positive effect on both the ASQ and the overall satisfaction of airline passengers.

4.3 Assessing Overall Passenger Satisfaction and Airport Service Quality

It was established from the above analysis that, of the total observed variables, only 15 represented the six-airport service-quality dimensions. Using these selected observable variables, the questionnaire survey data was utilised to calculate the score for each dimension. Each dimension score was derived by averaging the values of the observable variables under its respective constructs. Subsequently, the overall satisfaction score for each airport was calculated by averaging its dimension scores. Based on these overall satisfaction scores, the airports were ranked accordingly. Additionally, the survey findings aided the identification of superior and inferior airport services for each airport.

Table 8 shows that Janakpur Airport ranked the highest. This ranking can be attributed to the inauguration of its state-of-the-art new terminal building in 2021. Similarly, Tumlingtar Airport and Surkhet Airport ranked second and third, respectively. This improvement is attributed to the entry of additional airlines and the operation of larger aircraft, such as ATR 72. Comparatively, these two airports have the lowest passenger volumes. Moreover, the introduction of larger aircraft has resulted in reduced airfares and improved terminal mobility for passengers. In contrast, the TIA ranked at the bottom. As Nepal's primary international airport, TIA faces significant challenges due to high passenger traffic and limited facilities. Biratnagar and Bhairahawa airports were ranked 11^{th} and 10^{th} respectively. Regional hubs, including TIA and other large airports, received low satisfaction scores primarily because passengers have high expectations of these airports. Generally, high passenger demand during peak hours and limited terminal space contribute to perceived dissatisfaction among travellers.

The rankings of other airports were as follows: Bharatpur and Pokhara tied for fourth, Simara ranked sixth, Nepalgunj seventh, Dhangadhi eighth, and Bhadrapur ninth. Despite Pokhara featuring a state-of-the-art terminal, it ranked fourth. This can be attributed to the timing of the survey, which was conducted from January 19 to 29- shortly after the new airport commenced operations on Jan 1. Due to limited passenger participation at the new facility during this period, data were collected based on passengers' experience at previous airport.

The overall satisfaction scores of the top airports - JNK, TUM, and SKH - were found to be similar. However, the service quality gap between other airports beyond the top three was relatively narrow, with scores ranging from 3.01 to 3.39. This suggests that even small improvements in service delivery at any airport could significantly impact its ranking.

Table 8 Airports Rank Concerning Service Quality

	TIA	PKR	BHW	BIR	KEP	BHR	BDP	DHI	SIF	JNK	SKH	TUM
Access	2.97	3.35	3.57	3.11	3.33	3.35	3.27	3.18	3.33	3.38	2.89	3.47
Check-in	3.01	3.67	3.34	3.2	3.2	3.79	3.45	3.35	3.84	3.8	3.84	4.05
Security	3.16	3.3	3.36	3.32	3.41	3.57	3.26	3.31	3.52	3.74	3.73	3.69
Wayfinding	3.23	3.63	3.81	3.6	3.64	3.94	3.78	3.75	4.18	4.23	3.82	4.38
Facilities	2.71	3.14	2.2	2.77	2.87	2.53	2.55	3	2.33	2.95	3.35	2.53
Environment	2.99	3.26	2.74	2.92	3.27	3.18	3.03	2.94	2.97	3.31	3.45	3.07
Overall Satisfaction	3.01	3.39	3.17	3.15	3.29	3.39	3.22	3.26	3.36	3.57	3.51	3.53
Rank	**12**	**4**	**10**	**11**	**7**	**4**	**9**	**8**	**6**	**1**	**3**	**2**

The ranking showed that, except for Pokhara airport, passengers perceived low service quality at the larger airports. When comparing the service quality dimensions, check-in, security, wayfinding, and access had better scores, whereas environment and facilities had lower scores. This indicates that passengers perceive low satisfaction with airport facilities and the environment. Airports should improve their services associated with facilities and the environment. Proper availability and an increase in the cleanliness of washrooms/toilets can improve the quality of a facility's service, whereas increasing the cleanliness of the airport terminal and surrounding environment can improve the environment.

The service parameter ranks of each airport studied are detailed in Table 9 which shows every service parameter, highlighting the superior and inferior sectors of airports. The parameter scores represent the satisfaction level of the passengers with the service. The higher the scores of the services, the higher the level of satisfaction, which means that the services were on par with passenger expectations. Conversely, a lower score indicated a low perception of the service and the need for improvement. Table 10 lists the superior and inferior services provided by each airport.

From the table below, it can be summarised that the superior service parameters were ease of finding your way through the airport (WA1), efficiency of check-in staff (CI2), walking distance inside the terminal (WA3), feeling of being safe and secure (SE4), and courtesy of check-in staff (CI3). Similarly, the most inferior service parameters were cleanliness of washrooms/toilets (AF7), availability of washrooms (AF6), and parking facilities (AC2). Thus, it is recommended that airport authorities spend more resources on the cleanliness of washrooms instead of working on improving wayfinding and check-in/arrival parameters. Cleanliness and availability of washrooms were commonly inferior services to all airports. This service improvement alone can improve passenger perceptions of airport quality.

Table 9 Parameter-wise Result for Customer Satisfaction Survey

		TIA	**PKR**	**BHW**	**BIR**	**KEP**	**BHR**	**BDP**	**DHI**	**SIF**	**JNK**	**SKH**	**TUM**
1	Ground transportation to/from airport	2.98	3.42	3.9	3.15	3.43	3.38	3.29	3.33	3.71	3.65	3.37	3.37
2	Parking facilities	2.95	3.27	3.23	3.07	3.22	3.32	3.24	3.03	2.94	3.1	2.4	3.57
3	Waiting time in check-in queue/line	2.81	3.64	3.19	3.05	2.97	3.59	3.12	3.27	3.74	3.84	3.73	4
4	Efficiency of check-in staff	3.14	3.73	3.42	3.27	3.32	3.68	3.65	3.3	3.87	3.71	3.9	4.17
5	Courtesy and helpfulness of check-in staff	3.09	3.64	3.42	3.27	3.32	4.09	3.59	3.47	3.9	3.84	3.9	3.97
6	Courtesy and helpfulness of security staff	2.86	3.33	3.52	3.34	3.43	3.65	3.29	3.27	3.68	3.74	3.83	3.9
7	Thoroughness of security inspection	3.28	3.15	3.35	3.34	3.3	3.26	3.21	3.33	3.35	3.71	3.6	3

		TIA	PKR	BHW	BIR	KEP	BHR	BDP	DHI	SIF	JNK	SKH	TUM
8	Waiting time at security inspection	3.02	3.15	3.03	3.02	3.32	3.62	3.03	3.4	3.45	3.81	3.7	3.93
9	Feeling of being safe and secure	3.49	3.55	3.52	3.56	3.59	3.76	3.5	3.23	3.58	3.68	3.8	3.93
10	Ease of finding your way through airport	3.3	3.7	3.94	3.71	3.59	4.09	3.94	3.83	4.48	4.42	4.03	4.63
11	Walking distance inside the terminal	3.16	3.55	3.68	3.49	3.68	3.79	3.62	3.67	3.87	4.03	3.6	4.13
12	Availability of washrooms/toilets	2.81	3.24	2.65	2.95	3.22	2.82	2.88	3.17	2.68	3.16	3.6	2.83
13	Cleanliness of washrooms/toilets	2.6	3.03	1.74	2.59	2.51	2.24	2.21	2.83	1.97	2.74	3.1	2.23
14	Cleanliness of airport terminal	3.05	3.3	2.77	3.05	3.32	3.26	3.15	2.97	2.81	3.19	3.57	3.3
15	Ambience of the airport	2.93	3.21	2.71	2.78	3.22	3.09	2.91	2.9	3.13	3.42	3.33	2.83
16	Overall Satisfaction	3.01	3.39	3.17	3.15	3.29	3.39	3.22	3.26	3.36	3.57	3.51	3.53
17	**Rank**	**12**	**4**	**10**	**11**	**7**	**4**	**9**	**8**	**6**	**1**	**3**	**2**

Table 10 Superior and Inferior Service Parameters of Airports

Airports	Superior Services	Inferior Services
TIA Domestic	Feeling of being safe and secure (3.49)	Cleanliness of washroom (2.6)
	Thoroughness of security staff (3.28)	Availability of washroom (2.81)
PKR	Efficiency of check-in staff (3.73)	Availability of washroom (3.03)
	Ease of finding your way (3.7)	Thoroughness of security staff (3.15)
BHW	Ease of finding your way (3.94)	Cleanliness of washroom (1.74)
	Ground transportation to/from (3.9)	Availability of washroom (2.65)
BIR	Ease of finding your way (3.71)	Cleanliness of washroom (2.59)
	Feeling of being safe and secure (3.56)	Ambience of the airport (2.78)
KEP	Walking distance inside terminal (3.68)	Cleanliness of washroom (2.51)
	Feeling of being safe and secure (3.59)	Waiting time in check-in (2.97)
BHR	Courtesy of check-in staff (4.09)	Cleanliness of washroom (2.24)
	Ease of finding your way (4.09)	Availability of washroom (2.82)
BDP	Ease of finding your way (3.94)	Cleanliness of washroom (2.21)
	Efficiency of check-in staff (3.65)	Availability of washroom (2.88)
DHI	Ease of finding your way (3.83)	Cleanliness of washroom (2.83)
	Walking distance inside terminal (3.67)	Ambience of the airport (2.9)
SIF	Ease of finding your way (4.48)	Cleanliness of washroom (1.97)
	Courtesy of check-in staff (3.9)	Availability of washroom (2.68)
JNK	Ease of finding your way (4.42)	Cleanliness of washroom (2.74)
	Walking distance inside terminal (4.03)	Parking facilities (3.1)
SKH	Ease of finding your way (4.03)	Parking facilities (2.4)
	Efficiency of check-in staff (3.9)	Cleanliness of washroom (3.1)
TUM	Ease of finding your way (4.63)	Cleanliness of washroom (2.23)
	Efficiency of check-in staff (4.17)	Availability of washroom (2.83)

5. Conclusion

The rising domestic air passenger travel in Nepal, stimulated by demographic improvements, challenges the aviation industry. This study evaluates airport service quality based on passenger expectations. This study aimed to identify the factors influencing the overall satisfaction of airport passengers across domestic airports in Nepal. CFA was used to assess the analogy between the six-service dimension structure of the proposed model and empirical data collected from surveying 405 domestic air passengers. This study assessed airport service quality dimensions, including access, check-in, security, wayfinding, facilities, and environment, using 25 observed variables specified by the ACI. Of these, only 15 variables contributed to airport service quality.

Based on the weight of the service quality dimensions, security emerged as the most crucial factor, indicating the need for airport policymakers to prioritise its enhancement. Janakpur Airport ranked the highest overall passenger satisfaction, while TIA ranked the lowest due to frequent congestion. This study highlights the immediate need for improvement in the cleanliness and availability of washrooms.

The limitations of this study are as follows.

- The questionnaire data collected solely reflect the viewpoints of domestic travellers at airports, neglecting insights from airport staff, personnel, and foreign travellers, which could provide valuable perspectives on airport dynamics and opportunities for improvement.
- While the sample size was sufficient for assessing significant aspects of the service quality of domestic airports, it was insufficient for ranking the services of each airport, highlighting the necessity of appropriate sample sizes to accurately evaluate service quality across different airports.

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