

# Operational Factors Associated with Passenger Satisfaction at Civil Aviation Authority of the Philippines-Managed Airports

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## ABSTRACT

Passenger satisfaction has become a key indicator of operational performance in modern airport management, particularly in government-operated airports striving to meet international standards of safety, sustainability, and service excellence. This study examined the operational factors associated with passenger satisfaction at Civil Aviation Authority of the Philippines (CAAP)-managed commercial airports, focusing on three key dimensions: security measures, environmental sustainability, and service quality. Using a quantitative correlational-predictive research design, data were collected from 385 passengers across the five busiest CAAP-

managed airports in the Philippines. Descriptive statistics, Pearson correlation, multiple regression analysis, and Structural Equation Modeling (SEM) were employed to analyze relationships among variables. Results revealed that all operational factors were rated high and were significantly associated with passenger satisfaction. Among the variables, service quality emerged as the strongest predictor, followed by environmental sustainability and security measures. These findings emphasize that passenger satisfaction in government-managed airports is shaped by the integrated performance of operational systems rather than by a single operational factor. The study contributes empirical evidence to the airport management literature and provides practical insights to improve operational performance, sustainability initiatives, and service delivery in public aviation systems.

**Keywords:** *passenger satisfaction, airport operations, service quality, environmental sustainability, security measures, structural equation modeling*

## INTRODUCTION

Airports today are not only transportation hubs but also service environments where passengers evaluate performance based on safety, comfort, efficiency, and overall experience. Recent industry reports indicate that travelers increasingly expect strong security, better service, and greater attention to well-being and sustainability (International Air Transport Association [IATA], 2024; Airports Council

International [ACI], 2024). For airport managers, passenger satisfaction is now a key indicator of operational success.

Passenger satisfaction is strongly linked to service quality, particularly the condition of facilities, staff responsiveness, and reliable service delivery, consistent with the SERVQUAL framework (Parasuraman et al., 1988). Studies confirm that higher airport service quality improves satisfaction, airport image, and even passengers' airport and destination choices (Adeniran & Fadare, 2018; Halpern & Mwesiumo, 2021; Prentice & Kadan, 2019; Usman et al., 2023). Similar findings have been reported in the Philippine context, where better airport services and infrastructure were associated with higher passenger satisfaction (Roxas & Ylagan, 2025).

Security is another essential operational factor that shapes satisfaction. Passengers are more satisfied when screening is efficient, personnel are competent, and safety procedures are implemented without causing unnecessary delays (Gkritza et al., 2006; Sakano et al., 2016). Research also shows that security service performance and personnel competence significantly influence passengers' confidence and overall airport experience (Güreş et al., 2017; Billa & Dewantari, 2023; Majid et al., 2022; Sariva et al., 2024).

Environmental sustainability is increasingly important to passengers. Green airport practices – such as energy efficiency, waste management, and eco-design – can enhance passenger perceptions, well-being, and satisfaction (Greer et al., 2020; Raimundo et al., 2023; Han et al., 2020; Abdel-Gayed et al., 2023; Wibowo et al., 2022). Studies also show that sustainable energy and waste management strategies strengthen airport operations and improve the passenger experience (Baxter, 2022, 2023).

Despite increasing research on airport service quality and passenger satisfaction, most studies focus on privately managed or major international hub airports. Limited empirical evidence exists on how operational factors influence passenger satisfaction within government-managed airport systems, particularly in developing countries such as the Philippines. In CAAP-managed airports, operational performance must balance regulatory compliance, infrastructure development, and service delivery while meeting growing passenger expectations. However, few studies have systematically examined how security measures, environmental sustainability, and service quality collectively influence passenger satisfaction in this context. Addressing this gap is important for supporting evidence-based operational planning and policy development in public aviation management.

In the Philippines, CAAP-managed airports continue modernization efforts, yet local evidence remains limited on how security, sustainability, and service quality jointly influence passenger satisfaction (Francisco & Lim, 2022; Rodolfo, 2024). Guided by the Theory of Constraints, which emphasizes identifying key operational bottlenecks (Goldratt, 1984), this study examines how these factors relate to passenger satisfaction in CAAP-managed airports and provides evidence to guide operational and policy improvements.

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## **Theoretical and Conceptual Framework**

This study is grounded in the Theory of Constraints (TOC) and SERVQUAL to explain how operational performance shapes passenger satisfaction in CAAP-managed airports. TOC treats airport operations as an interdependent system in which overall performance is constrained by the most critical bottleneck; thus, improving passenger satisfaction requires identifying and strengthening the operational constraint rather than improving isolated areas (Goldratt, 1984). Complementing this, SERVQUAL explains how passengers judge service quality through tangibles, responsiveness, and reliability, which strongly shape satisfaction and airport image (Parasuraman et al., 1988; Adeniran & Fadare, 2018; Halpern & Mwesiumo, 2021).

Guided by these theories, the study positions security measures (screening efficiency, personnel competence, emergency preparedness) as an operational domain that affects perceived safety and satisfaction (Gkritza et al., 2006; Sakano et al., 2016; Majid et al., 2022), and environmental sustainability (energy efficiency, waste management, green infrastructure) as a growing determinant of passenger perceptions, well-being, and experience evaluation (Greer et al., 2020; Han et al., 2020; Abdel-Gayed et al., 2023; Baxter, 2022).

In this framework, security measures, environmental sustainability, and service quality are treated as key operational factors associated with passenger's satisfaction, as reflected in passengers' overall experience, perceived value, and willingness to return or recommend, consistent with prior airport satisfaction research emphasizing the predictive value of operational service performance and customer outcomes (Bakır et al., 2022; Robertson et al., 2023).

This study examined the operational factors associated with passenger satisfaction at CAAP-managed commercial airports. It assessed security measures, environmental sustainability initiatives, and service quality and evaluated passenger satisfaction at government-operated airports.

Specifically, the study determined the levels of (1) security measures, including screening efficiency, personnel competence, and emergency preparedness; (2) environmental sustainability, including energy efficiency, waste management, and green infrastructure; (3) service quality, including tangibles, responsiveness, and reliability; and (4) passenger satisfaction, including overall experience, perceived value, and willingness to return or recommend. Furthermore, it examined (5) whether a significant relationship exists between passenger satisfaction and the operational factors of security measures, environmental sustainability, and service quality.

## **REVIEW OF RELATED LITERATURE**

### **Security Measures**

Airport security influences how safe and comfortable passengers feel. Studies show that passengers are more satisfied when security screening is efficient and does not cause unnecessary delays

(Gkritza et al., 2006; Sakano et al., 2016). Research also indicates that security outcomes improve when processes are well managed and queues are controlled (Skorupski & Uchroński, 2016; Naji et al., 2020). In addition, passengers value competent and professional security personnel, which increases trust and satisfaction (Güreş et al., 2017; Faoziah, 2022). Emergency preparedness is also important because clear response plans and readiness improve passenger confidence in airport safety (Price & Forrest, 2016a, 2016b; Stambaugh et al., 2009).

### **Environmental Sustainability**

Sustainability is now integral to airport performance related to influencing passenger perceptions. Airports that implement energy-saving programs and sustainable energy management improve environmental performance (Ortega Alba & Manana, 2016; Baxter et al., 2018a; Baxter, 2023). Effective waste management strategies, such as recycling and proper segregation, support green airport goals and reduce environmental impact (Baxter, 2022; Sebastian & Louis, 2021; Sangnok et al., 2023). Green infrastructure and eco-design also matter because they improve environmental outcomes and enhance passenger well-being and experience (Shi et al., 2015; Monteiro et al., 2020; Han et al., 2020; Abdel-Gayed et al., 2023).

### **Service Quality**

Service quality is consistently linked to passenger satisfaction and is often strongly associated with passengers' evaluations of airport services. SERVQUAL identifies tangible facilities, staff responsiveness, and service reliability as key dimensions through which passengers evaluate airport service (Parasuraman et al., 1988). Studies confirm that higher service quality leads to greater satisfaction among airport passengers (Adeniran & Fadare, 2018; Halpern & Mwesiumo, 2021; Farah & Hacıoglu, 2024). Service quality also shapes airport image and passengers' willingness to recommend (Mainardes et al., 2021; Robertson et al., 2023).

### **Passenger Satisfaction**

Passenger satisfaction reflects how travelers judge their airport experience. It is commonly reflected through overall experience, perceived value, and willingness to return or recommend. Studies emphasize that satisfaction is shaped by the entire airport journey, not just a single service point (Ahmed, 2017; Dimitriou et al., 2021). Perceived value also matters because passengers compare what they receive with the time, effort, and inconvenience involved (Caber et al., 2020). Positive experiences increase recommendation behavior, especially when service delivery is strong (Robertson et al., 2023; Kim et al., 2024).

### **Relationship of Operational Factors and Passenger Satisfaction**

Research indicates that passenger satisfaction is associated with multiple operational factors, particularly service quality, security, efficiency, and sustainability initiatives. Service quality is often the strongest contributor to satisfaction and airport choice (Prentice & Kadan, 2019; Usman et al., 2023).

Security performance also matters, as passengers value safety and efficient screening (Gkritza et al., 2006; Sakano et al., 2016). Sustainability practices increasingly shape passenger perceptions and well-being, affecting overall evaluations of airports (Han et al., 2020; Abdel-Gayed et al., 2023; Antwi et al., 2022). Data-driven studies further show that satisfaction outcomes typically result from combined operational conditions rather than a single factor alone (Bakır et al., 2022; Du, 2024). In the Philippine context, improving airport services and facilities is associated with higher passenger satisfaction, underscoring the need for operational assessments in government-managed airports (Francisco & Lim, 2022; Roxas & Ylagan, 2025).

## **METHODOLOGY**

### **Research Design**

This study employed a quantitative, descriptive-correlational research design to examine levels of operational factors and their associations with passenger's satisfaction at CAAP-managed airports. The design was appropriate for assessing perceptions and determining whether significant relationships exist among the identified variables.

### **Research Setting and Participants**

The study was conducted at the top five CAAP-managed commercial airports in the Philippines, namely: Davao International Airport, Iloilo International Airport, Laguindingan Airport, Bohol-Panglao Airport, and Bacolod-Silay Airport, selected based on passenger volume. The respondents were departing and arriving passengers who had used airport services during the data collection period. A total of 385 passengers participated in the survey, with the sample size determined using standard recommendations for correlational studies to ensure statistical reliability.

### **Research Instrument**

Data were collected using a structured survey questionnaire divided into four sections:

1. Security Measures (screening efficiency, personnel competence, emergency preparedness),
2. Environmental Sustainability (energy efficiency, waste management, green infrastructure),
3. Service Quality (tangibles, responsiveness, reliability), and
4. Passenger Satisfaction (overall experience, perceived value, willingness to return or recommend).

Items were measured on a five-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree). The instrument was content-validated by experts in airport management and pilot-tested to ensure clarity and reliability.

### Data Collection Procedure

Permission was obtained from the relevant airport authorities prior to data collection. Respondents were approached in designated public areas of the terminals and provided informed consent. Participation was voluntary, and anonymity and confidentiality were assured.

### Data Analysis

Descriptive statistics (mean and standard deviation) were used to assess the levels of operational factors and passenger satisfaction (Problems 1–4). For Problem 5, Pearson product–moment correlation and multiple regression analyses were used to assess the strength and significance of associations between operational factors and passenger satisfaction. Statistical analysis was performed using standard statistical software, with  $p < 0.05$  as the significance threshold.

### Presentation, Analysis, and Interpretation of Data

This chapter presents the study's empirical findings in relation to the research questions stated in the Statement of the Problem. The analysis is structured to address: (1) the level of security measures, including screening efficiency, personnel competence, and emergency preparedness; (2) the level of environmental sustainability initiatives, including energy efficiency, waste management, and green infrastructure; (3) the level of service quality, including tangibles, responsiveness, and reliability; (4) the level of passenger satisfaction, including overall experience, perceived value, and willingness to return or recommend; and (5) the significance of the relationships between passenger satisfaction and the three operational factors.

Descriptive statistics, including means and standard deviations, were used to summarize each construct. Pearson's product-moment correlation assessed the strength and direction of associations among variables, and multiple regression assessed the degree to which security measures, environmental sustainability, and service quality were associated with passenger satisfaction. All statistical tests were conducted at the 0.05 level of significance.

The findings are presented systematically and interpreted to provide a clear, objective understanding of how operational factors affect passenger satisfaction at CAAP-managed airports.

**Problem 1.** *What is the level of security measures implemented in the airport in terms of screening efficiency, personnel competence, and personnel preparedness?*

**Table 1. Overall Mean Summary of the Participants' Level of Security Measures**

Sub-constructs	Mean	SD	Description	Interpretation
Screening efficiency	4.28	.614	Agree	High
Personnel competence	4.32	.630	Agree	High
Emergency preparedness	4.23	.636	Agree	High
OVERALL	4.27	.578	Agree	High

Passengers reported a high level of perceived airport security ( $M = 4.27$ ,  $SD = 0.578$ ), indicating that they generally view CAAP-managed airports as safe and well-regulated environments. Among the dimensions, personnel competence received the highest rating, followed by screening efficiency, while emergency preparedness obtained a slightly lower but still high rating. The high rating for personnel competence suggests that the professionalism, conduct, and visible expertise of security personnel contribute significantly to passengers' confidence in airport safety procedures. This finding supports previous research indicating that competent security personnel and efficient screening procedures enhance passengers' perception of safety and improve their overall airport experience (Güreş et al., 2017; Majid et al., 2022). Efficient screening processes also help maintain smooth passenger flow while ensuring compliance with aviation safety regulations (Gkritza et al., 2006; Sakano et al., 2016). In operational terms, these results highlight the importance of maintaining well-trained, professional airport security personnel, as continuous training and professional development remain critical to sustaining passenger confidence and trust in airport security systems.

**Problem 2.** *What is the level of environmental sustainability initiatives in the airport in terms of energy efficiency, waste management, and green infrastructure?*

**Table 2. Overall Mean Summary of the Participants' Level of Environmental Sustainability**

Sub-constructs	Mean	SD	Description	Interpretation
Energy Efficiency	4.16	.679	Agree	High
Waste management	4.18	.692	Agree	High
Green Infrastructure	4.10	.728	Agree	High
OVERALL	4.15	.644	Agree	High

Passengers reported a high level of perceived environmental sustainability initiatives ( $M = 4.15$ ,  $SD = 0.644$ ), indicating that passengers recognize and positively evaluate the environmental practices implemented in CAAP-managed airports. Among the sustainability dimensions, waste management received the highest rating, followed by energy efficiency, while green infrastructure obtained a slightly lower but still favorable evaluation. The relatively high perception of waste management suggests that visible sustainability practices, such as proper waste segregation, recycling systems, and environmental cleanliness, are noticeable to passengers and positively influence their evaluation of airport operations. Previous studies emphasize that effective waste management programs and environmentally responsible operational practices help airports reduce environmental impact while improving passengers' perceptions of sustainability (Baxter, 2022; Sebastian & Louis, 2021; Sangnok et al., 2023). Similarly, initiatives promoting energy efficiency and environmentally friendly infrastructure have been shown to enhance passenger perceptions of airport responsibility and overall experience (Greer et al., 2020; Han et al., 2020; Abdel-Gayed et al., 2023). These findings indicate that sustainability initiatives are increasingly recognized by passengers and may help strengthen airports' reputations and long-term operational sustainability.

**Problem 3.** *What is the level of quality of services in the airport in terms of tangibles, responsiveness, and reliability?*

**Table 3. Overall Mean Summary of the Participants' Level of Service Quality**

Sub-constructs	Mean	SD	Description	Interpretation
Tangibles	4.21	.686	Agree	High
Responsiveness	4.26	.665	Agree	High
Reliability	4.24	.688	Agree	High
OVERALL	4.24	.624	Agree	High

Passengers reported a high level of perceived service quality ( $M = 4.24$ ,  $SD = 0.624$ ), indicating that airport services are generally viewed as efficient, reliable, and responsive. Among the dimensions, responsiveness received the highest rating, followed closely by reliability, while tangibles obtained a slightly lower but still high evaluation. The high rating for responsiveness suggests that passengers value prompt assistance, courteous interaction, and timely service delivery from airport personnel. Reliability also plays an important role, as passengers expect airport services to operate consistently and dependably throughout the travel process. These findings align with the SERVQUAL framework, which identifies tangibles, responsiveness, and reliability as critical determinants of service quality evaluation (Parasuraman et al., 1988). Previous research similarly confirms that higher levels of airport service quality significantly enhance passenger satisfaction and influence passengers' evaluation of airport performance (Adeniran & Fadare, 2018; Halpern & Mwesiumo, 2021; Farah & Hacioglu, 2024). The results suggest that maintaining responsive personnel, dependable service processes, and well-maintained facilities remains essential in sustaining positive passenger experiences in airport environments.

**Problem 4.** *What is the level of passenger satisfaction in terms of overall experience, perceived value, and willingness to return or recommend?*

**Table 4. Overall Mean Summary of the Participants' Level of Passenger Satisfaction**

Sub-constructs	Mean	SD	Description	Interpretation
Overall experience	4.19	.713	Agree	High
Perceived value	4.09	.746	Agree	High
Willingness to return or recommend	4.17	.712	Agree	High
OVERALL	4.15	.690	Agree	High

Passengers reported a high level of overall satisfaction with airport services ( $M = 4.15$ ,  $SD = 0.690$ ), indicating that most passengers have positive experiences when using CAAP-managed airports. Among the satisfaction dimensions, overall experience obtained the highest rating, followed by willingness to return or recommend, while perceived value was slightly lower but still high. The high rating for overall experience suggests that passengers evaluate airport services based on the cumulative quality of their travel journey, including safety procedures, service delivery, and facility conditions. Previous studies emphasize that passenger satisfaction is influenced by the overall travel experience rather than by a single service interaction (Ahmed, 2017; Dimitriou et al., 2021). Similarly, perceived value reflects passengers' evaluation of the benefits they receive relative to the time, effort, and inconvenience associated with airport processes (Caber et al., 2020). The strong willingness of passengers to return or recommend the airport further indicates that positive experiences can strengthen passenger

loyalty and promote favorable word-of-mouth recommendations (Robertson et al., 2023; Kim et al., 2024). These findings suggest that maintaining consistent operational performance is essential in sustaining high levels of passenger satisfaction.

**Problem 5.** *Is there a significant relationship between the passengers' satisfaction and security measures, environmental sustainability, and service quality?*

**Table 5. Pearson Correlation of Passenger Satisfaction with Security Measures, Environmental Sustainability, and Service Quality**

Variables	Pearson r	P-value	Interpretation
<b>Security Measures</b>	<b>.753**</b>	<b>.000</b>	<b>Significant</b>
Screening Efficiency	.654**	.000	Significant
Personnel Competence	.711**	.000	Significant
Emergency Preparedness	.719**	.000	Significant
<b>Environmental Sustainability</b>	<b>.822**</b>	<b>.000</b>	<b>Significant</b>
Energy Efficiency	.753**	.000	Significant
Waste Management	.762**	.000	Significant
Green Infrastructure	.755**	.000	Significant
<b>Service Quality</b>	<b>.872**</b>	<b>.000</b>	<b>Significant</b>
Tangibles	.793**	.000	Significant
Responsiveness	.794**	.000	Significant
Reliability	.814**	.000	Significant

*Legend:  $p < .05$  the relationship is significant (\*)*

The Pearson correlation analysis revealed significant positive relationships between passenger satisfaction and all three operational factors. Service quality showed the strongest association with passenger satisfaction ( $r = .872$ ), followed by environmental sustainability ( $r = .822$ ) and security measures ( $r = .753$ ). These findings indicate that improvements in operational performance are consistently associated with higher levels of passenger satisfaction.

At the dimensional level, reliability showed the strongest association with satisfaction ( $r = .814$ ), followed by responsiveness ( $r = .794$ ) and tangibles ( $r = .793$ ), highlighting the importance of dependable and responsive service delivery in shaping passengers' overall experience. Sustainability-related dimensions, including waste management ( $r = .762$ ), green infrastructure ( $r = .755$ ), and energy efficiency ( $r = .753$ ), also demonstrated strong associations with satisfaction, suggesting that passengers increasingly recognize environmentally responsible airport practices. Security-related factors such as emergency preparedness ( $r = .719$ ), personnel competence ( $r = .711$ ), and screening efficiency ( $r = .654$ ) likewise showed significant relationships with satisfaction, indicating that passengers value efficient and well-managed security systems.

These results are consistent with previous studies demonstrating that airport satisfaction is influenced by a combination of service quality, operational efficiency, safety performance, and environmental responsibility (Prentice & Kadan, 2019; Han et al., 2020; Bakır et al., 2022; Du, 2024). The findings, therefore, suggest that passenger satisfaction is shaped by the integrated performance of

multiple operational factors rather than by a single operational dimension. Consequently, the null hypothesis stating that no significant relationship exists between the operational factors and passenger satisfaction is rejected.

## CONCLUSION

This study examined the association between operational factors and passenger satisfaction at CAAP-managed airports. The findings demonstrate that passengers perceive security measures, environmental sustainability initiatives, and service quality to be implemented at a high level across the studied airports. More importantly, the study confirms that these operational domains are significantly associated with passenger satisfaction.

Among the operational factors, service quality exhibited the strongest relationship with passenger satisfaction, indicating that passengers primarily evaluate airport performance through their direct service experiences, including staff responsiveness, service reliability, and facility quality. Environmental sustainability also showed a strong association with satisfaction, suggesting that passengers increasingly value environmentally responsible airport operations. Security measures, while essential for ensuring safety, were perceived primarily as a fundamental operational requirement rather than a primary source of satisfaction.

Overall, the findings highlight that passenger satisfaction in government-managed airports is shaped by the integrated performance of operational systems. Improving only one operational area is insufficient; instead, airport management must ensure balanced improvements across security, sustainability, and service quality to achieve a consistently positive passenger experience.

## PRACTICAL IMPLICATION

The findings of this study offer several practical implications for airport management and policy development. First, airport administrators should prioritize service quality improvements, particularly in terms of staff responsiveness and service reliability, as these were most strongly associated with passenger satisfaction. Second, sustainability initiatives such as energy-efficient systems and effective waste management programs should be integrated into airport operations, as passengers increasingly value environmentally responsible practices. Third, maintaining efficient security procedures and well-trained security personnel remains essential to sustaining passenger confidence and trust. By aligning operational improvements with these key factors, government-managed airports can enhance passenger experience while meeting international aviation standards.

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## RECOMMENDATION

Based on the study's findings and conclusions, the following recommendations are proposed to strengthen operational factors associated with passenger satisfaction at CAAP-managed airports.

The Civil Aviation Authority of the Philippines (CAAP) may consider reinforcing policies and standards that enhance security, environmental sustainability, and service quality across all airports it operates. Continuous training for security personnel, improved screening efficiency, strengthened emergency preparedness, expanded energy and waste management programs, and standardized service quality benchmarks for tangibles, responsiveness, and reliability may further improve passenger satisfaction.

Airport Authorities are encouraged to sustain high operational performance by ensuring efficient checkpoint operations, maintaining clean, functional facilities, improving service reliability, and strengthening staff responsiveness. Investments in sustainability programs, such as energy-saving systems and effective waste management, may also positively influence passenger perceptions.

Aviation Stakeholders, including airlines, security agencies, and concessionaires, are encouraged to maintain coordinated operations to ensure consistent service across all passenger touchpoints. Compliance with security standards and support for environmental initiatives may help sustain positive passenger evaluations.

For the flying public, passengers are encouraged to provide constructive feedback through available evaluation platforms to support continuous service improvement. Compliance with airport procedures and responsible environmental practices may also contribute to smoother airport operations.

Future researchers may replicate the study in other airport settings or explore additional operational factors that influence passenger satisfaction. Further studies may also apply advanced statistical techniques to deepen the understanding of the relationships among operational variables and passenger outcomes.

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