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ASSESSMENT OF GROUND HANDLING OPERATIONS AND THEIR IMPACT ON FLIGHT TURNAROUND TIME IN NIGERIAN AIRPORTS

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Abstract

Ground handling operations represent a critical determinant of flight turnaround time and overall airport efficiency, yet inadequacies in equipment, staffing, coordination, and regulatory enforcement continue to affect service delivery at Nigerian airports. This study assessed ground handling operations and their impact on flight turnaround time, focusing on three key dimensions: passenger and cargo handling, ramp handling and aircraft servicing, and refueling, catering and load control. The study adopted a quantitative research design and employed a purposive sampling technique to select respondents comprising ground handling staff, airline operations personnel, and airport authority officials. Population of 300 was accessible, and a sample size of 171 was determined using the Taro Yamane formula; 79 valid respondents was used for analysis, using descriptive statistics and simple linear regression, The findings revealed

that passenger and cargo handling had a significant effect on flight turnaround time, explaining 31.4% of the variation (R^2 = .314, F = 35.225, p < .05). Ramp handling and aircraft servicing showed the strongest effect, explaining 45.8% of the variation (R^2 = .458, F = 65.084, p < .05), while refueling, catering and load control accounted for 43.1% of the variation (R^2 = .431, F = 57.456, p < .05). The study concludes that ground handling operations are a critical determinant of flight turnaround time in Nigerian airports. It therefore recommends that improved staffing, equipment maintenance, inter-agency coordination, and stronger regulatory enforcement by the NCAA and FAAN to reduce ground delays and enhance on-time departure performance.
Keywords: Ground Handling Operations, Flight Turnaround Time, Airport Operational Efficiency, Passenger and Cargo Handling, Ramp Handling, Nigerian Airports

INTRODUCTION

The international aviation sector has experienced tremendous growth within the past few decades, contributing more than 87 million jobs and about 3.5 trillion dollars to global gross domestic product (Dev et al., 2023), and its continued growth and development must be properly managed (Gössling and Humpe, 2020). Among the wide spectrum of activities that ensure the safety, efficiency and punctuality of airport operations, ground handling has been identified as the major factor influencing operational efficiency (Ayadi and Rashid, 2025). Ground handling refers to the range of services an aircraft receives from the time it lands to the time it departs, spanning above-the-wing activities such as passenger check-in, boarding and customer service, and below-the-wing activities such as baggage handling, marshalling, pushback, refuelling, catering and cargo handling (Sheibani, 2020).

Ground handling is closely linked to flight turnaround time, defined as the period from aircraft arrival to departure, and is regarded as a key performance indicator with a direct effect on aircraft and airline profitability (Al-Qatawneh et al., 2025). Any delay in a single ground handling activity can propagate through the entire turnaround process (Hutter and Pfennig, 2023). Airlines therefore continually seek ways of minimising turnaround time without compromising safety or service quality.

Nigeria's aviation sector has undergone considerable development following sectoral reforms and rising demand for air travel, with 32 airports nationwide, the busiest being Murtala Muhammed International Airport (Lagos), Nnamdi Azikiwe International Airport (Abuja) and Port Harcourt International Airport (Ojo, 2024). Despite the critical role these airports play in domestic and international air transport, the sector continues to face significant operational challenges (Sylva and Amah, 2021). Ground handling agencies in Nigerian airports frequently

rely on old and poorly maintained ground support equipment such as baggage tractors, loading bridges, pushback tugs and refuelling vehicles, which are often unavailable at critical turnaround times, while the Federal Airports Authority of Nigeria (FAAN) has itself acknowledged infrastructural inadequacy as a persistent challenge (Ojo, 2024).

Beyond infrastructure, ground handling in Nigeria is also constrained by human-resource challenges, including high staff turnover, understaffing, non-compliance with standard operating procedures, and insufficient investment in staff training, all of which affect the efficiency of passenger handling, baggage handling, aircraft cleaning and load-sheet generation, and consequently the achievement of on-time departures (Sheibani, 2020; Ohida, 2023). The lack of synergy among the several independent agencies involved in the turnaround process — airline operations staff, ground handling agencies, fuel providers, caterers, air traffic control and security — has also been identified as a major challenge, particularly the absence of a defined Turnaround Coordinator and of digital communication among agencies, leading to delays that exceed airlines' Minimum Ground Time (Ayadi and Rashid, 2025). Weaknesses also persist in regulatory enforcement by the Nigerian Civil Aviation Authority (NCAA), where the absence of punitive measures for non-compliant service providers has contributed to generally poor performance in ground handling service delivery (Sylva and Amah, 2021).

At mid-sized airports such as General Tunde Idiagbon International Airport, Ilorin, unique challenges relating to handling capacity and economies of scale have produced turnaround delays that are disproportionate to the volume of traffic handled. Notwithstanding the evident severity of these challenges, research on the relationship between ground handling efficiency and flight turnaround time in Nigeria remains limited, with most existing studies focused on general infrastructural, policy and funding challenges rather than the direct, quantifiable relationship between ground handling dimensions and turnaround performance (Abili and Oji, 2024). This study therefore assessed ground handling operations and their impact on flight turnaround time in Nigerian airports, with specific reference to three operational dimensions — passenger and cargo handling; ramp handling and aircraft servicing; and refuelling, catering and load control — using General Tunde Idiagbon International Airport, Ilorin, as a case study. Specifically, the study examined the effect of passenger and cargo handling on flight turnaround time, determined the effect of ramp handling and aircraft servicing on flight turnaround time, and assessed the effect of refuelling, catering and load control on flight turnaround time at Nigerian airports.

LITERATURE REVIEW

Ground handling operations encompass the entire spectrum of services extended to an aircraft from arrival to departure. The International Air Transport Association defines ground

handling operations as “all operational activities required to enable the preparation of an aircraft for the next flight,” including passenger handling, baggage handling, aircraft handling and ramp handling (Maizara and Sutarwati, 2024). These activities are traditionally grouped into above-the-wing services, such as check-in, boarding-gate management and passenger assistance, and below-the-wing services, such as baggage handling, marshalling, fuelling and cargo handling (Ayadi and Rashid, 2025). Passenger handling covers check-in, baggage tagging, seat allocation, boarding, assistance to passengers with special needs and complaint handling, and its effectiveness is directly tied to passenger satisfaction (Bilqis and Afnan, 2024). Baggage handling involves sorting, transporting, loading, unloading, tracing and reconciling baggage with the concerned flight, and is a particularly complex and costly process (Tymofiiv et al., 2024). Ramp service covers marshalling, parking guidance, pushback, towing and provision of ground power and air conditioning, requiring close coordination with the flight deck (Rahman and Akbar, 2023), while aircraft cleaning, catering and refuelling coordination — including load planning, load-sheet preparation and weight-and-balance verification — complete the range of turnaround activities (Sheibani, 2020; Plaza and Santos, 2020).

Flight turnaround time, the period from aircraft arrival at the gate to its subsequent departure, is bounded by each airline's Minimum Ground Time (MGT); when actual ground time exceeds the MGT, a ground delay occurs, which is among the leading causes of flight delays worldwide (Hajko and Badánik, 2020). Because an aircraft is only productive while airborne, turnaround time carries direct financial significance, a concern that is especially acute for Nigerian airlines already burdened by high operating costs (Hutter and Pfennig, 2023). Turnaround time is also a proxy for the effectiveness of the ground handling system as a whole, reflecting the quality of inter-agency communication, equipment availability and personnel deployment (Vigneswaran et al., 2025).

Airport operational efficiency describes an airport system's ability to deploy its resources to provide safe, efficient and cost-effective service to passengers, cargo operators and airlines, minimising delay without compromising safety or service standards (Alomar and Nikita, 2025). It is commonly tracked through key performance indicators such as on-time departure rates, gate occupancy time, baggage delivery compliance and ground equipment availability, and is increasingly supported by technologies such as Airport Operational Databases (AODB) and Advanced Surface Movement Guidance and Control Systems (A-SMGCS) (Bilal, 2024). In Nigeria, even strategic airports such as Murtala Muhammed International Airport and Nnamdi Azikiwe International Airport continue to experience epileptic power supply, outdated ground support equipment, understaffing and weak inter-agency coordination, all of which extend ground time, raise operating costs and erode passenger confidence (Hassan and Olabosinde,

2025). Regulatory oversight of Nigerian ground handling rests principally with the Nigerian Civil Aviation Authority (NCAA), which licenses airports and certifies ground handling companies under the Civil Aviation Act 2006 and the Nigerian Civil Aviation Regulations, and the Federal Airports Authority of Nigeria (FAAN), which manages the physical infrastructure — runways, terminals, ramps and cargo facilities — of over twenty federally owned airports (NCAA, 2022; Unaegbunam et al., 2020).

Theoretical Review

This study is anchored on Systems Theory and Queuing Theory. Systems Theory, traceable to Bertalanffy (1968), holds that complex phenomena are better understood through the interaction of their component parts than through the parts in isolation, with overall performance depending on how well the subsystems are interdependent. Ground handling is not performed by a single agent but by multiple interacting subsystems — passenger handling teams, baggage crews, ramp agents, refuelling personnel, caterers, maintenance technicians, load controllers and airline operations staff — all operating within the same limited time frame (Wandelt and Wang, 2024). A failure in any one subsystem, such as equipment breakdown, staff shortage or a communication lapse, propagates through the entire turnaround process rather than remaining contained, a pattern documented at Nigerian airports where the absence of a defined Turnaround Coordinator and weak inter-agency communication were recurring causes of ground delay (Ayadi and Rashid, 2025). Systems Theory therefore situates ground handling as an integrated operational system in which the productivity of one component quantifiably affects overall turnaround time, implying that systemic interventions, rather than piecemeal fixes, are more likely to produce sustainable improvement.

Queuing Theory, originating from Erlang's (1913) work on telephone-network congestion, explains how queues form and dissipate when demand for a service exceeds the capacity of a finite number of service channels (Santos et al., 2022). In ground handling, queuing arises at several points — aircraft awaiting an available gate or stand, ground equipment already committed to another aircraft, and passengers queuing at check-in, gates or immigration — all of which can extend the departure process if not properly managed (Ramaganesh et al., 2021). When the service rate falls below the arrival rate, queues lengthen and turnaround time extends beyond schedule, a condition frequently observed at Nigeria's busiest airports (Ekeocha and Ushe, 2018). Queuing Theory further emphasises efficient server utilisation and adequate buffer capacity; Nigerian ground handling companies typically operate with narrow resource margins, so that any unexpected disruption produces long queues and consequent delay (Vigneswaran et al., 2025). The theory thus offers a systematic basis for

understanding how resource constraints, demand fluctuations and service inefficiencies combine to produce the turnaround delays characteristic of Nigerian airports, and for identifying targeted interventions such as pre-positioning equipment, staggering flight schedules and reinforcing crew presence at peak periods.

Empirical Review

A growing body of empirical work supports the relationship between ground handling and airport/airline performance in Nigeria and comparable contexts. Auya et al. (2026), studying airline policy compliance and operational efficiency at Nnamdi Azikiwe International Airport, Abuja, found that airlines with higher policy compliance recorded better flight, passenger-control and baggage-handling efficiency, although inadequate infrastructure and outdated technology limited these gains. Chukundah et al. (2025) established that flight dispatch reliability and baggage-handling accuracy were positively associated with service delivery performance among aviation enterprises in Akwa Ibom and Rivers States. Ollor and Uhiene (2023), examining service quality and passenger satisfaction at Port Harcourt International Airport, found that check-in efficiency and baggage handling were strongly correlated with both service quality and turnaround-linked satisfaction.

Bor et al. (2025), assessing ground handling and air-safety performance at Jomo Kenyatta International Airport, found that passenger handling exerted a considerable effect on air safety while cargo handling had a smaller effect, and recommended additional staff training and stronger adherence to standard operating procedures. Sheibani (2020) applied critical path analysis and simulation to aircraft turnaround scheduling and found that simulation-based scheduling reduced idle time in equipment and crew utilisation relative to existing practice. Szabo et al. (2021), analysing turnaround processes at Košice Airport using 2,340 recorded data points, showed that turnaround time could be reduced through improved equipment placement and ground-vehicle routing without significant financial investment.

Within the Nigerian context specifically, Oluwafisayo and Mobolaji (2020) found that 63% of domestic flights at Murtala Muhammed International Airport experienced delay in a given month, with baggage handling and boarding processing among the leading operational causes after aircraft-related factors. Ogunleye et al. (2022) established a significant relationship between facility management and airport service quality across the terminals of the same airport, while Hassan and Olabosinde (2025) confirmed that airport infrastructure — particularly ticketing, reservation and security-check areas — was a key determinant of operational efficiency. Nwasonuba and Okeudo (2021) reported that security service delivery at Nigerian airports fell below international standards owing to inadequate equipment and outdated

technology, a factor with direct implications for passenger-processing turnaround. Mwang'amba (2020), studying ground handling at Julius Nyerere International Airport, Tanzania, attributed inefficiencies to under-utilised human resources, high absenteeism and poor manpower planning — patterns also widely reported in Nigeria.

Vigneswaran et al. (2025) identified resource shortages, procedural inefficiency, adverse weather, equipment shortfalls and security requirements as simultaneous, interacting causes of ground handling delay, requiring coordinated solutions spanning technology, infrastructure, training and communication. Related studies have shown that external factors also shape turnaround performance in Nigeria: Onwuadiochi et al. (2023) found a strong positive association between thunderstorm activity and flight delay/cancellation at Murtala Muhammed International Airport, while Gladys et al. (2022) demonstrated that disruptions in ground handling increase downstream fuel consumption. Taken together, these studies confirm that ground handling efficiency — spanning passenger and cargo handling, ramp and aircraft servicing, and refuelling, catering and load control — is a consistent and significant determinant of flight turnaround performance, and that its improvement in Nigeria requires simultaneous attention to infrastructure, staffing, coordination and regulatory enforcement.

Building on this literature, the study conceptualises ground handling operations as the independent variable, disaggregated into passenger and cargo handling; ramp handling and aircraft servicing; and refuelling, catering and load control, with flight turnaround time as the dependent variable. Regulatory environment, infrastructure quality and human resource capacity are conceived as moderating conditions that shape the strength of this relationship, consistent with the Systems Theory and Queuing Theory perspectives adopted above.

MATERIALS AND METHODS

This study employed a quantitative research design to examine how ground handling operations affect flight turnaround time in Nigerian airports, using a survey approach to collect structured data suitable for hypothesis testing. The study was carried out at General Tunde Idiagbon International Airport (GTIA), Ilorin, Kwara State — a domestic airport serving the North-Central geopolitical zone of Nigeria, characterised by a comparatively lower volume of ground handling activity alongside operational challenges linked to limited handling capacity and resources.

The population of the study comprised aviation personnel directly involved in ground handling operations and flight turnaround activities at GTIA, drawn from FAAN staff (airport operations, administration, airside management, safety/fire services and terminal security), airline personnel (check-in agents, operations officers and ramp supervisors) and ground

handling staff (ramp operations, baggage handling, aircraft marshalling, fuelling coordination, cleaning and cargo handling). In the absence of officially published airport-specific staff data, a working population of 300 was adopted as a conservative and realistic estimate for an airport of GTIA's operational scale.

A purposive (judgmental) sampling technique was adopted to select respondents with direct knowledge of, and involvement in, ground handling activities, since random sampling risked including individuals without the relevant expertise (Makwana et al., 2023). The Taro Yamane (1967) formula was applied to determine the sample size from the population of 300:

$n = N / [1 + N(e)^2]$

where, n is the required sample size, N is the total population (300) and e is the margin of error (0.05).

$n = 300 / [1 + 300(0.05)^2] = 300 / 1.75 \approx 171$

A sample size of 171 respondents, proportionately distributed across FAAN staff, airline personnel and ground handling staff, was therefore adopted. Owing to constraints encountered during fieldwork — including limited availability of staff on duty shifts or leave, the restricted time frame for data collection, and security-clearance limitations on access to airside personnel — a total of 79 valid, properly completed responses were eventually obtained and used for the analysis, a number considered adequate for testing the study's hypotheses.

Primary data were collected using a structured questionnaire administered directly to sampled respondents. The instrument comprised two sections: Section A captured demographic and background information (gender, age, educational qualification, designation and years of experience), while Section B contained items on the three ground handling dimensions — passenger and cargo handling; ramp handling and aircraft servicing; and refuelling, catering and load control — alongside items assessing flight turnaround time outcomes. Section B items were rated on a five-point Likert scale ranging from strongly agree (5) to strongly disagree (1) (Tanujaya et al., 2023).

Data were analysed using both descriptive statistics (frequencies, percentages, means and standard deviations) and inferential statistics. Simple linear regression analysis was used to test the predictive effect of each of the three ground handling dimensions on flight turnaround time, with Analysis of Variance (ANOVA) applied to assess the statistical significance of each regression model. All analyses were conducted in the Statistical Package for the Social Sciences (SPSS) version 25, with hypotheses tested at the 5% ($p < 0.05$) level of significance. The functional relationship for each hypothesis is expressed as:

Flight Turnaround Time (FTT) = f (Ground Handling Dimension)

With the econometric form specified separately for each dimension as:

$FTT = \beta 0 + \beta 1PCHi + \varepsilon i$ $FTT = \beta 0 + \beta 1RHSi + \varepsilon i$ $FTT = \beta 0 + \beta 1RCLi + \varepsilon i$

Where: FTT = Flight Turnaround Time; PCH = Passenger and Cargo Handling; RHS = Ramp Handling and Aircraft Servicing; RCL = Refuelling, Catering and Load Control; β0 = constant; β1 = regression coefficient; εi = error term.

Instrument reliability was assessed through Cronbach's Alpha analysis of pilot-test data collected from 20 respondents drawn from the study population but excluded from the final sample, with an alpha value exceeding 0.70 taken as acceptable (Nunnally, 1978). Face validity was established through review of the draft instrument by the research supervisor and experienced academics in transport management and aviation studies, while content validity was ensured by aligning questionnaire items with the dimensions and sub-components defined in the study's conceptual framework and with previously validated instruments used in related ground handling and airport operations research.

RESULTS AND DISCUSSION

Response Rate and Demographic Characteristics of Respondents

A total of 79 properly completed and valid copies of the questionnaire were retrieved and used for the descriptive and inferential analyses presented in this section. Table 1 presents the demographic characteristics of respondents. Female respondents constituted a slight majority, at 43 (54.4%), compared with 36 male respondents (45.6%). In terms of age, the sample was dominated by younger, economically active respondents: 43 (54.4%) were aged 18–25 years and 31 (39.2%) were aged 26–35 years, with only 4 (5.1%) aged 36–45 and 1 (1.3%) aged 46 years and above. Regarding educational qualification, 50 respondents (63.3%) held an HND/B.Sc., 20 (25.3%) held WAEC/NECO/OND, and 9 (11.4%) held an M.Sc./MBA, indicating an adequately literate respondent base capable of understanding the questionnaire items. By designation, 31 respondents (39.2%) were ground handling staff, 23 (29.1%) were airline operations personnel, 11 (13.9%) were airport authority officials, and 14 (17.7%) held other roles - a spread well suited to a study centred on ground handling and turnaround performance.

Table 1: Demographic Characteristics of Respondents

Variable / Category	Frequency	Percentage (%)
Gender		
Female	43	54.4
Male	36	45.6

Table 1…

Age		
18–25 years	43	54.4
26–35 years	31	39.2
36–45 years	4	5.1
46 years and above	1	1.3
Educational Qualification		
HND/B.Sc.	50	63.3
WAEC/NECO/OND	20	25.3
M.Sc./MBA	9	11.4
Designation/Role		
Ground Handling Staff	31	39.2
Airline Operations Personnel	23	29.1
Airport Authority Official (FAAN)	11	13.9
Others	14	17.7
Years of Experience		
Less than 2 years	41	51.9
2–5 years	25	31.6
6–10 years	8	10.1
Above 10 years	5	6.3

Effect of Ground Handling Dimensions on Flight Turnaround Time

Descriptively, respondents rated all three ground handling dimensions favourably. For passenger and cargo handling, 49.4% strongly agreed and 44.3% agreed that check-in was completed within schedule, while 38.0% strongly agreed and 49.4% agreed that delays in check-in and boarding extend turnaround time; a similar pattern held for cargo documentation and baggage offloading/loading. For ramp handling and aircraft servicing, 46.8% strongly agreed and 45.6% agreed that marshalling and parking guidance were carried out promptly, and 54.4% strongly agreed that ramp staff demonstrated competence and adherence to standard operating procedures, while 38.0% strongly agreed and 48.1% agreed that poor ramp–operations coordination causes delay. For refuelling, catering and load control, 48.1% strongly agreed and 45.6% agreed that refuelling was completed within scheduled turnaround time, 44.3% strongly agreed and 46.8% agreed that load-sheet preparation and weight-and-balance calculations were completed on time. A general assessment item further showed that 49.4% strongly agreed and 48.1% agreed that ground handling operations at the airport were carried out efficiently overall, while 55.7% strongly agreed that NCAA/FAAN regulatory enforcement positively influences ground handling performance.

Table 2 presents the regression results for the three hypotheses tested. Each dimension of ground handling operations was regressed separately against flight turnaround time.

Table 2: Regression Results on the Effect of Ground Handling Dimensions on Flight Turnaround Time

Ground Handling Dimension	Constant (β_0)	β	t-value	F-value	Sig.
Passenger and Cargo Handling	2.424	.464	5.935	35.225	.000
Ramp Handling and Aircraft Servicing	1.703	.624	8.067	65.084	.000
Refuelling, Catering and Load Control	1.995	.554	7.580	57.456	.000

Dependent Variable: Flight Turnaround Time.

Table 3: Model Summary of Regression Analysis for the Three Study Hypotheses

Ground Handling Dimension	R	R^2	Adjusted R^2	Std. Error
Passenger and Cargo Handling	.560	.314	.305	.389
Ramp Handling and Aircraft Servicing	.676	.458	.451	.345
Refuelling, Catering and Load Control	.657	.431	.424	.354

The model summary in Table 3 shows that passenger and cargo handling explained 31.4% of the variation in flight turnaround time ($R = .560$, $R^2 = .314$), with an F-value of 35.225 significant at $p = .000$; the null hypothesis that passenger and cargo handling has no significant effect on flight turnaround time was therefore rejected. Ramp handling and aircraft servicing produced the strongest effect of the three dimensions, explaining 45.8% of the variation ($R = .676$, $R^2 = .458$, $F = 65.084$, $p = .000$), leading to rejection of the corresponding null hypothesis. Refuelling, catering and load control explained 43.1% of the variation ($R = .657$, $R^2 = .431$, $F = 57.456$, $p = .000$), and its null hypothesis was likewise rejected. Across all three models, the positive and statistically significant beta coefficients (.464, .624 and .554, respectively) confirm that improvements in each ground handling dimension are associated with better (shorter) flight turnaround performance.

Discussion of Findings

The finding that passenger and cargo handling significantly affects flight turnaround time is consistent with the view that passenger flow and baggage handling are core components of aircraft turnaround operations (Schmidt, 2017) and supports evidence that baggage-handling inefficiencies constrain airport operational performance more broadly (Ekeocha and Ushe, 2018). This implies that improving check-in, boarding coordination, cargo documentation and

baggage reconciliation can meaningfully reduce departure delay and strengthen schedule reliability.

The stronger effect recorded for ramp handling and aircraft servicing supports the position that turnaround performance depends heavily on the coordination of ramp activities, ground equipment and aircraft servicing tasks (Szabo et al., 2021), and aligns with evidence that ground-support-equipment availability and maintenance are central to efficient turnaround (Rahman and Akbar, 2023). Because ramp activities occur in direct proximity to the aircraft within a tightly bounded time window, prompt marshalling, pushback, cleaning and equipment support carry disproportionate weight in determining overall turnaround time.

The significant effect of refuelling, catering and load control is consistent with studies showing that logistics processes, load documentation and task sequencing shape ground operations (Sheibani, 2020), and with recent evidence that ground-time reduction requires coordination across multiple turnaround functions rather than reliance on a single operational unit (Hutter and Pfennig, 2023). This underscores the need for effective communication among refuelling, catering and load-control teams to avert late aircraft readiness.

Taken together, the results support the broader argument that ground handling efficiency is central to flight turnaround performance, consistent with recent findings that inadequate staffing, equipment constraints and weak coordination generate operational bottlenecks (Vigneswaran et al., 2025), and with workforce and digitalisation research showing that staffing levels, scheduling practices and technology adoption shape airport ground operations (Wandelt and Wang, 2024). Improving ground handling performance in Nigerian airports therefore requires simultaneous attention to adequate manpower, equipment availability, regulatory enforcement and digital monitoring of turnaround tasks, rather than isolated interventions in any single operational area.

CONCLUSION

This study assessed ground handling operations and their impact on flight turnaround time at General Tunde Idiagbon International Airport, Ilorin, focusing on passenger and cargo handling, ramp handling and aircraft servicing, and refuelling, catering and load control. Based on 79 valid responses analysed through descriptive statistics and simple linear regression, the study found that all three dimensions of ground handling operations exert a statistically significant effect on flight turnaround time, with ramp handling and aircraft servicing showing the strongest explanatory power (45.8%), followed by refuelling, catering and load control (43.1%) and passenger and cargo handling (31.4%). All three null hypotheses were accordingly rejected.

The study concludes that passenger and cargo handling is significant because check-in, boarding, baggage handling, cargo documentation and baggage reconciliation determine whether the earliest stage of the turnaround process is completed on time, with any delay at this stage carrying forward into subsequent aircraft preparation activities. Ramp handling and aircraft servicing is significant because ramp activities occur closest to the aircraft and most directly determine the pace of departure preparation, so that prompt marshalling, pushback, towing, cleaning, ground power supply and equipment availability are essential to timely turnaround. Refuelling, catering and load control is significant because delays in refuelling, late catering, load-sheet errors and weak coordination among these units directly delay aircraft readiness. Ground handling operations are, therefore, a critical determinant of flight turnaround time in Nigerian airports, and effective turnaround management requires coordinated operations across passenger handling, cargo handling, ramp servicing, refuelling, catering and load control functions.

In light of these findings, it is recommended that airport management and ground handling companies improve passenger check-in, boarding coordination, baggage loading and cargo documentation processes to ensure these activities are completed within scheduled turnaround time, and that adequately trained staff be provided for passenger, baggage and cargo handling, particularly during peak periods. Ramp handling teams should ensure that marshalling, parking guidance, pushback, towing, aircraft cleaning and ground power supply are carried out promptly and in line with standard operating procedures, while airport authorities should ensure that ground support equipment — baggage tractors, ground power units and towing equipment — is available, functional and well maintained. Refuelling, catering and load control teams should strengthen coordination to keep these activities within airlines' minimum ground time, and airlines and ground handling agencies should reinforce communication among ramp teams, operations staff, refuelling staff, catering staff and load control officers. The NCAA and FAAN should strengthen enforcement of operational standards for ground handling services to reduce delays arising from poor compliance, and airport operators should invest in digital tracking and turnaround-monitoring systems capable of identifying delayed ground handling tasks early enough for corrective action before departure time is affected.

LIMITATIONS OF THE STUDY

The study was limited geographically to the General Tunde Idiagbon International Airport, Ilorin, Kwara State, and therefore, the findings may not be readily generalisable to other airports in Nigeria with different operational characteristics. In addition, the analysis was based on the questionnaires that were successfully retrieved and found usable for the study.

Consequently, the availability and completeness of the retrieved questionnaires may have constrained the volume of data available for analysis and potentially limited the extent to which the findings reflect the views of the entire target population. Despite these limitations, appropriate measures were taken to ensure that the data collected were relevant, adequately analysed, and suitable for addressing the objectives of the study.

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