The Impact of Service Innovation on Airport Service Quality and Passenger Satisfaction

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ABSTRACT

This study aims to investigate the impact of service innovation on airport service quality and passenger satisfaction. Based on service quality theory and innovation diffusion theory, this study proposes a theoretical model to examine these relationships. Structural Equation Modeling (SEM) is used to test the values in the proposed model using data collected from 371 passengers who used services at Terminal 3 – Tan Son Nhat International Airport. The results demonstrate that service innovation strongly influences service quality and passenger satisfaction, and that airport service quality under the influence of service innovation positively impacts passenger satisfaction. Theoretical and practical implications based on the research findings are discussed, and future studies are proposed.

KEYWORDS: Services innovation, Airport services quality, Passenger satisfaction, Arrival, Environment, Security.

1. Introduction

Service quality has become a major area of concern for airports and stakeholders. It is one of the attributes that differentiates airports from others and contributes to building a competitive advantage (Pantouvakis & Renzi, 2016). The International Airports Council (ACI) has a well-established global benchmarking program, Airport Service Quality (ASQ). ASQ surveys passengers to evaluate airports across 34 areas related to eight service attributes (accessibility, check-in, gate control/personal identification, security, navigation, airport facilities, airport environment, and arrival services) and overall satisfaction levels (Bezerra & Gomes, 2015; Hong et al., 2020; Mainardes et al., 2021; Prentice & Kadan, 2019; Saut & Song, 2022).

The continuous expansion of the aviation industry to meet the growing travel and business needs of passengers requires the thoughtful development of appropriate airport service facilities (Pandey, 2016), aimed at handling total domestic and international passenger and flight volumes exceeding initial design capacity to increase capacity and enhance passenger satisfaction. Airports can benefit from innovative projects across many aspects, including design, construction, operations, and passenger experience. A common area of innovation in airports involves the use of information and communication technology (ICT) to facilitate interaction, providing passengers with efficient, fast, and high-quality services (Straker & Wrigley, 2018).

Several previous studies have focused on the importance of perceived airport service quality for passenger satisfaction (Hong et al., 2020; Bezerra & Gomes, 2015). Specifically, Bakır et al. (2022) examined the relationship between airport service attributes and passenger satisfaction using data collected by Skytrax from 50 major European airports. Antwi et al. (2021) measured the impact of airport self-service technology (SST) on SST satisfaction, airport satisfaction, and electronic word-of-mouth intention. However, research examining the impact of service innovation on airport service quality to enhance passenger satisfaction remains limited. Therefore, this study fills this gap by suggesting that service innovation can influence terminal service quality and passenger satisfaction during flights.

The objectives of this study are (1) to identify the constructs of terminal service quality and (2) to explore the role of service innovation. The results of this study will help explain the interactive, supportive relationship between service innovation, terminal service quality, and passenger satisfaction. They may also serve as a reliable reference for airport managers in their future planning and decision-making.

2. Literature reviews and hypothesis proposal

2.1. Integrated Theoretical Framework

The concept of Service-Dominant Logic (S-DL) is the application of both tangible and intangible resources to influence processes and create benefits for stakeholders by generating use value in interactions between providers and users (Vargo & Lusch, 2017). Organizations must possess Dynamic Capabilities (DC), defined as the ability to integrate, develop, and reconfigure internal and external capabilities to adapt to rapid changes in the business environment (Teece, 2007). Therefore, ensuring flexibility in deploying service, technical, and technological innovations is essential to meeting users' evolving needs. Based on the SDL approach, it is necessary to consider how these innovations spread within organizations. According to DOI theory, users evaluate innovations based on five attributes: relative advantage over existing options, compatibility with workflows and knowledge, complexity of implementation, ability to test before commitment, and the ability to observe results within the organization (Rogers, 2003). These attributes shape both the accessibility of new innovations and the speed of their adoption.

2.2. Service Quality - Airport Service Quality (ASQ)

Airport service quality is a multidimensional construct that has been examined through diverse theoretical and methodological frameworks over the past three decades. Initial research emphasized the accessibility of physical infrastructure, such as terminals and connecting routes, as primary determinants of passenger experience (Ashford, 1988; Omer & Khan, 1988). Over time, the research focus broadened to encompass service interactions and the overall terminal environment, indicating a transition from an infrastructure-centric to a passenger-centric approach.

Given the increasing competitive pressure among airports in attracting airlines and passengers, the need for systematic measurement of service quality has become urgent. Studies on specific contexts also reveal considerable diversity in factor structure. Bezerra and Gomes (2015) conducted exploratory and confirmatory factor analyses at Brazilian airports, initially identifying seven dimensions (including check-in, security, convenience, atmosphere, facilities, mobility, and price), then removing the price factor in subsequent model versions. Chonsalasin et al. (2021) expanded the measurement dimensions using a model that yielded ASQ factors: security, check-in, wayfinding, airport environment, access, arrival services, and airport facilities. Pandey (2016) applied a fuzzy multi-criteria decision-making method in Thailand and constructed a seven-dimensional scale from accessibility to on-site service. Jiang and Zhang (2016) clustered 30 Melbourne Airport indicators into three groups reflecting essential services, amenities, and specialized support. Nuraida and Danil (2019) applied the SERVQUAL model with five classic dimensions — tangibility, empathy, reliability, assurance, and responsiveness — to the Indonesian airport context, while Hong et al. (2020) organized airport service quality into three dimensions: interaction quality, outcome quality, and physical environment quality.

In general, although airport service quality measurement models share the common goal of quantifying the passenger experience, they differ significantly in their theoretical foundation, measurement scope, and generalizability. The Airports Council International (ACI) ASQ program is designed according to the logic of the passenger journey—from airport approach, check-in, security and passport control, navigation within the terminal, to service arrival—forming a linear chain linked to airport operations (ACI, 2007). The core strength of ASQ is its standardization: data is collected uniformly across hundreds of member airports, enabling real-time cross-country benchmarking. SERVQUAL (Parasuraman et al., 1991), in contrast, is based on the gap model in service marketing and measures service quality as the difference between expectations and actual perceptions across five dimensions: tangibility, reliability, responsiveness, assurance, and empathy. When adapted to the airport context, for example, by Nuraida and Danil (2019), this model encounters structural fit issues: dimensions such as "empathy" or "responsiveness" do not clearly distinguish between services provided by staff and automated physical systems—two entities that are increasingly difficult to separate in the modern airport environment. Furthermore, the SERVQUAL expectation-perception gap measurement mechanism has been criticized for its measurement stability (Cronin & Taylor, 1992), and its direct application without adaptation to airport-specific contexts undermines the scale's content validity. To overcome the limitations of SERVQUAL and ACI ASQ, a series of studies has developed measurement models from field data at specific airports, using exploratory and validation factor analyses. Fodness and Murray (2007) were a key breakthrough: instead of mapping dimensions from existing theories, they allowed the structure to emerge from the perceptions of nearly 1,000 passengers, identifying three factors—functional, interactive, and recreational—that reflect how passengers actually experience the airport, not how managers categorize services. George et al. (2013) further expanded this to 11 dimensions from 74 indicators, providing comprehensive coverage but also raising questions about the model's parsimony. Bezerra and Gomes (2015) demonstrate the most rigorous refinement effort: starting from seven dimensions via EFA, they remove the price factor after CFA, resulting in a six-dimensional model with a more solid measurement foundation. The second-order CFA is comprised of endogenous latent variables, which refer to the expectations of service quality in conjunction with the exogenous latent variables in the seven domains.

A comparison of the three approaches reveals a fundamental trade-off: ASQ optimizes comparability and applicability in management but sacrifices theoretical depth; SERVQUAL provides a strong theoretical foundation in consumer behavior but lacks industry specificity; and the aforementioned context-specific models achieve high accuracy in their original contexts but are limited in generalizability. (Usman et al., 2022) The current study proposes a model that is both rigorously theoretically sound and flexible enough for cross-context application, using second-order measurement frameworks with fully tested subdivisions. (Bezerra & Gomes, 2015)

2.3. Service Innovation (SI)

In the contemporary aviation sector, service innovation has progressed beyond simple technological adoption to become a strategic process of value restructuring. The Innovation Diffusion Theory (Rogers, 2003) posits that passenger adoption depends on factors such as relative advantage and compatibility. This analysis synthesizes findings from published literature and recent empirical studies in aviation service management. From the perspective of Shared Value Creation (Manohar et al., 2023), innovation is conceptualized as a co-creative process rather than a top-down organizational directive. The integration of passengers into the service delivery chain through self-service technologies (SSTs), such as biometric kiosks and electronic boarding passes, transforms them from passive recipients into active co-producers. This transformation enhances operational speed and transparency while fostering passenger autonomy and proactiveness (Antwi et al., 2021; Usman et al., 2023).

Service innovation serves as a catalyst across seven sub-aspects of Airport Service Quality (ASQ), which are organized into three primary functional groups: (1) Operational Efficiency (Check-in, Access, and Arrival Services): In this context, innovation operates by optimizing passenger resources. The integration of real-time traffic data and intelligent baggage retrieval systems reduces traveler uncertainty and ensures a seamless journey from curb to gate (Awuku et al., 2023); (2) Cognitive Management (Security and Wayfinding): Biometric screening and AI-driven security systems streamline control processes, rendering technology unobtrusive while enhancing perceived safety (Antwi et al., 2021). Additionally, interactive digital navigation tools and Augmented Reality (AR) maps address accessibility barriers and increase passenger confidence in complex terminal environments; and (3) Servicescape Re-engineering (Airport Environment and Facilities): Modern airports employ green technologies and intelligent design to align with current sustainability preferences (García-Avilés, 2020). Facilities such as automated retail and smart charging stations offer superior benefits compared to traditional infrastructure, directly contributing to increased passenger satisfaction through enhanced convenience (Coutelle–Brillet et al., 2014).

Additional, the effectiveness of digitalization initiatives is ultimately determined by their impact on passenger satisfaction, which is a multi-dimensional construct encompassing both cognitive and emotional responses to service performance (Bezerra & Gomes, 2015; Saut & Song, 2022). Although traditional quality indicators such as punctuality, clear signage, and efficient security remain essential (Chen & Chang, 2015; Fodness & Murray, 2007), innovation introduces additional psychological drivers. Bogicevic et al. (2017) observe that the use of self-service technology is positively associated with passenger confidence and hedonic enjoyment. Satisfaction is thus conceptualized as an evaluation of the trade-off between customer effort and value received (Manohar et al., 2024). In this study, Airport Service Quality (ASQ) is assessed from the passenger's perceptual perspective, recognizing that psychological responses to both tangible equipment and intangible processes serve as the primary metric for evaluating the effectiveness of innovation (Bezerra & Gomes, 2015; Park & Park, 2018).

2.4. Passenger satisfaction (PS)

Within contemporary airport management, passenger satisfaction serves not only as an operational objective but also as a critical indicator of competitive advantage and user loyalty. Pantouvakis and Renzi (2016) argue that airport service quality (ASQ) constitutes the primary performance metric. In the current context, however, satisfaction is conceptualized more broadly as a complex psychological response that includes both cognitive and affective dimensions of passengers' interactions with service touchpoints and airport innovation initiatives (Bezerra & Gomes, 2015; Saut & Song, 2022).

Recent research highlights that technology has transitioned from a supplementary element to a primary determinant of passenger satisfaction. Building on the argument presented by Bogicevic et al. (2017), Usman et al. (2023) demonstrate that self-service technologies (SSTs) enhance cognitive control, reduce anxiety, and increase passenger enjoyment. In the post-pandemic era, touchless experiences and biometric-based processes have become standard criteria for assessing airport quality, contributing to passengers' perceptions of safety and respect (Halpern & Mwesiumo, 2021; Awuku et al., 2023).

Passenger satisfaction is strongly associated with a diverse service ecosystem. In addition to established factors such as punctuality, information transparency, and efficient security procedures (Chen et al. 2015; Fodness & Murray, 2007), recent research by Manohar et al. (2024) demonstrates that personalization enabled by digital data and the quality of the airport environment are critical in fostering positive emotional responses. Enhancing wayfinding signage and improving airport access both reduce physical effort and contribute to a more favorable pre-flight psychological state for passengers.

Passengers serve as primary evaluators of service quality, directly defining and assessing its dimensions. As Airport Service Quality (ASQ) is measured through subjective perceptions, passenger surveys represent the most effective method for capturing discrepancies between expectations and actual experiences. The present study builds upon and extends existing measurement models grounded in passenger perceptions, drawing on the frameworks of Bezerra and Gomes (2015) and Park & Park (2018), and incorporates additional variables related to service innovation to more accurately reflect the current state of digitalization in the aviation industry.

2.5. Hypothesis proposal

**Components of Airport Service Quality (ASQ)*

Based on the theoretical framework outlined, airport service quality is conceptualized as a multidimensional construct, encompassing the entire passenger journey at the terminal. Starting with the accessibility of the departure terminal, the process of movement and use of services at the departure terminal, and the completion of the journey at the arrival terminal area. Therefore, factors such as transportation connections and guidance systems are considered fundamental components that shape initial impressions and influence the overall assessment of airport service quality. When access is convenient and guidance is clear, passengers tend to have a more positive assessment of airport service quality (Bitner, 1992; Chonsalasin et al., 2021). Amenities at the departure terminal directly reflect the airport's service capacity through food and beverage services, waiting areas, shopping, and technological connectivity. Numerous studies have shown that modern and convenient amenities not only meet functional needs but also enhance passengers' perceptions of overall service quality (Bezerra et al., 2015; Bellizzi et al., 2020). Similarly, airport procedures, especially check-in, are key touchpoints due to their mandatory nature and high frequency of contact, significantly influencing passengers' overall assessment of airport service quality (Parasuraman et al., 1991). Furthermore, security screening and the terminal environment are also considered indispensable elements in the structure of airport service quality. An effective security process creating a sense of safety, along with a clean and comfortable terminal environment, will contribute to increased trust and positive passenger evaluations (Halpern & Mwesiumo, 2021). The final stage of the journey is the arrival area, where passengers collect their luggage and leave the terminal. The experience in this area often leaves a lasting impression and significantly affects the overall assessment of airport service quality (Bezerra et al., 2015).

Based on the theoretical arguments and empirical results presented, this study proposes a second-order model for examining airport service quality (ASQ), where ASQ is a composite concept comprised of specific service components:

H1a: Access is a component that positively reflects airport services quality.

H1b: Wayfinding is a component that positively reflects airport services quality.

H_{1c}: Facilities is a component that positively reflects airport services quality.

H_{1d}: Check-in is a component that positively reflects airport services quality.

H_{1e}: Security is a component that positively reflects airport services quality.

H_{1f}: Environment is a component that positively reflects airport services quality.

H_{1g}: Arrival is a component that positively reflects airport services quality.

** The Relationship Between Service Innovation and Airport Service Quality*

Recent studies show that service innovation plays a crucial role in enhancing perceived value and overall service quality. Service innovation is understood as intentional changes in products, processes, or interaction methods aimed at creating new value for customers (Gallouj and Weinstein, 1997). In the airport context, innovation is often manifested through the application of self-service technologies, such as check-in kiosks, self-bag drop, electronic boarding passes, and mobile applications, to support passengers (Antwi et al., 2021; Usman et al., 2023).

These innovations help shorten processing times, reduce pressure at key touchpoints, and increase convenience during travel. Consequently, passengers tend to have a more positive assessment of the components of airport service quality and of overall service quality at the system level. From a service-dominant logic perspective, Vargo and Lusch (2014) argue that technological innovation initiatives are signals of a service organization's operational capacity and adaptability. In the airport environment, innovation therefore not only improves operational processes but also conveys an image of a modern, professional airport ready to meet passenger expectations (Barney, 1991).

Empirical studies have reinforced this relationship. Usman et al. (2023) found that service innovation has a positive, statistically significant impact on airport service quality. Halpern & Mwesiumo (2021) also indicated that the application of modern technology helps reduce service incidents and improve the level of positive passenger ratings. These results indicate that service innovation is an important predictor of airport service quality. Based on this, the study proposes the hypothesis:

H_2: Service innovation (SI) positively impacts airport service quality.

** The Relationship Between Service Innovation and Passenger Satisfaction*

Service Innovation is also considered to directly influence passenger satisfaction. Satisfaction is understood as the overall evaluation state after a service experience, formed by comparing initial expectations with actual results (Oliver, 1999; Kotler, 2000). In the airport environment, the use of innovative services such as self-service kiosks or mobile applications often helps passengers feel more proactive, reduces time stress, and increases a sense of control during their journey, thereby enhancing overall satisfaction (Antwi et al., 2021; Usman et al., 2023).

The Expectation-Confirmation Theory provides a suitable theoretical framework for explaining this relationship. When innovative solutions meet or exceed expectations for convenience and efficiency, they elicit positive validation, leading to passenger satisfaction (Oliver, 1980; Patterson, 1993). Simultaneously, from a dynamic capability perspective, innovation signals the airport's organizational capacity and reliability, thereby reinforcing passenger confidence and reassurance during service use (Barney, 1991). Empirical evidence from Antwi et al. (2021) and Usman et al. (2023) indicates that service innovation has a direct, statistically significant positive impact on passenger satisfaction. These results confirm the role of innovation in enhancing the experience and positive post-trip feelings. Therefore, the following hypothesis is proposed:

H_3: Service innovation (SI) positively impacts on passenger satisfaction (PS).

** The Relationship Between Airport Service Quality and Passenger Satisfaction*

In addition to innovation, airport service quality remains a central factor in passenger satisfaction. Airport service quality reflects passengers' overall assessment of specific service components during the service experience, including facilities, terminal amenities, check-in procedures, security, and the overall experience environment (Parasuraman et al., 1999; Bitner, 1992). When these components are positively evaluated, passengers tend to experience greater satisfaction. According to Cronin and Taylor (1992), service quality is a direct precursor to satisfaction. In the airport sector, numerous empirical studies have confirmed this relationship.

Bezerra and Gomes (2015) showed that attributes such as check-in, security, and terminal environment significantly influence overall passenger satisfaction. In Vietnam, Hai et al. (2017) also found that factors related to airport service quality positively affect satisfaction. Based on the theoretical arguments and empirical evidence above, the study proposes the hypothesis:

H4: Airport service quality (ASQ) positively impacts on passenger satisfaction.

3. Methodology

3.1. Site research

Tan Son Nhat International Airport Terminal 3 is a key national aviation infrastructure project, built to meet the increasing domestic passenger transport needs of the Southern region. The project officially commenced construction at the end of 2022 and opened to passengers on April 19, 2025. The total construction floor area is 112,000 m², including 1 basement floor and 4 above-ground floors, arranged in a way that separates check-in areas, security checks, waiting areas, arrival areas, baggage areas, and commercial spaces. Inside the terminal, there are 89 check-in counters, 20 self-service baggage drop-off counters, 42 check-in kiosks, and 27 boarding gates, of which 13 are jet bridges, and 14 are bus-accessible. Notably, the terminal is equipped with a state-of-the-art biometric technology system, the first of its kind in Vietnam, allowing passengers to check in using facial recognition, shortening processing times and enhancing the passenger experience.

3.2. Research Sample Selection

The preliminary study surveyed 400 domestic passengers at Terminal T3 – Tan Son Nhat International Airport, using a random sampling method. Questionnaires were distributed at representative service touchpoints throughout the journey (excluding individuals who had received them in the previous phase, ensuring that each randomly selected individual responded only once): (i) Terminal entrance/landside (parking area – entrance), (ii) check-in counter, (iii) security screening area, (iv) waiting area – boarding gate, (v) baggage claim area, (vi) transportation connection area (taxi, ride-hailing, bus) and (vii) information counter/kiosk – SST. At each touchpoint, approximately 25–35 questionnaires were collected, ensuring a balanced time frame (morning/afternoon/evening) over 12 consecutive days to minimize discrepancies due to time of day.

Table 1: Milestones Descriptions

	N=371	Number	Frequency %
Gender	Male	193	52
	Female	178	48
Ages	18-25	8	2.2
	26-30	119	32.1
	31-35	103	27.8
	36-40	128	34.5
	41-50	13	3.5
	>50	8	2.2
Purpose of the trip	Business	124	33.4
	Travel	115	31.0
	Relative	132	35.6
Domestic flight frequency	1 time	97	26.1
	2–3	84	22.6
	4–6	93	25.1
	>6	97	26.1
Airline	Vietnam Airlines	122	32.9
	Bamboo Airways	121	32.6
	Vietravel Airlines	128	34.5
Flight schedule	Peak hours (06–09h; 16–21h)	192	51.8
	Other	179	48.2

(Source: Authors, 2026)

4. Results

4.1. Measurement Model

The ASQ second-order structural model needs to be tested for measurement invariance and bias. To test invariance, Harman's single-factor test shows that factor 1 accounts for only 22.67% of the extracted variance. Next, a Common Method Factor (CMF) analysis or marker-variable test is conducted, which considers VIF. The model's VIF values are all < 3.3, indicating no common method bias (Kock, 2015). Therefore, this design does not suffer from Common Method Bias (CMB).

In this study, the two-stage method was chosen to estimate and test the high-order variable ASQ in the PLS-SEM model. In the first stage, the model is estimated to obtain scores for the lower-order variables; in the second stage, these scores are used as observed variables to test the role of ASQ as a higher-order variable in its relationships with SI and outcome variables. This approach allows for more stable estimates, is easier to interpret, and is consistent with the goal of testing the mediating role of ASQ in the research model.

To validate the study's measurement model, we conducted assessments of content validity, convergent validity, and discriminant validity. First, the content validity of our survey was established using existing literature, and our measures were constructed by applying validated constructs from other researchers. Second, convergent validity was established by testing composite reliability (CR), Cronbach's Alpha, and extracted mean variance (AVE) (Hair et al., 2019). As shown in Table 2, Cronbach's alpha (greater than 0.7), CR (greater than 0.7), and AVE (greater than 0.5) indicate that all constructs in the model meet the requirements. Therefore, the results establish that the items demonstrated convergent validity.

Finally, the discriminant validity of the measurement model was tested by comparing the square roots of each construct's AVE with the correlations between that construct and other constructs. If the square root of the AVE is greater than the correlations between that construct and another construct, then it indicates discriminant validity. As shown in Table 2, the square root of the AVE for each construct exceeded the correlations between that construct and other constructs. Therefore, the instrument's discriminant validity was established (Hair et al., 2019).

Table 2: Reliability of the measurement scales

	Outer loading	Cronbach's alpha	Composite reliability	Average variance extracted (AVE)
Security		0.884	0.889	0.741
SC1	0.847			
SC2	0.859			
SC3	0.852			
SC4	0.886			
Wayfinding		0.813	0.818	0.639
WF1	0.812			
WF2	0.781			
WF3	0.777			
WF4	0.827			
Check-in		0.859	0.865	0.779
CI1	0.855			
CI2	0.761			
CI3	0.842			
CI4	0.821			
Services Innovation		0.884	0.908	0.683
SI1	0.803			
SI2	0.853			
SI3	0.882			

SI4	0.847			
SI5	0.741			
Access		0.829	0.844	0.744
AC1	0.885			
AC2	0.862			
AC3	0.84			
Environment		0.89	0.895	0.752
EN1	0.846			
EN2	0.863			
EN3	0.893			
EN4	0.866			
Passengers Satisfaction		0.847	0.859	0.688
PS1	0.729			
PS2	0.878			
PS3	0.851			
PS4	0.851			
Arrival		0.838	0.842	0.674
AR1	0.876			
AR2	0.88			
AR3	0.892			
Facilities		0.814	0.835	0.641
FA1	0.833			
FA2	0.872			
FA3	0.769			
FA4	0.721			

(Source: Authors, 2026)

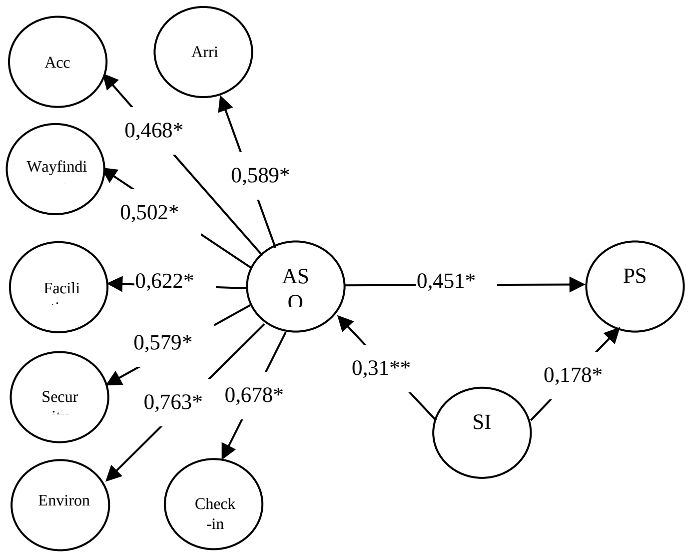
4.2. Structural Model

To assess the predictive power of the structural model, we calculated R^2 values for the assertion of airport service quality systems, service innovation, and passenger satisfaction. Interpreted similarly to multiple regression results, R^2 indicates the amount of variance explained by exogenous variables (Hair et al., 2022). Using bootstrapping techniques, path estimates and statistics were calculated for the hypothetical relationships. The bootstrapping sample size used in the PLS analysis was 5000. The results showed a positive, statistically significant relationship between airport service quality (R^2_{ASQ} = 0,096) and passenger satisfaction (R^2_{PS} = 0,285). Furthermore, the relationship between service innovation, airport service quality, and passenger satisfaction was tested, yielding positive, statistically significant results. Figure 1 and Table 3 present the results of the hypothesis tests of the proposed model.

Table 3. Model validation results

	β	Sample mean (M)	T values	P value	Result
ASQ -> SC	0.597	0.589	6.954	0.00	Accepted
ASQ -> WF	0.502	0.512	6.506	0.00	Accepted
ASQ -> AR	0.589	0.549	3.839	0.00	Accepted
ASQ -> AC	0.468	0.426	2.701	0.007	Accepted
ASQ -> EN	0.763	0.734	7.488	0.00	Accepted
ASQ -> PS	0.451	0.442	4.519	0.00	Accepted
ASQ -> CI	0.678	0.685	10.373	0.00	Accepted
ASQ -> FA	0.622	0.626	9.565	0.00	Accepted
SI -> ASQ	0.31	0.295	2.716	0.007	Accepted
SI -> PS	0.178	0.179	3.791	0.00	Accepted

(Source: Authors, 2026)



(Source: Authors, 2026)

Figure 1: Structural model testing result

Table 4: Discriminant validity – HTMT matrix

	ASQ	SC	WF	AR	SI	AC	EN	SAS	CI	FA
ASQ										
SC	0.67									
WF	0.64	0.18								
AR	0.66	0.25	0.23							
SI	0.34	0.15	0.10	0.20						
AC	0.58	0.20	0.19	0.32	0.20					
EN	0.81	0.35	0.29	0.46	0.32	0.33				
SAS	0.58	0.37	0.37	0.32	0.35	0.20	0.40			
CI	0.77	0.36	0.33	0.30	0.26	0.18	0.45	0.46		
FA	0.73	0.29	0.29	0.27	0.22	0.24	0.40	0.36	0.41	

Table 3 shows that all proposed hypotheses in the model are accepted, reflecting that the relationships in the structural model are statistically significant ($p < 0.05$). In the second-order structure, airport service quality (ASQ) is most strongly reflected by the terminal environment (β = 0.763) and check-in procedures (β = 0.678), followed by facilities (β = 0.622), arrival (β = 0.589) and security screening (β = 0.579); while way finding (β = 0.502) and access (β = 0.468) have lower but still satisfactory contributions. Regarding the impact relationship, service innovation (SI) has a positive impact on ASQ (β = 0.310) and a direct impact on passengers' satisfaction (PS) (β = 0.178); at the same time, ASQ has a positive influence on PS (β = 0.451), indicating that airport service quality is a prominent channel impacting satisfaction. In contrast, innovation plays a supporting and reinforcing role in the passenger satisfaction**.**

4.3 Testing the mediating role

The results show that ASQ partially mediates the relationship between Inno and the outcome variables. Specifically, Inno has a positive, statistically significant influence on ASQ (β = 0.310, p = 0.007), while ASQ continues to have a positive, significant impact on all dependent variables, including Security, Access, Wayfinding, Arrival, Environment, SAS, Facilities, and Check-in. This suggests that the effect of Inno is not only direct but also transmitted through ASQ.

In terms of mediating effect, the indirect effect of Inno through ASQ was significant in most relationships, with coefficients of 0.185, 0.156, 0.183, 0.145, 0.237, 0.140, 0.210, and 0.193, respectively. If converted to total effect, ASQ explains approximately half of service innovation impact on most outcome variables; for SAS, the mediating rate is lower, at around 44%. Overall, these results confirm the important mediating role of ASQ in the mechanism by which service innovation interacts with the studied aspects, and suggest that improving ASQ could significantly increase service innovation's impact on outcomes.

Table 5: Results of the mediating effects test

Path	Direct effect	Indirect effect	Total effect	Intermediate rate
SI→SC	0.185	0.185	0.37	50.00%
SI → WF	0.156	0.156	0.312	50.00%
SI → FA	0.183	0.183	0.366	49.90%
SI → AC	0.145	0.145	0.29	50.00%
SI → EN	0.237	0.237	0.474	49.90%
SI → SAS	0.178	0.14	0.318	44.00%
SI → CI	0.21	0.21	0.42	50.00%

(Source: Authors, 2026)

4.4. Discussion

This study developed and tested, for the first time, an integrated model of the impact of service innovation on airport service quality and passenger satisfaction. The results of testing the initial hypotheses proposed in this study are statistically significant. Our study examines the developing relationship between airport service quality, service innovation, and passenger satisfaction in the context of the newly constructed and operational Tan Son Nhat Terminal 3. Based on the results of this study, in addition to further confirming the reliability of the airport service quality scales of Chonsalasin et al. (2021), passenger satisfaction (Usman et al., 2023), and service innovation (Rubio-Andrada et al., 2023; Usman et al., 2023), the study also shows that the impact of service innovation plays a crucial role in improving both airport service quality and passenger satisfaction. However, the direct impact of service innovation on passenger satisfaction is modest (β = 0.178) compared to the direct impact on ASQ (β = 0.451). This demonstrates that service innovation must be achieved through passenger evaluation of airport service quality, and that ASQ partially mediates the SI-ASQ-PS relationship, as shown in the ASQ mediation test. This result is also a novel finding in this study.

5. Conclusion and implications

Firstly, this study further confirms the validity and convergent reliability of the criteria in the Airport Service Quality Component Scale (ASQ) of Chonsalasin et al. (2021) in the context of research in Vietnam. Secondly, the statistical results of this study show that service innovation has the strongest impact on airport service quality, followed by passenger satisfaction, consistent with the studies of Rubio-Andrada et al. (2023) and Usman et al. (2023).

Furthermore, this study continues to expand the role of the integrated theory framework of diffusion of innovation, dynamic capability, SD-L, in the study of airport service quality, as demonstrated by the studies of Antwi et al. (2021); Halpern & Mwesiumo (2021) on service innovation, and Yokumar et al. (2020) on the influence of passenger satisfaction. This study presents an extensive assessment of the relationship between service innovation, airport service quality, and passenger satisfaction. Model validation results show that all measurement models exhibit good fit. Furthermore, reliability and validity testing results show that the scales and their aspects are sufficiently reliable and valid.

An airport that invests in both infrastructure, modern technology, and service innovation will attract and satisfy passengers, increase competitiveness, and meet the growing needs of customers.

The theoretical contributions of this study lie in the following aspects: (1) Integrating, proposing, and validating an integrated theoretical framework of DOI, SD-L, and DC theories in the context of the newly commissioned T3 terminal; (2) Affirming the important role of service innovation in airport service quality. The results show that the service innovation factor positively affects airport service quality (β = 0.31) and passenger satisfaction (β = 0.178); (3) Contributing to the confirmation that the airport service quality measurement structure of Chonsalasin et al. (2021) and the service innovation structure of Rubio-Andrada et al. (2023), Usman et al. (2023) are valid and reliable.

The study demonstrates that airport service quality (ASQ) exerts a positive and statistically significant influence on all evaluated components. Environment is most strongly affected (β=0.763), followed by Check-in (β=0.678) and Facilities (β=0.622). It is recommended that management prioritize the enhancement of physical environmental factors, the streamlining and digitization of procedures, the upgrading of amenities, and the improvement of connectivity. These initiatives should target passenger groups most sensitive to the airport experience, including transit passengers, families, seniors, international travelers, and business travelers, to achieve comprehensive and sustainable improvements in ASQ.

This study achieved its stated objectives, but still has some limitations. Firstly, the convenient sampling method included only domestic passengers and surveyed only three airlines, omitting international passengers, which may not yield generalizable results for the entire sample at international terminals and other airlines in Vietnam. Secondly, this study did not analyze differences across customer segments or between international and domestic airports. Future studies should examine the differences between international and domestic airports, as this would be very valuable. Further research directions should be considered, including longitudinal designs, comparisons across multiple airports, and the role of passenger technological readiness as a moderating factor.

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