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**Research Article**

## Commuter Boarding Management Practices and its Effects on Passenger Experience at Cebu South Bus Terminal, Philippines


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**ABSTRACT**

Effective boarding is necessary for the maintenance of order and promoting commuter satisfaction in high-traffic terminals. Long queues and delays remain an ongoing problem at Cebu South Bus Terminal. The effectiveness of boarding management practices and their impact on commuter satisfaction was investigated in this paper. We employed descriptive-correlational design with 511 commuters (18–50 years old) who use the terminal regularly. Data was collected using a structured survey using a five-point Likert scale to evaluate the adoption of boarding practices and passenger satisfaction. All data were summarised in weighted means, and simple linear regression was used to check the relationships between variables. (mean = 3.37) Boarding management practices were rated as Occasionally Observed (with strengths in fairness, announcements, and lane discipline, but weakness in staff availability and boarding time). Passenger experience was equally Occasionally Observed (mean = 3.35) with safety and willingness to recommend rated higher than waiting time and comfort. Results from regression analysis ($R = 0.871$; $R^2 = 0.759$; $p < 0.001$) confirmed a strong positive relationship between boarding practices and passenger satisfaction and significant effect was also confirmed by coefficient analysis ($\beta = 0.895$). Boarding management has a strong prediction of passenger satisfaction: 76% of the variance in the passenger satisfaction. Operational improvements should emphasize staffing, communication, lane discipline, and fairness (supported by standardizing the operations through standardization, training, and real-time monitoring) based on Standard Operating Procedures. Further investigations might focus on technological assistance methods, passenger segmentation, and longitudinal evaluations to assess the effects of interventions.



***Keywords****: Boarding Management, Cebu South Bus Terminal, Commuter Satisfaction, Passenger Experience, Public Transportation*

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## Background

Public transportation is such an important part of daily life in the Philippines that millions of people commute every day to and from work, school, and personal situations. Cebu South Bus Terminal (CSBT) provides a critical hub of transport for the city as well as linking the city to southern towns or provinces (Cebu, 2018). So, with the vast number of travellers coming in and out regularly, optimal terminal facilities are needed to guarantee comfort, order and convenience for commuters. Within these functions, passenger boarding responsibility is fundamental in arranging, directing and supporting the passengers going through the boarding system (Gumasing et al., 2025). Yet, existing obstacles like overcrowding, long queues, and waiting lead to negative travel experiences. Poor procedures of boarding create stress, dissatisfaction, a decreased trust of public transportation; while good procedures result in confidence, safety, and satisfaction (Jou et al., 2023).

Beyond these general challenges, boarding conditions at the Cebu South Bus Terminal vary noticeably by time and travel purpose. During peak morning and late-afternoon hours, queues often extend beyond designated lane markings as passengers cluster near boarding bays in anticipation of early boarding. This congestion intensifies during the rainy season, when commuters seek shelter near covered areas, unintentionally narrowing passageways and slowing movement. These situations frame how boarding management practices are experienced on the ground and are not always visible in formal operational plans.

There are several dimensions to the research concerning this issue. The user experience is largely shaped by spatial design, where an insufficient number of waiting areas and poor passenger flow hamper overall satisfaction, and careful space management is important (Qin & Husain, 2025). The technological interventions also help—systems of sensing and real-time data that improve crowd and boarding management (Darsena et al., 2023) and RFID and Big Data allow for dynamic operational models that lessen waiting times and optimize resources (de Gouveia et al., 2014). Organizational approaches, such as Enterprise Architecture frameworks, tackle manual processes' inefficiencies (Legowo & Kaharmies, 2023), while simulation tools are useful for coping with safety risks of reconstruction (Yatskiv et al., 2016). Advanced passenger flow models further refine congestion control by exploring individual users' behaviors (Luangboriboon et al., 2024).

Studies also report quantifiable ways to try to make improvements. Yu (2024) proposes a framework based on 17 indicators of safety and efficiency for crowd management, while Safiullin and Arias (2024) highlight intelligent technology for real-time monitoring and automated systems. Podder et al. (2024) link satisfaction to terminal facilities, guiding infrastructure priorities. At Cebu North Bus Terminal, Benigra et al. (2025) found seating capacity to be the strongest satisfaction driver, aligning their findings with Li et al.'s (2020) findings on comfort and waiting time. Al-Nami (2024) reiterates the need for structured crowd management strategies like clear communication and designated boarding areas.

For all operational solutions, broader strategic models help build long-term improvements. Zhang et al. (2022) call for proactive boarding control so as to provide equitable capacity allocation, while Oprea et al. (2016) emphasise a critical function for internal passenger flow optimization. Yannis and Aifadopoulou (2008) situate boarding management in a systemic quality control program context; it plays a critical role in service quality. Likewise, Rudenko (2016) advocate Quality Management Systems for continuous improvement, whereas Setyawati et al. (2020) proposed a triad methodology—SERVQUAL, IPA, and QFD—to translate passenger feedback into engineering solutions. The case study of Mammo (2019) cautions against the catastrophic impact when operational efficiency is neglected.

Passenger satisfaction is still at the heart. Shaaban and Khalil (2013) validated comfort, convenience, safety, and cleanliness as universal drivers, whereas Islam et al. (2014) and Wan et al. (2016) reveal the predictive power of service quality dimensions on satisfaction using SEM and regression models. Van Lierop and El-Geneidy (2016) correlate service quality to loyalty, emphasizing boarding efficiency as a

strategic imperative. Amponsah and Adams (2016) also note overcrowding and reliability as key aspects, and Eboli and Mazzulla (2009) provide SEM-based tools which allow the identification of high-impact attributes. Lastly, Fu and Juan (2016) apply behavioral theories by explaining that negative boarding experiences reduce future use intentions, underscoring the need to implement systematic boarding improvements for the sustainability of public transport in Cebu.

Prior studies that focused on crowd management; on spatial design; and on service quality were mainly available in other transport terminals, while there were rather fewer studies on the relationship between boarding management and commuter experience specifically for the perspective of the Philippines. This study situates these perspectives within the everyday boarding conditions of the Cebu South Bus Terminal, where operational constraints, space limitations, and fluctuating passenger volumes converge to shape commuter experience. The following questions are of particular interest to the study: (1) What is the level of effectiveness of boarding management practices at the Cebu South Bus Terminal? (2) What is the level of satisfaction of commuters on existing boarding management practices at the Cebu South Bus Terminal? (3) Is there a significant relationship between the implementation of boarding management practices and commuter satisfaction? (4) What are the implications of the study particularly on actionable recommendations for improving boarding efficiency and passenger comfort? The null hypotheses focused in the study would be, there is no significant relationship between the implementation of boarding management practices and commuter satisfaction.

Figure 1 indicates the conceptual relationship of the two main variables investigated in this research. It highlights how the practices of boarding management work as the input (or independent variable in this example) influencing the composite passenger boarding satisfaction (the outcome or dependent variable). The figure clearly depicts the directional flow of influence, emphasizing how effective boarding management practices can shape commuters' experiences and perceptions during the boarding process.

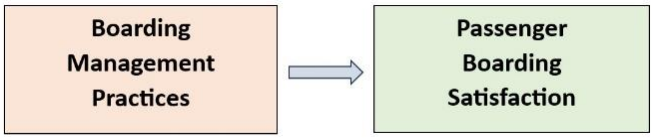


*Figure 1. Conceptual Model of the Relationship Between Boarding Management Practices and Passenger Boarding Satisfaction*

The Independent Variable (IV) in the figure is Boarding Management Practices, and the Dependent Variable (DV) is Passenger Boarding Satisfaction. Accordingly, any increase or decrease in the quality of performance in the field of boarding procedures such as orderliness, staff support, announcements, lane discipline, and fairness should influence passengers' satisfaction with the boarding process. This shows the DV is influenced by the quality and consistency of the IV.

## Methods

### *Research Design and Respondents*

In particular, it used a descriptive-correlational research design to investigate the relationship between passenger boarding management and commuter experience at the Cebu South Bus Terminal. Thus, this method allowed researchers both to present current boarding practices in the actual context and probe their effects on commuter satisfaction. Participants in this research are the 511 respondents who travel between 18 to 50 years of age and regularly use the Cebu South Bus Terminal, whether on a daily, weekly, or monthly basis.

### *Instruments*

The main data used for data collection in this research was a structured online survey consisting of two main parts. The first part investigated the extent of implementation of

boarding management practices and passenger experience, while the latter portion assessed commuter satisfaction with these practices. Perceptions were measured using a five-point Likert scale (1 = "never observed" and 5 = "always observed"). The datasets collected were run as reliability testing, revealing: Coefficients of .9211 for satisfaction of boarding process, and .9428 about passenger experience during boarding, indicating excellent internal consistency.

Questionnaire statements on the implementation of boarding management practices were derived from key concepts in this paragraph. Thus, effective boarding management underpins the provision of passenger comfort, safety, and operational excellence within the bus terminals. The study identifies various key factors that are in play in achieving this process. An orderly and organized boarding system, which is buttressed by well-designed boarding lanes, will alleviate the congestion and improve the flow of passengers which leads to more efficiency (Li et al., 2020). Availability and helpfulness of staff and synchronization were critical to service quality and to peak loads management (Fernández-Lobo et al., 2025). Convenient announcement of events and visible signage promote communication and reduce uncertainty, especially when implemented in real-time data processing platforms (Souassi & Hnaka, 2025). Reasonable boarding times can be ensured through the optimization of procedures and layout with the result that dwell time reduction (Xue et al., 2022) is significant. Fairness between passengers is also of great importance, because unfair boarding processes such as buses filling up at upstream stops result in dissatisfaction in terms of the perceived delay (Yap & Cats, 2021). All combined – structured processes, the support of service staff, clear communication, organised lanes, punctuality and fairness, and proactive management of the staff – make up a strong boarding management system that improves passenger experience and increases operational reliability.

Satisfaction statements in a questionnaire of the satisfaction of boarding management practices were derived from the themes mentioned in this paragraph. There are a number of elements affecting commuter satisfaction over boarding management that determine in which area the operator would like to take service of the service. Waiting time is an important measure; when prolonged delays occur, the perceived service quality significantly declines (Fan et al., 2016). Comfort during boarding was associated with passenger experience and is shown to be related to physical conditions and crowding (Roncoli et al., 2023). Safety and security are still important because poor safety practices at boarding places may pose more risk and cause dissatisfaction (Salum et al., 2024). Simplicity of boarding including ease of flow in travel and clarity of the procedures are also essential, especially in developing countries where the quality service gaps remain (Sogbe et al., 2024). Overall satisfaction is the aggregate of each of these factors and should be used as a reference point for terminal performance (Podder et al., 2024). Finally, the propensity to recommend the terminal to others is highly dependent on the positive passenger boarding experience, further validating the effect of satisfaction in generating passenger loyalty and use (Hasan et al., 2021). Taken together, these are the dimensions to form a holistic model to measure commuter perceptions of the boarding process: waiting time, comfort, safety, convenience, overall satisfaction and recommendation.

### *Data Collection Procedures*

Respondents were recruited through voluntary response sampling. The survey was conducted both in person and online. Printed questionnaires were distributed and digital versions were circulated with Microsoft Teams and Messenger. On-site distribution allowed the researchers to observe queue formation, staff–passenger interactions, and bottlenecks near boarding bays, which informed the interpretation of survey responses during analysis. Survey respondents were notified of the purpose of the study and their rights before participating. Only those who voluntarily agreed completed the survey and submitting the form indicated that they had given informed consent. Responses were anonymized and the information was used for academic purposes alone.

### *Data Analysis*

This study employed descriptive and inferential statistical methods to carry out statistical analysis of data collected in order to ensure a comprehensive interpretation of the results. For the variables involved, weighted means were calculated to gauge the implementation level of the boarding management process and commuter satisfaction with boarding services. In addition, a simple linear regression analysis was also performed to assess whether the level of implementation of boarding management significantly predicts or influences commuter satisfaction.

### *Ethical Considerations*

The study followed ethical guidelines according to research involving human subjects. Respondents were told prior to data collection that their participation was voluntary and that they could withdraw from the study at any time without consequence. Participants were kept completely anonymous by using no personally identifiable information. All of the data were kept confidential and were for academic research only. Throughout the research process, the principles of honesty, integrity, and respect for participants' rights and welfare were consistently upheld in accordance with established ethical standards.

## Result and Discussion

### *Summary of Observed Boarding Practices*

Table 1 presents a summary of the mean scores and their corresponding interpretations for the different criteria related to the boarding process. These results were obtained from respondents' answers to a survey questionnaire that utilized a five-point Likert scale. The computed means indicate the respondents' perceptions regarding how frequently each criterion was observed or experienced. Overall, the table provides a quantitative basis for understanding patterns and trends in the boarding process as perceived by commuters.

*Table 1. Mean Scores and Interpretation of Boarding Management Practices*

| Boarding Management Practices | Mean Scores | Interpretation |
|---|---|---|
| 1. Orderly and Organized Boarding Process | 3.36 | Occasionally Observed |
| 2. Staff Availability and Helpfulness | 3.34 | Occasionally Observed |
| 3. Clear Announcements and Signage | 3.42 | Frequently Observed |
| 4. Proper Implementation of Boarding Lanes | 3.41 | Frequently Observed |
| 5. Reasonable Boarding Time | 3.29 | Occasionally Observed |
| 6. Fairness Among Passengers | 3.44 | Frequently Observed |
| 7. Staff Management of Boarding | 3.32 | Occasionally Observed |
| Average | 3.37 | Occasionally Observed |

*Note*. Interpretation of mean scores: 1.00–1.80 = Never Observed; 1.81–2.60 = Seldom Observed; 2.61–3.40 = Occasionally Observed; 3.41–4.20 = Frequently Observed; 4.21–5.00 = Always Observed

Other aspects of the overall implementation of the boarding process are Occasionally Observed (average 3.37). Three areas score fairly highly: Fairness among passengers (3.44), Clear announcements and signage (3.42), Proper implementation of boarding lanes (3.41). All three indicate an overall tendency toward the somewhat more frequently observed; the other criteria—Orderly process (3.36), Staff availability/helpfulness (3.34), Staff management (3.32), and Reasonable boarding time (3.29)—occur in the Occasionally Observed range, and therefore require improvement, especially in staffing, coordination, and timeliness.

The management should focus on sufficient employee levels, good on-ground coordination to enhance orderliness, to be more accessible for staff and to reduce boarding time delays. Nevertheless, existing strengths like clear announcements, visible signage, lane discipline, and fairness in the boarding process should be sustained and evenly spread across operations. Setting performance goals that move all criteria into the Frequently Observed range (≥ 3.41) and frequent monitoring of relatively simple

KPIs (key performance indicators) also facilitate ongoing improvement and contribute to maintaining an upsurge in the level of overall commuter satisfaction (Fernández-Lobo et al., 2025).

***Summary of Commuter Satisfaction Rating***

Table 2 presents the mean scores along with their corresponding interpretations for the criteria related to passenger experience during the boarding process. The data were obtained from survey responses collected using a five-point Likert scale. The computed mean values reflect the extent to which passengers perceived these aspects of the boarding experience as being consistently observed in actual practice. Overall, the table provides insight into passengers' perceptions and levels of satisfaction regarding the quality and reliability of the boarding process.

*Table 2. Mean Scores and Interpretation of Passenger Satisfaction During Boarding*

| Passenger Boarding Satisfaction | Mean Scores | Interpretation |
|---|---|---|
| 1. Satisfaction with Waiting Time | 3.18 | Occasionally Observed |
| 2. Comfort During Boarding | 3.30 | Occasionally Observed |
| 3. Safety and Security of Boarding | 3.41 | Frequently Observed |
| 4. Convenience of Boarding Process | 3.39 | Occasionally Observed |
| 5. Overall Satisfaction with Boarding Experience | 3.40 | Occasionally Observed |
| 6. Recommendation of Terminal Based on Experience | 3.44 | Frequently Observed |
| Average | 3.35 | Occasionally Observed |

*Note*. Interpretation of mean scores: 1.00–1.80 = Never Observed; 1.81–2.60 = Seldom Observed; 2.61–3.40 = Occasionally Observed; 3.41–4.20 = Frequently Observed; 4.21–5.00 = Always Observed.

Generally observed passenger experience during boarding (averaging 3.35). There are two frequently observed facets – Safety and Security (3.41) and Recommendation of the Terminal (3.44) — both indicating passengers feel safe and highly willing to recommend the terminal. The last four sections (Waiting Time (3.18, lowest), Comfort (3.30), Convenience (3.39) and Overall Satisfaction (3.40)) fall under the area within Occasionally Observed: These scores reflect recurring delays during peak boarding periods, when high passenger volume and limited staff coverage stretch waiting times and reduce physical comfort, particularly for standing passengers.

The relatively low rating for waiting time (mean = 3.18) reflects more than simple delays; it captures commuters' lived experience of uncertainty during peak boarding periods. Observations during on-site data collection indicate that bus arrivals are often uneven, with multiple vehicles for certain routes arriving simultaneously after extended gaps, leading passengers to experience prolonged queuing followed by sudden crowding. This pattern suggests that perceived waiting time is likely intensified by inconsistent dispatch intervals rather than absolute delay alone. Limited staff availability during high-demand periods further constrains the ability to actively regulate queues and provide real-time updates, reinforcing a sense of inefficiency among commuters. In this context, waiting time dissatisfaction is not purely an operational issue but an experiential one, shaped by predictability, communication, and visible control of the boarding process.

Management needs to focus on reducing waiting time and increasing comfort and convenience while maintaining strong safety standards. Practical measures include improved queue management and staffing at peaks, clear, timely announcements, and improvements to comfort (seating and shade/ventilation). Simple benchmarks to elevate all criteria to Frequently Observed (≥ 3.41) and measure KPIs such as average waiting time, comfort scores, announcement timing adherence, and lane discipline to steadily raise overall satisfaction (Roncoli et al., 2023).

Means of implementation (Mean = 3.37) and commuter satisfaction (Mean = 3.35) are comparable; however, the satisfaction scores were not as high as the implementation scores. This indicates that even when processes are

actually implemented on an "Occasionally Observed" level, the experience is perceived as somewhat less satisfying by passengers. In other words, commuters tend to expect more than what is currently delivered, and their expectations may exceed the operational standards being applied (Mabini et al., 2024). From a practical standpoint, this expectation gap may stem from commuters' repeated exposure to congestion during predictable high-demand periods. Regular users tend to benchmark current performance against their own prior experiences rather than against formal operational standards, making incremental improvements less visible unless they meaningfully reduce waiting or improve comfort.

### *Regression Model Summary*

**Regression Analysis of Boarding Management and Satisfaction.** Table 3 presents a concise summary of the regression model employed to analyze the relationship between boarding management practices and passenger experience during the boarding process. The table reports key statistical indicators, including the correlation coefficient (R), which reflects the strength of association between the variables, as well as the coefficient of determination (R Square), adjusted R Square, and the standard error of the estimate. Together, these measures provide an overall assessment of the model's explanatory power and predictive accuracy.

*Table 3. Regression Model Summary for Passenger Experience Prediction*

| Regression Statistics | Value |
|---|---|
| Multiple R | 0.871023 |
| R Square | 0.758681 |
| Adjusted R Square | 0.758207 |
| Standard Error | 0.430054 |
| Observations | 511 |

The analysis shows a strong positive relationship between boarding management practices and passenger experience (Multiple R = 0.871). In practical terms, boarding management explains about 76% of the differences in how passengers experience the boarding process and Adjusted R Square = 0.7582, so we are confident that such a high explanatory power can be achieved after adjustment for any complexity in the model. The standard error of 0.43 suggests that predictions are reasonably accurate given the five-point scale used. Given the large sample size, the results are likely to be stable and reliable for operational decision-making.

The regression model explains roughly 76% of the variation in passenger experience, underscoring the dominant role of boarding execution in shaping commuter perceptions. In day-to-day operations, this largely comes down to having enough visible staff, making clear announcements, enforcing boarding lanes, and applying rules fairly. With a standard error of around 0.43 on a 1–5 scale, predictions are reasonably accurate, which makes the model appropriate for service dashboards and daily operational decisions such as staffing level adjustments during peak times or managing boarding lanes effectively (Alanazi et al., 2024).

The great model fit also provides ample support for redirecting resources to these key, high impact areas, specifically front-line staffing and communication, revealed in the previous survey results as the critical contributors. The results also warrant standardization of best practices, including boarding lane discipline, timing of announcements, and signage placement. These practices can be integrated into standard operating procedures and reinforced within training and quality audits to maintain consistency and enhance passenger satisfaction across board (Bakır et al., 2022).

Table 4 shows the analysis of variance (ANOVA) results of the regression model for the relationship between boarding management as predictor variable and passenger experience as outcome variable. The table summarizes the basic statistics such as degrees of freedom (df), sums of squares (SS), and mean squares (MS). It also provides the calculated

F-statistic along with the corresponding significance level (p-value) of both regression and residual components, and describes the total variation explained by the model.

*Table 4. ANOVA Summary for the Regression Model Predicting Passenger Satisfaction*

| | *df* | *SS* | *MS* | *F* | Significance *F* |
|---|---|---|---|---|---|
| Regression | 1 | 295.9589 | 295.9589 | 1600.243 | 3E-159 |
| Residual | 509 | 94.13761 | 0.184946 | | |
| Total | 510 | 390.0965 | | | |

ANOVA reveals that the regression model explains considerable variability in passenger response: the regression sum of squares (SS = 295.959) vs. the total (SS = 390.097) gives $r^2 \approx 0.759$ (consistent with the model summary). The F-statistic = 1600.243, we have df = (1, 509) and the p-value is minimal ($\approx 3.0 \times 10^{-159}$), which demonstrates the model is highly statistically significant, i.e., that the predictor(s) jointly account for variance of the passenger experience which would be unanticipated by chance. The residual mean square (MS=0.184946) corresponds to a root mean squared error of about 0.43 ($\sqrt{0.184946}$), suggesting typical prediction error in the scale of the output. The results show that the model fits the data well and reliably explains variations in passenger experience.

This makes the model useful for setting clear and measurable service targets for boarding operations. For example, staffing ratios and maximum response times can be defined so that sufficient workers will be available during boarding periods. Also, announcements may be systematically scheduled at specified time intervals prior to boarding to increase passengers' preparedness. Lane adherence targets and clearly defined fairness protocols should likewise be institutionalized as standard, to ensure that consistency, transparency, and accountability in boarding operations are made to improve passenger experience (Alanazi et al., 2024).

Predictive tools are utilized to optimize operations by modeling passenger experience across varying staffing and lane configurations. This should aid managers in scheduling extra personnel during peak times and better lane distribution. Real-time dashboards can be created to track critical indicators, such as announcement clarity, lane discipline, and fairness incidents. If these indicators fall below set thresholds, immediate corrective actions are triggered (Alanazi et al., 2024).

Performance variability should be controlled by control charts at various times of the day, by routes, and by gates. This would aid in distinguishing normal variations from any issues that need fixing. Managers can perform A/B testing of announcements, signage design, and lane layout to find out what works best and use all to ensure broad implementation (Bakır et al., 2022). Fairness continues to be a delicate field, so service recovery procedures should be designed to handle disruptions promptly. Such communications might include transparent announcements of boarding logic and available escalation pathways for complaints. More ongoing efforts should be incorporated so that prediction error can be minimized by increasing SOP compliance and improving the physical and communication systems (Bakır et al., 2022).

Management must establish clear accountability for each predictor, and link performance incentives to these areas. Training programs will include announcements, fairness handling, lane management, and periodic certification to maintain standards. This model has very strong explanatory power, and investments in infrastructure (e.g., PA systems, signage) should be prioritized. Last but not least, managers need to have a well-defined change management plan and develop early warning systems to identify dissatisfaction and mitigate against it before it escalates.

Table 5 provides estimates of regression coefficients of the model predicting the passenger experience by boarding management practices. These unstandardized coefficients for the intercept and predictor variable are shown in the table along with their standard errors.

Additionally, t-statistics and p-values are reported to evaluate the significance of each coefficient. The addition of 95% confidence intervals also gives an indication of the precision and reliability of the estimated effects in a regression model.

*Table 5. Regression Coefficients for Boarding Management Practices Predicting Passenger Experience*

| | *B* | *SE* | *t* | *p* | 95% *CI* |
|---|---|---|---|---|---|
| Intercept | 0.34 | 0.08 | 4.40 | < .001 | [0.19, 0.49] |
| Boarding Management Practices | 0.90 | 0.02 | 40.00 | < .001 | [0.85, 0.94] |

*Note. B* = unstandardized regression coefficient; SE = standard error; CI = confidence interval. Confidence intervals are reported at the 95% level. *p* values less than .001 are reported as $p < .001$ in accordance with APA guidelines.

The boarding management practice coefficient is 0.8949 (SE = 0.0224, t = 40.00, $p \approx 3.0 \times 10^{-159}$), 95% CI [0.8509, 0.9388]. This indicates a strong and meaningful positive relationship between boarding management practices and passenger experience. A slight uptick can be significant; for instance, a 0.10-point improvement in boarding practices is associated with an approximate 0.089-point increase in passenger experience.

The intercept of 0.3420 (SE = 0.0777, t = 4.40, $p \approx 1.3 \times 10^{-5}$, 95% CI [0.1894, 0.4946]), denotes the model's baseline prediction when the predictor equals zero. Although this value is essentially a scaling constant, achieving statistical significance shows that the model is a calibrated baseline. The coefficients confirm that there is a sizable and statistically robust effect of boarding management practices on passenger experience and are consistent with the reported high fit of the model.

The strong coefficient for boarding management practices suggests that management could design improvement targets in numbers with high coefficient estimates. Since the consequence is nearly one-to-one, even small improvement in boarding behavior would have significant benefits in passenger experience. For instance, a 0.10-point improvement in boarding practices is expected to raise passenger experience by about 0.09 points. This information can inform quarterly KPI targets and lead to a more realistic goal-setting approach for managers (Alanazi et al., 2024).

The narrow confidence interval means these estimates can be used with confidence when planning operational improvements. When it comes to estimates of improvements, managers may use the lower bound of the confidence interval to minimize the tendency to over-promise. This accuracy provides evidence for the definition of minimum acceptable scores in terms of announcements, lane adherence, and fairness. If boarding practices fall by some amount, managers can predict the drop in passenger experience and take corrective actions immediately.

Scenario planning and sensitivity analysis can simulate different operational conditions—e.g., peak and off-peak boarding periods. Through these methods, management can also determine how fluctuations in staffing levels, signage clarity, or announcement frequency affect a customer's level of satisfaction. Decision-makers can find out from exploring various scenarios what is going to have to change in order to maintain acceptable satisfaction levels, and what improvements are necessary. In addition, the very strong and stable role of boarding management supports the introduction of performance guarantees as part of the operating procedure, maintaining accountability and consistency in operation, and providing uniform service quality to all the teams.

The narrow confidence interval of the regression estimates provides support for proactive risk management in boarding operations. Even a slight deterioration in boarding management practices is expected to incur visible, quantifiable decreases in passenger satisfaction with their experience. Hence, early warning systems should be set-up to identify emerging issues promptly. These systems have the

potential to aggregate key operational metrics into an alert or risk score such that managers may be able to act early and avert dissatisfaction from becoming a bigger service issue (Alanazi et al., 2024).

### *Summary of Findings*

The evaluation of the boarding management system in Cebu South Bus Terminal was rated as Occasionally Observed (mean score of 3.37). Three of the seven considered criteria were rated as Frequently Observed fairness among the passengers (3.44), clear announcements and signage (3.42), and the proper implementation of boarding lanes (3.41). The rest were just occasionally observed as well—orderly process, staff availability and helpfulness, staff management, reasonable boarding time, indicating that there is a need for improvement, especially in areas such as staffing, coordination, and timeliness.

The passenger experience at boarding was rated as occasionally observed too, at an average mean score of 3.35. Two areas were rated as frequently observed: safety and security (3.41) and recommendation of the terminal (3.44) indicating that the general feeling of safety and willingness to recommend the terminal are there by passengers. While waiting time (3.18), comfort during boarding (3.30), convenience of the process (3.39) and overall satisfaction (3.40) were noted as occasionally observed, indicating slight dissatisfaction with time, comfort and ease of movement.

The implementation and satisfaction scores showed that the implementation rating (3.37) was a bit higher than the satisfaction rating (3.35). Hence there is a slight difference between the two score categories suggesting that while boarding management practices are generally being implemented at an acceptable level, they may not be fully meeting commuter expectations. There are higher standards to satisfy the passengers for service quality and experience, which may help to understand passengers' satisfaction after implementation. And the result of this, is that services must continuously refine their boarding processes if service delivery is to better meet commuter expectations and perceptions.

The analysis performed in regression showed that boarding management practices have a strong positive correlation to passenger experience with correlation coefficient of 0.871 and an $R^2$ = 0.759, indicating that boarding practices can describe approximately 76% of the variability in passenger experience. The model was statistically significant and precise with around a standard error of 0.43. A coefficient analysis indicated that boarding management practice has a large and significant effect on passenger experience ($\beta$ = 0.895), implying that even minor improvements to boarding practices are able to significantly improve customer satisfaction.

### *Summary of Implications and Recommendations to Management*

As an immediate and low-cost intervention, terminal management may implement a fixed, time-based public announcement protocol during peak hours (e.g., every 5–7 minutes), during which staff verbally inform passengers of the status of incoming buses, approximate waiting times, and boarding sequence rules. This measure requires no additional infrastructure and can be executed using existing public address systems and frontline personnel. By reducing informational uncertainty, such announcements directly address the lowest-rated satisfaction dimension—waiting time—by improving perceived control and predictability, even when actual delays cannot be fully eliminated. This “quick win” can be deployed immediately and evaluated through short-term passenger feedback before more resource-intensive interventions are introduced.

Boarding management strategies are the key factors of passenger experience, accounting for roughly 76% of the variance. Operational improvements can markedly increase commuter satisfaction. Control of the most impactful factors: personnel supply and helpfulness, clear announcements and signage, proper lane implementation, and fairness among passengers (Alanazi et al., 2024). These are areas where managers could establish clear service-level objectives if they wish to drive improvement in their work practices. Staffing ratios and response times will need to be established to

maintain the number of personnel for when operations become busiest. Announcements should follow a structured schedule and be clear and audible, supported by visible signage. Lanes should be properly marked and monitored to ensure order and fairness (Bakır et al., 2022).

Tools like predictive analytics and real-time dashboards can be used to keep a pulse on waiting time, lane discipline, and announcement clarity as key performance indicators. If performance falls below set thresholds, corrective action should be immediately initiated. Frequent audits and A/B tests of announcements, signage layouts, and lane configurations can identify best practices for wider implementation (Alanazi et al., 2024). The management side should assign accountability for each key area and then link incentives to performance based on these indicators. Training should focus on communication, fairness handling, and lane management, with periodic certification. Focus should be on investing in infrastructure including PA systems, signage, and queue barriers. Finally, early warning systems should be established to detect and address potential dissatisfaction before it escalates (Bakır et al., 2022).

## Conclusion

This study examined how boarding management is experienced by commuters at the Cebu South Bus Terminal, where daily operational pressures directly shape perceptions of order, fairness, and comfort. Results showed that the implementation of boarding practice (mean = 3.37) and passenger experience (mean = 3.35) were generally perceived as Occasionally Observed. Strengths such as fairness, clarity of announcements, lane discipline, and safety were reported, but challenges such as waiting time, comfort, and availability of staff were reported. Regression results showed a significant positive relationship between boarding management and passenger experience ($R = 0.871$; $R^2 = 0.759$); hence improvements of boarding practices lead to greater commuter satisfaction. The results also show that even small improvements in boarding practices can noticeably improve passenger experience.

The study provides solid empirical evidence for practical suggestions for terminal improvements on the operation and management. The focus is more on having enough staff and better timing of announcements and communications. More progress might also be made via formalizing boarding procedures, increasing the visibility and clarity of signage and strictly applying fairness guidelines. Continued investment in facilities, staff training, and basic monitoring systems will be important to sustain these improvements. Management could also use predictive analytics, operational dashboards, or early warning mechanisms to effectively ensure service levels continue to improve and lower the likelihood of increasing commuter dissatisfaction.

The contribution of this research could be strengthened by examination of the passenger segmentation and any difference in boarding experiences by age, travel motivation, and frequency of travel. It is also possible to study the possible role technology-oriented solutions, for example, automated lane systems, digital queue management tools, or real-time crowd surveillance, can play in enhancing boarding processes. Longitudinal studies are suggested to assess the long-term results of implementation, while more extensive comparisons between terminals or regions could also provide broader insight into best boarding management in the public transportation system.

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