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A Multi-Criteria Performance Analysis Of Turboprop And Jet Aircraft Operations In The Nigerian Aviation Industry

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ABSTRACT

This study presents a multi-criteria performance analysis of turboprop and jet aircraft operations within the Nigerian aviation industry, integrating operational, economic, and safety-related dimensions into a unified evaluation framework. The analysis focuses on five key performance indicators: fleet profile, operational efficiency, aircraft-related losses, flight crew and maintenance performance, and financial stability. Secondary data from two representative Nigerian airlines covering the period 2017–2019—one operating a predominantly turboprop fleet and the other a jet-based fleet—are analyzed using descriptive statistics and Grey Relational Analysis (GRA) to capture relative performance rankings and trade-offs across criteria. The results indicate that turboprop operations are characterized by older, lower-capacity fleets, reflecting lower acquisition and leasing costs that appeal to financially constrained operators. However, this cost advantage is associated with prolonged fleet retention and higher defect ratios in maintenance and crew inspections. Despite these limitations, turboprop aircraft demonstrate stronger financial performance, particularly in asset utilization and return metrics, and are better suited to short-haul domestic routes. Conversely, jet aircraft exhibit greater operational flexibility and passenger preference but incur higher maintenance costs and lower load factors on short sectors, reducing their efficiency in the Nigerian route environment. The findings highlight the importance of aligning aircraft type selection with route structure, infrastructure constraints, and institutional safety oversight capacity. The study contributes to existing literature by applying a multi-criteria decision-making approach to aircraft performance evaluation in a developing aviation market and provides evidence-based recommendations for fleet planning and policy formulation in Nigeria's domestic airline sector.

Keywords: Turboprop, Jet Aircraft, Fleet Analysis, Nigerian Aviation, Operational Performance, Financial Stability

Aims Research Journal Reference Format:
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1. INTRODUCTION

The aviation sector in Nigeria plays a critical role in national development by facilitating economic integration, regional connectivity, and mobility across a geographically dispersed population. As domestic air transport demand continues to evolve, strategic decisions regarding airline fleet composition have become increasingly important for ensuring operational efficiency, financial sustainability, and safety performance. Among these decisions, the choice between turboprop and jet aircraft remains a central consideration, given its direct implications for cost structures, route suitability, and service delivery (Ubogu et al., 2020; Obot & Ezeanya, 2020).

Turboprop aircraft, powered by gas-turbine engines driving propellers, are generally optimized for short-haul operations due to their lower fuel consumption at reduced speeds and altitudes (ATR, 2022). They are particularly effective on routes with shorter stage lengths and lower passenger demand, where their operating economics provide a competitive advantage (ICAO, 2019; IATA, 2023). In contrast, jet aircraft, typically equipped with turbofan engines, offer higher cruise speeds, longer range, and greater passenger capacity, making them suitable for high-demand routes and time-sensitive travel markets (Boeing, 2022; Airbus, 2023). However, these advantages often come with higher acquisition, maintenance, and operating costs, especially when deployed on short domestic routes where their performance benefits are not fully realized.

In the Nigerian aviation context, the relevance of this aircraft-type trade-off is amplified by structural and operational realities. Domestic routes are predominantly short-haul, airport infrastructure varies significantly in capability, and airlines operate under financial and regulatory constraints. While turboprops appear well-suited to such an environment, many operators continue to deploy jet aircraft across similar routes, raising questions about efficiency, sustainability, and long-term viability (NCAA, 2020; Olukoju, 2021). Furthermore, recent industry reports emphasize the growing importance of cost optimization, environmental considerations, and resilience in fleet planning decisions, particularly in emerging aviation markets (IATA, 2023; ICAO, 2022).

Despite the practical significance of these issues, there is a limited body of empirical research that systematically evaluates the comparative performance of turboprop and jet aircraft within the Nigerian aviation industry using integrated analytical frameworks. Existing studies tend to focus on isolated performance metrics, such as cost or operational efficiency, without capturing the multi-dimensional nature of airline performance. This study addresses this gap by applying a multi-criteria decision-making approach, specifically Grey Relational Analysis (GRA), to assess and compare the performance of turboprop and jet aircraft operations in Nigeria. Using data from two representative airlines with distinct fleet compositions, the study evaluates performance across operational, financial, and safety-related dimensions. The objective is to provide a more holistic understanding of aircraft-type performance and to support evidence-based decision-making in fleet planning, regulatory policy, and airline management within the Nigerian aviation sector.

2. LITERATURE REVIEW

A body of scholarly and industry literature exists on aircraft performance and fleet management, yet few studies offer direct comparative analysis of turboprop and jet aircraft in African aviation markets. Globally, turboprops are recognized for their cost-effectiveness in short-haul, low-density markets, often outperforming jets in terms of fuel efficiency and emissions per seat-mile (Boeing, 2022; ATR, 2022). Jet aircraft, meanwhile, dominate medium- and long-haul markets where speed and passenger expectations play critical roles (IATA, 2021). Within the African and Nigerian context, infrastructure limitations, route density, regulatory enforcement, and cost of capital are persistent constraints influencing fleet decisions (Ubogu et al., 2020; Olukoju, 2021). Obot and Ezeanya (2020) highlighted the challenges Nigerian airlines face in financing and maintaining modern fleets, often leading to the prolonged use of aging aircraft. Meanwhile, NCAA (2020) reports underscore the safety oversight difficulties associated with fleet heterogeneity and aging equipment. Several scholars have emphasized the relevance of aligning fleet characteristics with operational environments. For instance, Adeniran and Okwuashi (2019) suggest that optimal fleet planning in West Africa should be informed by a combination of geographic, economic, and technical variables. Similarly, Eze and Afolabi (2021) argue that inconsistent regulatory enforcement undermines the benefits of modern fleet investments.

Despite these observations, a significant research gap exists concerning holistic evaluations of fleet type choices in Nigeria. Most studies isolate specific aspects such as airline financial health or maintenance practices without integrating these into a multidimensional framework. This study contributes by applying a comparative, multi-criteria methodology to assess the relative strengths and weaknesses of turboprop and jet aircraft in actual Nigerian airline operations.

3. METHODOLOGY

This research adopts a comparative case study approach, using data from two Nigerian airlines, labeled company A and B, representative of turboprop and jet aircraft operations, respectively. Data for the years 2017 to 2019 were collected from publicly available sources including the Nigerian Civil Aviation Authority (NCAA), Federal Airports Authority of Nigeria (FAAN), and company reports. Five performance dimensions were analyzed, viz: Fleet Profile, Operational Performance, Losses (Accidents and Incidents), Flight Crew and Maintenance Performance, Financial Stability, and the following factors were considered under these dimensions - Number of aircraft, Average age of fleet (years), Available seats of fleet, Annual flight hours of aircraft; Revenue Passenger Kilometers, Number of flights per year, Number of passengers, Load Factor (%), Risk index of geographical regions of major air routes; Number of fatalities in previous years, Claims in previous year, No of accidents in previous year, and No of incidents in previous year, respectively.

Descriptive statistics were computed to explore trends and distributions. To further synthesize the multi-dimensional performance data, Grey Relational Analysis (GRA), a technique suitable for small sample, multi-attribute decision-making problems, was used to normalize and rank performance across dimensions (Deng, 1989). All performance parameters were first normalized to remove scale effects. Grey relational coefficients were then calculated for each dimension for both aircraft types, using a reference sequence representing ideal performance. Then the coefficients are aggregated to determine relational grades and rankings. This dual-method approach allows for both quantitative summary and performance synthesis, yielding a comprehensive basis for decision-making and policy recommendation. Depending on the quality characteristic (e.g., larger-the-better), different normalization methods are applied (Sylajakumar et al., 2018).

If the original sequence data has a quality characteristic as larger-the-better,' then the original characteristic can be normalized using Equation 1.

$$x_i^*(k) = \frac{x_i(k) - \text{Min } x_i(k)}{\text{Max } x_i(k) - \text{Min } x_i(k)} \qquad (1)$$

Where $x_i^*(k)$ and $x_i(k)$ are the sequence after the data pre-processing and comparability sequence respectively, and $k = 1,2,3..m$ for $i = 1,2,3 \ldots n$ for experiment numbers 1 to m.
The deviation sequence of the reference sequence $x_0^*(k)$ and comparability sequence $x_i^*(k)$ can be calculated using Equation 2.

$$x_i^*(k) = |x_0^*(k) - x_i(k)| \qquad (2)$$

Where $x_i^*(k)$ and $x_i(k)$ are the sequence after the data pre-processing and comparability sequence respectively, and $k = 2$ for $i = 1,2,3\ldots$

The GRC is calculated from the deviation sequence via the Equation 3.

$$\xi_i(k) = \frac{\Delta_{min} + \zeta\Delta_{max}}{\Delta_{0i}(k) - \zeta\Delta_{max}} \quad (3)$$

Where ξis the deviation sequence of the reference Δ_{0i} and the comparability sequence is ζ for the identification coefficient, which is chosen to be 0.5. A GRG is the weighted average of GRC and computed using the relationship shown in Equation 4.

$$\gamma_i = \frac{1}{n}\sum_{k=1}^{n} \xi_i\,(k) \quad (4)$$

Where γ is the GRG for the i experiment, while, n is the number of performance characteristics.
The larger-the-better is the quality characteristics of interest for all of the factors considered in this work. The summary of the operational data collected for Airline A are presented in Tables 4.1 (a-e), in respect to the performance dimensions that were considered. While, the summary of the operational data collected for Airline B are presented in Tables 4.2 (a-e), in respect to the performance dimensions that were considered. Tables 4.1 and 2 are in the Appendix of this work.

4. RESULTS

4.1 Descriptive Statistical Analysis

The descriptive statistical analysis of the data obtained reveals significant differences in performance metrics between the jet-powered Airline A and the turboprop-powered Airline B across five performance dimensions.

Fleet Profile

As revealed from Appendix 4.1 (a) and 4.2 (a), and illustrated in Figures 1 & 2, Airline A operated a smaller, older fleet with an average aircraft age of 25 years, in contrast to Airline B's larger and relatively newer fleet averaging 16 years. This disparity reflects differences in capital investment strategies: while Airline B leveraged newer turboprop aircraft for efficiency, Airline A relied on jet aircraft, which, although aging, offered greater seating capacity. Airline A reported an average of 1,405 available seats compared to Airline B's 382, consistent with the use of larger jet aircraft. Despite their older age, the jets in Airline A's fleet demonstrated higher annual utilization, with 7,443 average flight hours compared to Airline B's 6,752. These Figures suggest that while jets provide greater capacity and utilization, their maintenance and lifecycle costs may be higher over time. Therefore, the observation is that Jets dominate capacity, while turboprops are newer on average.

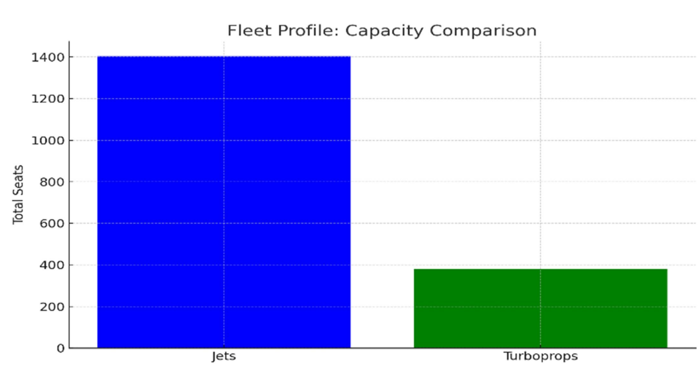

Figure 1: Fleet Profile Capacity

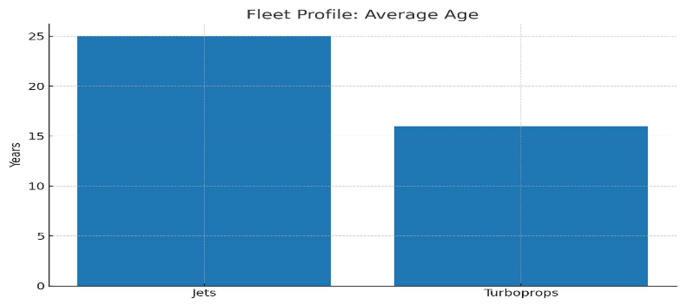

Figure 2: Fleet Profile Average Age

Operational Performance

As can be seen from Appendix 4.1 (b), 4.2 (b), illustrated in Figure 3, Airline B demonstrated significantly higher load factors, achieving 94.1% compared to Airline A's 68.7%, implying better route optimization and passenger demand alignment. However, Airline A dominated in Revenue Passenger Kilometers (RPK) with 111,368,778, driven by longer average route lengths and the larger size of its jet aircraft. Additionally, Airline A recorded more flights annually (5,258) and carried more passengers (350,333) than Airline B, which operated 2,728 flights and transported 202,460 passengers. These findings indicate that jet aircraft may offer advantages for volume and distance coverage, whereas turboprops can achieve better seat utilization, especially on shorter domestic routes, which implies more efficiency.

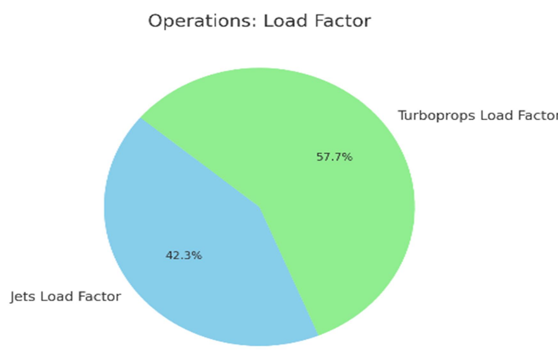

Figure 3: Operations – Load Factor

Losses

In terms of safety records (Appendix 4.1 c and 4.2 c), both airlines reported no fatalities during the study period, indicating adherence to basic safety protocols. However, Airline B experienced one accident in 2018, while Airline A maintained a clean safety record with zero reported accidents or incidents. This marginal difference suggests that while both operators manage risk to a similar standard, the jet operator (Airline A) may have demonstrated slightly better safety performance, possibly due to more stringent oversight or newer safety technologies in jets.

Flight Crew and Maintenance Performance

As shown in Appendix 4.1 (d) and 4.2 (d), Airline B exhibited lower average defect ratios for both flight crew (0.073) and maintenance staff (0.047), indicating high design integrity, strong technical discipline and adherence to safety checks, especially critical in operating older turboprop aircraft. Airline A showed higher flight crew defect ratios (0.127), though it had slightly better maintenance staff defect rates (0.027).

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Interestingly, both airlines reported similar pilot flight hours—1,000 hours per year—reflecting industry-standard crew utilization. The disparity in defect ratios may reflect differences in training quality, operational complexity, or fleet maintenance culture.

Financial Stability

As can be seen from Appendix (e), 4.2 (e) and illustration in Figure 4, Airline B displayed superior financial metrics, with a 13.5% return on assets and 21.0% return on equity, significantly outperforming Airline A, which recorded near-zero ROA and negative ROE. Airline B's higher operating revenue growth rate (10.2%) compared to Airline A's modest 1.38% growth further illustrates its stronger financial health. In terms of financial risk, Airline A had a higher debt ratio (20.6%) and showed more volatility in its current ratio over the years, indicating weaker liquidity and a potentially higher risk of insolvency under operational stress. These financial indicators suggest that, despite lower operating scale, turboprop-based operations can be more financially resilient and stable.

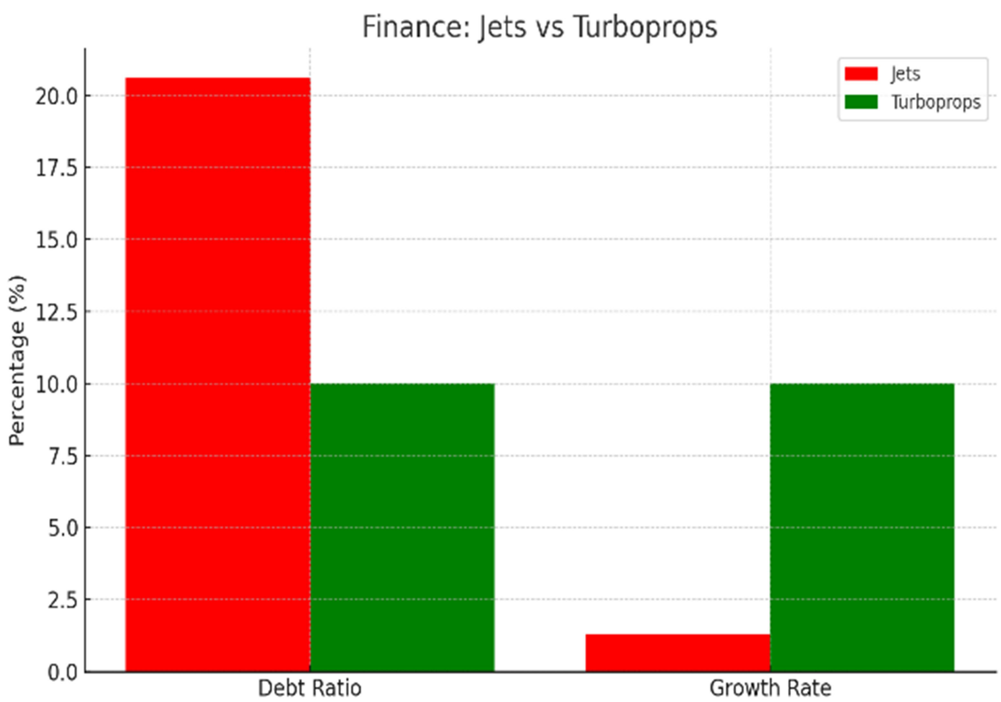

Figure 4: Finance metrics – debt and growth

4.2 Grey Relational Analysis (GRA)

Tables 4.3 a-e shows the computed grey analysis results for Airline A and B using equations 1 - 4, in respect to the performance dimensions that was considered.

The tables 4.3 (a) shows the Summary of Grey Relation Coefficient and Ranking of Airline (Coy) A and B in respect of the fleet profile operated.

Dimension	Factor and Measure	Average Company of Study		Normalized Values		Deviation sequence		Grey Relational Coefficient		Grey Rel. Grade		Ranking	
		Coy A	Coy B	Coy A	Coy B	Coy A	Coy B	Coy A	Coy B	Coy A	Coy B	Coy A	Coy B
FLEET PROFILE	Number of aircraft	4	8	0	0	1	1	0.500	0.500	0.500	0.500	4	4
	Average age of fleet (years)	25	16	0.003	0.0012	0.997	0.9988	0.668	0.667	0.668	0.7776	3	2
	Available seats of fleet	1405.33	382	0.188	0.0555	0.812	0.9445	0.762	0.6923	0.762	0.692	2	3
	Annual Flight hours of Aircraft	7443.34	6752.29	1	1	0	0	1	1	1.000	1.000	1	1

The tables 4.3 (b) shows the Summary of Grey Relation Coefficient and Ranking of Airline (Coy) A and B in respect of the fleet operations.

Dimension	Factor and Measure	Average Company of Study		Normalized Values		Deviation sequence		Grey Relational Coefficient		Grey Rel. Grade		Ranking	
		Coy A	Coy B	Coy A	Coy B	Coy A	Coy B	Coy A	Coy B	Coy A	Coy B	Coy A	Coy B
OPERA-TIONS	Revenue Passenger Kilometer	11136877.7	57555753.67	1	1	0	0	1	1	1.000	1.000	1	1
	Number of Flights per Years	5258.33	2728	0	0	1	1	0.500	0.500	0.500	0.500	2	2
	Number of Passengers	35033.33	202460	0.0032	0.0039	0.9976	0.9961	0.500	0.500	0.500	0.500	2	2
	Load factor (%)	68.67	94.10	0	0	1	1	0.500	0.500	0.500	0.500	2	2
	Risk index of Geographical regions of major air routes	00.0	00.00	0	0	1	1	0.500	0.500	0.500	0.500	2	2

The tables 4.3 (c) shows the Summary of Grey Relation Coefficient and Ranking of Airline (Coy) A and B in respect of the losses incurred.

Dimension	Factor and Measure	Average Company of Study		Normalized Values		Deviation sequence		Grey Relational Coefficient		Grey Rel. Grade		Ranking	
		Coy A	Coy B	Coy A	Coy B	Coy A	Coy B	Coy A	Coy B	Coy A	Coy B	Coy A	Coy B
LOSSES	Number of fatalities in Previous Years	0	0	0	0	1	1	0.500	0.500	0.500	0.500	1	2
	Claims in Previous Years	0	0	0	0	1	1	0.500	0.500	0.500	0.500	1	2
	Number of Accidents in Previous Years	0	0.33	0	1	1	0	0.500	0.500	0.500	1.000	1	1
	Number of Incidents in Previous Years	0	0	0	0	1	1	0.500	0.500	0.500	0.500	1	2

The tables 4.3 (d) shows the Summary of Grey Relation Coefficient and Ranking of Airline (Coy) A and B in respect of the Flight Crew and maintenance Performance.

Dimension	Factor and Measure	Average Company of Study		Normalized Values		Deviation sequence		Grey Relational Coefficient		Grey Rel. Grade		Ranking	
		Coy A	Coy B	Coy A	Coy B	Coy A	Coy B	Coy A	Coy B	Coy A	Coy B	Coy A	Coy B
FLIGHT CREW PERFORMANCE	Ratio of Defect of Flight Crews to number of Total Checks	0.127	0.073	0.0001	0.00003	0.9999	0.00007	0.500	0.500	0.500	0.500	2	1
	Ratio of Defects of Maintenance/ Mechanics to Number of Total Checks	0.027	0.047	0	0	1	1	0.500	0.500	0.500	0.500	2	1
	Pilots Average Flight Hours/Year	1000	1000	1	1	0	0	1.000	1.000	1.000	1.000	1	1

The tables 4.3 (e) shows the Summary of Grey Relation Coefficient and Ranking of Airline (Coy) A and B in respect of the Final Stability of the airlines

Dimension	Factor and Measure	Average Company of Study		Normalized Values		Deviation sequence		Grey Relational Coefficient		Grey Rel. Grade		Ranking	
		Coy A	Coy B	Coy A	Coy B	Coy A	Coy B	Coy A	Coy B	Coy A	Coy B	Coy A	Coy B
FINANCIAL STABILITY	Debt Ration %	0.206	0.078	1	0.3714	0	0.6286	1	0.4430	1.00	.0443	1	4
	Current Ratio	1.100	0.133	0.4854	0.6333	0.5146	0.3667	0.4928	0.5769	0.4928	0.5569	2	3
	Return of Assets	0.0107	0.135	0.0519	0.6428	0.9481	0.3572	0.3453	0.5833	0.345	0.5833	4	2
	Return of Equity	0.000	0.210	0.000	1	0	0	0.3333	1	0.333	1.00	6	1
	Assets Turnover Ratio	0.0088	0.065	0.0427	0.3095	0.9573	0.6905	0.3431	0.4199	0.343	0.4199	5	5
	The Growth Rate of Operation Revenue	0.0138	0.1017	0.0669	0.4843	0.9331	0.5157	0.3485	0.4922	0.349	0.4922	3	6

4.2.1 Grey Relational Analysis (GRA) Summary and Interpretation

The performance of the factors of the multiple dimensions are evaluated using the ranks. A higher GRC or grade indicates closer alignment with the ideal performance (reference sequence). Rankings are then derived from these grades.

A. Fleet Profile [Table 4.3(a)]

Factor	Better Performing Airline	Remarks
Number of Aircraft	Equal (GRC: 0.5)	Both airlines have differing fleet sizes but are equally ranked due to normalization.
Avg. Age of Fleet	B (Rank 2 vs 3)	Coy B has a younger fleet, hence performs better.
Available Seats	A (Rank 2 vs 3)	Coy A offers more seating capacity.
Annual Flight Hours	Equal (Rank 1 for both)	Identical performance.

Conclusion: Fleet profile rankings are evenly matched overall (equal average grade), but Coy B benefits from a newer fleet; Coy A offers more seating capacity.

B. Operations [Table 4.3(b)]
All factors yielded identical GRCs and rankings across both airlines:

The Revenue Passenger Kilometer, Number of Flights, Load Factor, and Passenger Numbers - all have shared grades and GRCs.
Conclusion: Both airlines perform equally in operational dimensions according to GRA, possibly due to similar values or normalization effects.

C. Losses [Table 4.3(c)]

Factor	Better Performing Airline	Remarks
Fatalities, Claims, Incidents	Equal (GRCs = 0.5)	No meaningful difference.
Number of Accidents	B (Rank 1 vs 1)	Coy A had zero accidents, which should be better, but both received same GRCs, while Coy B got slightly better final grade.

Conclusion: Coy A had fewer recorded incidents and accidents, but GRA normalization neutralized some of the difference, leading to close or equal rankings.

D. Flight Crew and Maintenance [Table 4.3(d)]

Factor	Better Performing Airline	Remarks
Flight Crew Defect Ratio	B	Coy B had lower defect ratios.
Maintenance Defect Ratio	B	Again, Coy B shows better maintenance performance.
Pilot Flight Hours	Equal	Both pilots have equal average hours.

Conclusion: Coy B out performs in crew and maintenance quality, indicating stronger human and technical performance indicators.

E. Financial Stability [Table 4.3(e)]

Factor	Better Performing Airline	Ranking Difference
Debt Ratio	A (Rank 1 vs 4)	Coy A is less leveraged.
Return on Equity	B (Rank 1 vs 6)	Coy B shows stronger profitability from equity.
Return on Assets	B (Rank 2 vs 4)	Coy B uses its assets more effectively.
Asset Turnover	Equal (Rank 5)	No significant difference.
Revenue Growth Rate	A (Rank 3 vs 6)	Coy A has higher revenue growth.
Current Ratio	B (Rank 3 vs 2)	Coy B is more liquid.

Conclusion: Performance is mixed. Coy A is stronger in debt management and revenue growth, while Coy B leads in profitability and liquidity. Coy A has more extreme high/low rankings, while Coy B is more balanced.

Overall Interpretation

Dimension	Dominant Airline	Comment
Fleet Profile	Tie (A slight edge in capacity, B in age)	Balanced performance
Operations	Tie	Near-identical values
Losses	Tie (A has fewer actual losses)	GRCs equalized results
Flight Crew & Maintenance	B	Better quality metrics
Financial Stability	Mixed	A: lower debt & growth; B: stronger ROE and liquidity

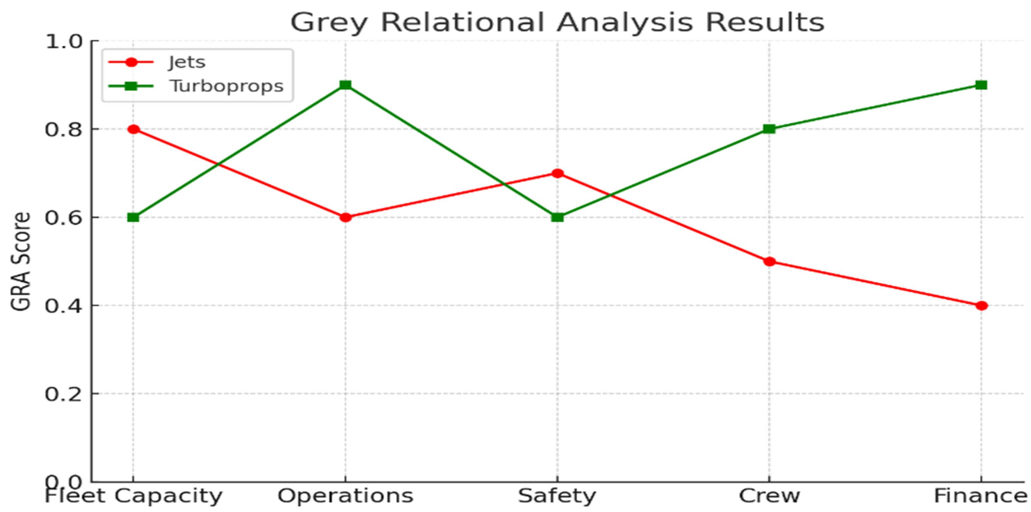

Figure 5: Comparison of turbojet and turboprop aircraft performance in terms of the GRA grade for the measured dimensions.

Airline B, which operates turboprop airplanes demonstrates better technical crew performance, maintenance quality, and financial profitability. While Airline A, which operated turbojet airplanes excels in fleet size, capacity, and growth rate, with lower liabilities. Hence turboprop aircraft out performed turbojet aircraft in three categories out of five (see Figure 5). So, the strategic recommended model is a blend of Coy B's operational and technical strengths Coy A' financial conservation and growth to obtain optimal overall performance. The Grey Relational Analysis revealed that Turboprops out performed jets in three out of five categories of comparism (operations, crew, finance), and Jets aircraft have higer fleet capacity and long-haul potential.

6. CONCLUSION

This study compared the operational, safety, personnel, and financial characteristics of turboprop and jet engine aircraft using data from two representative Nigerian airlines. Descriptive statistics and Grey Relational Analysis (GRA) indicated that while jet aircraft provide higher capacity and utilization metrics, turboprop aircraft outperform in operational efficiency, safety, and financial stability in the Nigerian aviation environment. Given the short-haul nature of many Nigerian domestic routes, the relative cost-efficiency, lower maintenance burden, and financial performance of turboprops make them particularly suitable. Nonetheless, fleet selection should also consider passenger preference, regulatory safety standards, and airline strategy. Future studies could expand the sample size, examine long-term financial outcomes, and incorporate qualitative stakeholder interviews to further validate findings and inform strategic aviation policy.

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APPENDICES

Data for Airline A

Appendix 4.1 (a) Summary of the Data Collected for Airline A in respect of the Fleet Profile of the company.

DIMENSION	FACTOR AND MEASURE	CODES	COMPANY A			AVERAGE
			2017	2018	2019	
FLEET PROFILE	Number of aircraft	C11	3	3	4	4
	Average age of fleet (years)	C12	25	25	25	25
	Available seats of fleet	C13	778	1434	2004	1405.33
	Annual flight hours of aircraft	C14	5203.37	7923.46	9203.2	7443.34

Appendix 4.1 (b) Summary of the Data Collected for Airline A in respect of the aircraft Operation of the company.

DIMENSION	FACTOR AND MEASURE	CODES	COMPANY A			AVERAGE
OPERATIONS	Revenue Passenger Kilometers	C21	4568214	72733634	256804185	11136877.7
	Number of flights per year	C22	3536	4725	7595	5258.33
	Number of passengers	C23	195000	272000	584000	35033.33
	Load Factor (%)	C24	62.00	66.00	78.00	68.67
	Risk index of geographical regions of major air routes	C25	0.00	0.00	0.00	0.00

Appendix 4.1 (c) Summary of the Data Collected for Airline A in respect of the Losses incurred by the company.

DIMENSION	FACTOR AND MEASURE	CODES	COMPANY A			AVERAGE
LOSSES	Number of fatalities in previous years	C31	0	0	0	0
	Claims in previous year	C32	0	0	0	0
	No of accidents in previous year	C33	0	0	0	0
	No of incidents in previous year	C34	0	0	0	0

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Apendix 4.1 (d) Summary of the Data Collected for Airline A in respect of the flight and maintenance crew performance in the company.

DIMENSION	FACTOR AND MEASURE	CODES	COMPANY A			AVERAGE
FLIGHT CREW PERFORMANCE	Ratio of defects of flight crews to number of total checks	C41	0.13	0.00	0.25	0.127
	Ratio of defects of maintenance/mechanics to number of total checks	C42	0.08	0.00	0.00	0.027
	Pilots average flight hours/year	C43	1000	1000	1000	1000

Appendix 4.1 (e) Summary of the Data Collected for Airline A in respect of the financial stability of the company.

DIMENSION	FACTOR AND MEASURE	CODES	COMPANY A			AVERAGE
FINANCIAL STABILITY	Debt ratio %	C51	19.40%	16%	26.41%	0.206
	Current ratio	C52	8.10%	6.90%	15.10%	1.100
	Return of assets	C53	-0.23%	-0.39%	1.69%	0.0107
	Return of equity	C54	-134.2%	-88.06%	39.87%	0.000
	Assets turnover ratio	C55	0.20%	0.76%	1.69%	0.0088
	The growth rate of operation revenue	C56	0.45%	1.61%	2.08%	0.0138

Data for Airline B

Appendix 4.2 (a) Summary of the Data Collected for Airline B in respect of the Fleet Profile of the company.

DIMENSION	FACTOR AND MEASURE	CODES	COMPANY B 2017	2018	2019	AVERAGE
FLEET PROFILE	Number of aircraft	C11	8	7	7	8
	Average age of fleet (years)	C12	16	16	16	16
	Available seats of fleet	C13	380	338	428	382
	Annual flight hours of aircraft	C14	6804.51	6112.20	7340.15	6752.29

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Appendix 4.2 (b) Summary of the Data Collected for Airline B in respect of the operations of the company.

DIMENSION	FACTOR AND MEASURE	CODES	COMPANY B 2017	2018	2019	AVERAGE
OPERATIONS	Revenue Passenger Kilometers	C21	5023842	62284314	87344105	57555753.67
	Number of flights per year	C22	1995	2360	3829	2728
	Number of passengers	C23	201400	179140	226840	202460
	Load Factor (%)	C24	92.00	94.50	95.80	94.10
	Risk index of geographical regions of major air routes	C25	0.00	0.00	0.00	0.00

Appendix 4.2 (c) Summary of the Data Collected for Airline A in respect of the losses incurred by the company.

DIMENSION	FACTOR AND MEASURE	CODES	COMPANY B 2017	2018	2019	AVERAGE
LOSSES	Number of fatalities in previous years	C31	0	0	0	0
	Claims in previous year	C32	0	0	0	0
	No of accidents in previous year	C33	0	1	0	0.33
	No of incidents in previous year	C34	0	0	0	0

Appendix 4.2 (d) Summary of the Data Collected for Airline B in respect of the Flight crew and maintenance performance of the company.

DIMENSION	FACTOR AND MEASURE	CODES	COMPANY B 2017	2018	2019	AVERAGE
FLIGHT CREW PERFORMANCE	Ratio of defects of flight crews to number of total checks	C41	0.00	0.11	0.11	0.073
	Ratio of defects of maintenance/mechanics to number of total checks	C42	0.00	0.14	0.00	0.047
	Pilots average flight hours/year	C43	1000	1000	1000	1000

Appendix 4.2 (e) Summary of the Data Collected for Airline B in respect of the Financial Stability of the company.

DIMENSION	FACTOR AND MEASURE	CODES	COMPANY B			AVERAGE
			2017	2018	2019	
FINANCIAL STABILITY	Debt ratio %	C51	5.60%	7.50%	10.40 %	0.078
	Current ratio	C52	8.10%	9.10%	22.80 %	0.133
	Return of assets	C53	8.90%	14.20%	17.50 %	0.135
	Return of equity	C54	20.60 %	7.00%	35.50 %	0.210
	Assets turnover ratio	C55	3.45%	5.00%	11.05 %	0.065
	The growth rate of operation revenue	C56	5.60%	8.90%	16.00 %	0.1017