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Strategic Aircraft Maintenance Systems and Sustainable Competitive Advantage in Kenya's Aviation Companies

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Abstract

This study examined the influence of Strategic Aircraft Maintenance Systems (SAMS) on sustainable competitive advantage (SCA) among aviation companies in Kenya. Grounded in institutional theory and the resource-based view, the study adopted an explanatory sequential mixed-methods design. Quantitative data were collected through a census survey of 360 managers drawn from all 60 aviation companies licensed by the Kenya Civil Aviation Authority (KCAA), complemented by in-depth interviews with senior managers responsible for aircraft maintenance planning, safety risk assessment, and regulatory oversight. Strategic Aircraft Maintenance Systems were operationalized through hazard identification, safety risk assessment, and maintenance turnaround time. Quantitative data were analyzed using simple linear regression, while qualitative data were analyzed thematically to provide explanatory insights. The results indicate that Strategic Aircraft Maintenance Systems have a strong and statistically significant influence on sustainable competitive advantage ($\beta = 0.579$, $p < 0.001$), explaining 35.8% of the variance in competitive outcomes ($R^2 = 0.358$). Qualitative findings reveal that structured hazard reporting, risk-based maintenance planning, and efficient turnaround times enhance aircraft availability, operational reliability, regulatory confidence, and customer trust, thereby strengthening competitive positioning. The study concludes that aircraft maintenance systems function not merely as compliance mechanisms but as strategic organizational capabilities that enable aviation firms to achieve and sustain competitive advantage in a highly regulated operating environment, with important implications for aviation managers and policymakers.

Keywords: Aircraft Maintenance, Safety Management Systems, Sustainable Competitive Advantage, Aviation Industry.

Introduction

Aviation organizations today operate in an increasingly complex and competitive environment shaped by rising operational costs, rapid technological change, heightened customer expectations, and intense global competition (Möller et al., 2020). In such an environment, organizational performance in the aviation sector is inseparable from safety, reliability, and operational continuity, given the industry's high exposure to technical, operational, and human risks (Abate et al., 2020). As a result, aviation firms are increasingly transitioning from traditional operational models toward strategically integrated systems that embed safety and efficiency into core organizational processes (Newman et al., 2020).

Globally, the aviation industry has experienced a strong resurgence, with total passenger traffic surpassing nine billion in 2024 following the recovery of international travel (Airports Council International [ACI] World, 2025). This growth has intensified pressure on airlines and aviation service providers to maintain high aircraft availability while simultaneously upholding uncompromised safety standards (International Air Transport Association [IATA], 2025). Increased traffic density, complex fleet operations, and expanded route networks have elevated exposure to maintenance-related risks, prompting international aviation authorities to emphasize proactive maintenance systems as a core component of safety management (International Civil Aviation Organization [ICAO], 2023).

Consequently, aircraft maintenance has evolved from a traditionally technical support function into a strategic domain that directly influences operational reliability, cost efficiency, and organizational competitiveness (Smith & Reynolds, 2018). Strategic Aircraft Maintenance Systems emphasize structured hazard identification, systematic safety risk assessment, and optimized maintenance turnaround time to minimize disruptions and improve fleet utilization (Bieder, 2021). Airlines that have embedded predictive maintenance technologies and risk-based maintenance planning have demonstrated superior operational resilience and long-term competitive positioning in highly regulated markets (Nasaj & Al-Marri, 2022).

In Africa, and particularly in Kenya, the aviation industry plays a critical role in economic development, regional connectivity, and international trade (Mtigwe, 2023). The sector contributes approximately 3.1 percent to Kenya's Gross Domestic Product and supports nearly 460,000 jobs, underscoring its strategic importance to national economic growth (International Air Transport Association [IATA], 2025). To safeguard this role, aviation operations in Kenya are regulated by the Kenya Civil Aviation Authority through the Civil Aviation (Safety Management) Regulations, 2018, which mandate the implementation of structured safety and maintenance systems across all licensed aviation organizations (Government of Kenya, 2018). These regulations require aviation firms to institutionalize hazard identification, safety risk management, and maintenance assurance mechanisms as part of their Safety Management Systems (Kenya Civil Aviation Authority [KCAA], 2024).

Despite this regulatory framework, variations persist in how aviation firms in Kenya strategically deploy aircraft maintenance systems to enhance organizational performance. While some operators have integrated maintenance planning into broader strategic decision-making processes, others continue to treat maintenance primarily as a compliance obligation rather than a strategic capability (Njeru, 2019). Existing empirical studies within the Kenyan aviation context have largely focused on general safety management systems, regulatory compliance, and operational performance, with limited attention given to isolating the strategic contribution of aircraft maintenance systems to sustainable competitive advantage (Mwikya et al., 2018). Recent studies have further emphasized the need to examine specific components of safety management systems individually in order to understand their distinct strategic value within aviation organizations (Thendu et al., 2023).

The limited empirical focus on Strategic Aircraft Maintenance Systems presents a critical knowledge gap, particularly given the safety-critical nature of maintenance activities and their direct influence on operational efficiency, cost control, and organizational reputation. Without clear empirical evidence linking strategic aircraft maintenance practices to sustainable competitive advantage, aviation managers face uncertainty regarding the strategic returns associated with investments in advanced maintenance technologies, structured hazard reporting, and workforce capability development (Ong'esa & Kinyua, 2020). This study therefore examines the influence of Strategic Aircraft Maintenance Systems specifically hazard identification, safety risk assessment, and maintenance turnaround time on sustainable competitive advantage among aviation companies in Kenya, contributing to the growing body of literature that positions safety-oriented systems as strategic enablers of long-term competitiveness.

Statement of the Problem

Globally, Strategic Aircraft Maintenance Systems are increasingly recognized as a critical driver of sustainable competitive advantage in the aviation industry. Effective aircraft maintenance enhances operational reliability, reduces unplanned downtime, minimizes safety incidents, and strengthens regulatory confidence, all of which directly influence an airline's competitive positioning (Smith & Reynolds, 2018). Through structured hazard identification, systematic safety risk assessment, and optimized maintenance turnaround time, aviation organizations are able to improve fleet availability, control operational costs, and sustain service reliability in highly competitive markets (Bieder, 2021). Industry evidence further indicates that airlines that adopt proactive and predictive maintenance systems experience fewer operational disruptions and stronger customer trust, thereby reinforcing long-term competitiveness (International Air Transport Association [IATA], 2018).

Despite these global insights, aviation industries in many emerging economies, including Kenya, continue to face maintenance-related challenges that undermine operational efficiency and strategic performance. These challenges include reactive maintenance practices, inconsistent hazard reporting mechanisms, extended aircraft downtime, and uneven application of risk-based maintenance planning across operators (Mtigwe, 2023). Although all aviation companies licensed by the Kenya Civil Aviation Authority operate under maintenance and safety requirements aligned with International Civil Aviation Organization standards, there remains substantial variation in how firms strategically deploy aircraft maintenance systems to achieve competitive outcomes (Kenya Civil Aviation Authority [KCAA], 2024). As a result, compliance with maintenance regulations does not always translate into superior operational performance or sustained competitive advantage.

Empirical research within the Kenyan aviation context has largely concentrated on broad safety management systems, regulatory compliance, and operational performance indicators, with limited focus on aircraft maintenance as an independent strategic construct. Studies have examined safety policy implementation, safety culture, and regulatory oversight without isolating the specific contribution of aircraft maintenance systems to sustainable competitive advantage (Njeru, 2019). Other studies have focused on operational risk management and organizational performance while treating maintenance as a supporting activity rather than a strategic capability (Mwikya et al., 2018). More recent research has called for the disaggregation of Safety Management System components to better understand their individual strategic value within aviation organizations (Thendu et al., 2023).

From a theoretical perspective, the Resource-Based View posits that organizational resources generate sustainable competitive advantage when they are valuable, rare, inimitable, and embedded within organizational processes (Barney, 1991). When aircraft maintenance systems are strategically embedded through advanced hazard identification, systematic risk assessment, and efficient turnaround processes, they can evolve from routine compliance functions into strategic capabilities that deliver durable competitive value (Ong'esa & Kinyua, 2020). However, the absence of focused empirical evidence on the strategic contribution of aircraft maintenance systems within the Kenyan aviation industry presents both a conceptual and practical gap. Without such evidence, aviation managers lack clarity on whether investments in advanced maintenance technologies, predictive diagnostics, and maintenance workforce development yield meaningful strategic returns.

This study addresses these gaps by empirically examining the influence of Strategic Aircraft Maintenance Systems on sustainable competitive advantage among aviation companies in Kenya. By isolating aircraft maintenance systems as a distinct strategic variable, the study provides evidence-based insights for aviation managers, regulators, and policymakers on how maintenance practices can be leveraged not merely for regulatory compliance, but as strategic mechanisms for enhancing long-term competitiveness in the aviation sector.

The purpose of this study was to examine the influence of Strategic Aircraft Maintenance Systems on sustainable competitive advantage among aviation companies licensed by the Kenya Civil Aviation Authority. By isolating strategic aircraft maintenance dimensions namely hazard identification, safety risk assessment, and maintenance turnaround time this study seeks to provide focused empirical evidence on how maintenance systems, when implemented strategically rather than purely for compliance, can enhance operational reliability, cost efficiency, and long-term competitiveness in the aviation industry.

Literature Review

Wendel et al. (2024) conducted a study on Creating Architectural Advantage in the airline industry in the United States. The primary data from semi-structured interviews with industry experts and secondary data from industry reports were used in the research to determine the primary drivers and strategic choices for value migration in airplane maintenance systems. The findings from the study highlighted that strategic aircraft management systems enhance operational efficiency by optimizing flight schedules, maintenance routines, and fuel consumption. Research by Johnson and Smith (2019) demonstrates that airlines employing advanced fleet management technologies enjoy reduced operational costs and improved punctuality, significantly contributing to customer satisfaction and loyalty. The study further established that by guaranteeing increased comfort and dependability, the integration of important aircraft management systems in the United States directly affects the customer experience. Doe et al. (2020) further asserted that airlines that use technology to expedite maintenance and operations are better positioned to offer consistent service quality, giving them a competitive edge in drawing in and keeping passengers.

Büyüközkan et al. (2020) conducted a study that used interval-valued intuitionistic fuzzy AHP, a new digital service quality model and its strategic analysis in the aviation industry in Turkey. The purpose of this study was to develop a novel and authentic data service quality model for maintenance of airplanes. The reliability, customer-centricity, digital engagement, digital trust, and digital tangibles characteristics make up the suggested model, along with 35 associated criteria. The IVIF AHP approach is used to determine the relative importance of criteria. The applicability of the suggested paradigm is confirmed through the use of an actual instance pertaining to the Turkish aviation sector. The results showed that with increasing attention to environmental sustainability, airlines that adopt strategic aircraft management for better fuel efficiency and reduced emissions gain a competitive advantage. Besides, similar findings were achieved by Green and Harris (2021) who showed how an airline's market posture may be improved by demonstrating how environmental compliance, led by strategic aircraft management, not only satisfies legal obligations but also appeals to environmentally concerned consumers.

Qin and Sun (2024) conducted a study on Service accessibility strategy for aircraft maintenance routing with interorganizational collaborations on outsourcing maintenance. The study looked into the Maintenance, Repair, and Overhaul (MRO) outsourcing mode's Aircraft Maintenance Routing Problem (AMRP) in China. When it comes to the implementation of interorganizational maintenance, the availability of heterogeneous maintenance resources (e.g., the accommodation capacity of maintenance hangars, the availability of maintenance technicians, and aviation spare parts) affects an airline company's accessibility to maintenance service. These factors also have an impact on the maintenance capabilities of the maintenance service provider. The study suggested an effective maintenance planning approach with a collaborative mechanism based on service information exchange and service capability evaluation from the airline's perspective in order to improve the accessibility of maintenance services for the airline. A time-complexity reduction strategy was then introduced to improve the formulation of the discrete-time-stamp-indexed mathematical model (Khalaf & Abdelrady, 2021).

Azevedo et al. (2020) conducted a survey on Estimation of health indicators using advanced analytics for prediction of aircraft systems remaining useful lifetime. The study aimed to propose a new formulation for the aircraft health indicator computation, derived from raw anonymized data retrieved from different sensors within the aircraft system. The suggested formulation assigned a positive or negative weight to each variable based on its influence on the behavior of the system, combining data from several variables (such as sensors) that affect the overall state of the system. Recent technical developments have greatly improved the effectiveness and precision of inspection and diagnosis in airplane maintenance, according to the survey's findings. Additionally, Johnson and Lee (2020) investigated the incorporation of sophisticated non-destructive testing (NDT) methods, like radiography and ultrasonic testing, which have enhanced the identification of structural anomalies and faults without endangering aircraft parts. These techniques lower maintenance expenses and extend the aircraft's service life.

Tchouamou (2021) studied the relationship between aviation and tourism the effect of implementing the Yamoussoukro Decision and concluded that this would increase the levels of growth of firms operating in the aviation industry, ultimately improving tourism in the region. According to KAA the airline industry business both in terms of cargo and passenger traffic has been growing at a rate of more than 9% from 2005 to 2019. There were 36 international airlines, as at 31st December 2019 operating (Kenya Airports Authority, 2019). KAA (2019) reports that most of the small domestic airlines had been reporting an average of 10% operating losses within the financial year despite an increase in local traffic. The report further indicated that the domestic airline was largely dominated by a few firms with the majority of the smaller domestic firms reeling from the over-competitive environment.

Methodology

The study adopted a positivist philosophical paradigm and a sequential mixed-methods research design. The quantitative phase was designed to examine the direct influence of Strategic Aircraft Maintenance Systems on sustainable competitive advantage among aviation companies. The subsequent qualitative phase sought to triangulate the quantitative findings by providing deeper explanatory insights into how aircraft maintenance practices, particularly hazard identification, safety risk assessment, and maintenance turnaround time, translate into competitive outcomes within aviation organizations.

The study targeted all managerial employees working in Kenya's aviation industry who are directly involved in, or significantly influenced by, the implementation of Strategic Aircraft Maintenance Systems. The aviation sector in Kenya comprises 60 organizations licensed by the Kenya Civil Aviation Authority as of December 2024, including airlines, maintenance and repair organizations (MROs), flight training institutions, and air service operators. These firms were selected because aircraft maintenance planning, hazard identification, safety risk assessment, and maintenance turnaround processes are core operational requirements across all categories of licensed aviation entities. A census approach was employed in terms of the unit of analysis. Within each company, stratified sampling was applied to ensure proportional representation of key departments including maintenance, safety, flight operations, quality assurance, human resource management, and senior executive leadership. This yielded a sample of 360 respondents as the unit of observation. For the qualitative component, twenty managers who regularly oversee or participate in aircraft maintenance planning, safety risk assessments, or regulatory maintenance audits were purposively selected to provide in-depth explanatory insights.

Strategic Aircraft Maintenance Systems were measured as a multidimensional construct comprising three key dimensions: hazard identification, safety risk assessment and identification, and maintenance turnaround time. These dimensions were assessed using a structured questionnaire adapted from established aviation safety and maintenance management frameworks. Measurement items captured the extent to which aviation firms systematically identify and report maintenance hazards, conduct and review risk assessments prior to maintenance activities, and efficiently plan and execute maintenance tasks to minimize aircraft downtime.

The dependent variable, sustainable competitive advantage, was measured using an eight-item scale capturing cost efficiency, operational reliability, fleet availability, customer confidence, market positioning, and organizational resilience. All items were measured on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Reliability analysis yielded Cronbach's alpha coefficients exceeding the recommended threshold of 0.70, indicating strong internal consistency of the measurement instruments.

Data analysis followed a structured quantitative approach supported by diagnostic validation to ensure robustness of results. Simple linear regression analysis was used to examine the direct influence of Strategic Aircraft Maintenance Systems on sustainable competitive advantage. Prior to regression analysis, assumption testing was conducted to assess linearity, normality, multicollinearity, autocorrelation, and heteroscedasticity. Diagnostic results confirmed the suitability of regression analysis, with variance inflation factor values well below the acceptable threshold, indicating the absence of multicollinearity, and Durbin–Watson statistics confirming independence of residuals.

The regression model was executed to determine the proportion of variance in sustainable competitive advantage explained by Strategic Aircraft Maintenance Systems and to assess the statistical significance of the regression coefficients. Complementing the quantitative analysis, qualitative data were transcribed verbatim and analyzed using NVivo 14 through open, axial, and selective coding procedures. This enabled the identification of dominant themes related to hazard detection practices, risk-based maintenance planning, and maintenance turnaround efficiency. The integration of quantitative and qualitative findings enhanced the methodological rigor and provided a comprehensive understanding of how Strategic Aircraft

Maintenance Systems contribute to sustainable competitive advantage in Kenya's aviation industry.

The study complied with international and national ethical standards for research involving human participants. Formal ethical clearance was obtained from the United States International University–Africa Institutional Ethics Review Committee (IERC Approval Reference No. IERC/2024/123), and a research permit was granted by the National Commission for Science, Technology and Innovation (NACOSTI Permit No. NACOSTI/P/24/28371). Prior to data collection, participants were provided with detailed information regarding the purpose of the study, the voluntary nature of participation, their right to withdraw at any time without penalty, and the confidentiality measures in place.

Results

Descriptive Statistics

Results show that Strategic Aircraft Maintenance Systems recorded a high overall mean score of 4.25 with a standard deviation of 0.56, indicating that aviation companies place strong emphasis on strategically managing maintenance activities to enhance safety, reliability, and competitive performance. The findings suggest that formal maintenance systems are well institutionalized across the industry, with relatively low variability implying consistency in implementation among licensed aviation firms.

Specifically, hazard identification recorded a mean score of 4.24 with a standard deviation of 0.53, indicating that aviation firms have established systematic mechanisms for identifying, reporting, and communicating maintenance-related hazards. It can be argued that effective hazard identification enhances early detection of potential failures, thereby reducing the likelihood of safety incidents and unplanned aircraft downtime. Safety risk assessment and identification registered a mean score of 4.23 with a standard deviation of 0.56, suggesting that maintenance activities are consistently prioritized based on assessed risk levels. This implies that aviation firms regularly evaluate and review maintenance risks to ensure safe and reliable operations.

Maintenance turnaround time emerged as the most strongly rated dimension, with a mean score of 4.28 and a standard deviation of 0.59, underscoring its importance in operational efficiency and competitive advantage. Efficient planning and timely resolution of maintenance issues were perceived as critical in minimizing aircraft downtime and improving fleet availability. Low standard deviation values across all dimensions indicate minimal variation in strategic aircraft maintenance practices among aviation firms, reflecting industry-wide adherence to structured maintenance systems.

Table 1

Descriptive Statistics for Strategic Aircraft Maintenance System and SCA

Aspects of Measurement	**Mean**	**Std. Dev**
The company systematically identifies and reports maintenance hazards to enhance safety (Hazard identification).	4.24	0.53
Risk assessments are conducted before maintenance, ensuring prioritized and reviewed safety measures (Safety Risk Assessment and Identification)	4.23	0.56

Efficient planning minimizes maintenance delays, enhancing operational efficiency and competitiveness (Maintenance and Turnaround Time)	4.28	0.59
Overall	4.25	0.56

Statistical tests

Linearity test

The scatter plot shows a positive trend, indicating a direct relationship between Strategic Aircraft Maintenance Systems and Sustainable Competitive Advantage. Although some dispersion is observed at lower values of aircraft maintenance systems, the overall pattern suggests an acceptable linear relationship, supporting the use of regression analysis.

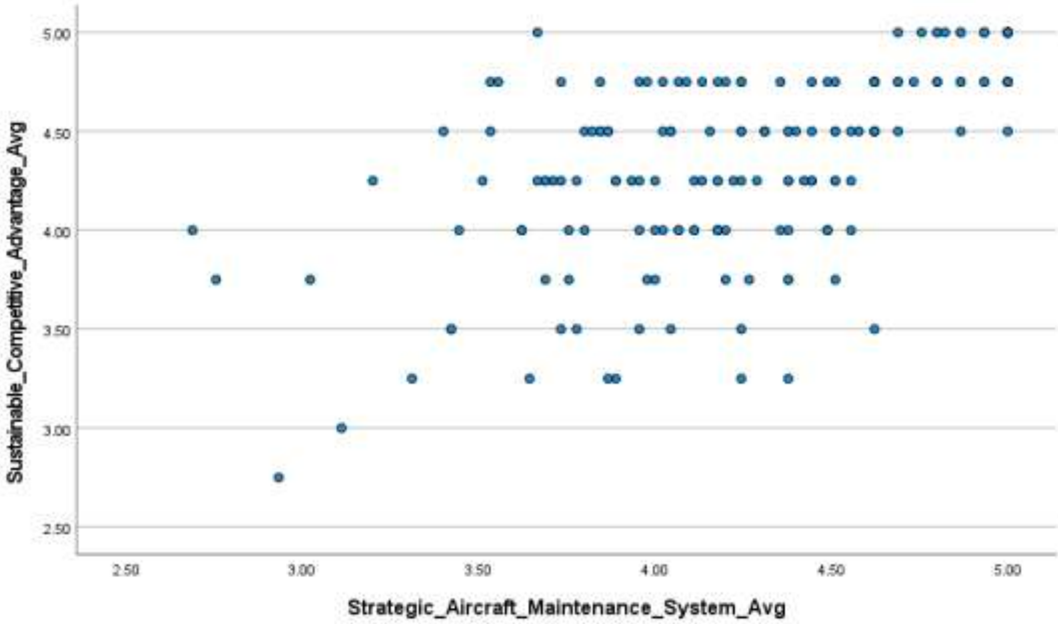

Figure 1

Linearity between Strategic Aircraft Maintenance System and SCA

Normality

Normality of the Strategic Aircraft Maintenance System variable was assessed using both the Kolmogorov–Smirnov and Shapiro–Wilk tests. The Kolmogorov–Smirnov test produced a statistic of 0.070 with a p-value of 0.040, while the Shapiro–Wilk test yielded a statistic of 0.966 with a p-value of less than 0.001, indicating deviation from normality. Given the sensitivity of normality tests to large samples, visual inspection using a Q–Q plot was conducted.

Table 2

Test of Normality for the Strategic Aircraft Maintenance System and SCA

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
Strategic Aircraft Maintenance System	.070	171	.040	.966	171	.000

a. Lilliefors Significance Correction

The Q–Q plot shown in Figure 2 revealed that data points closely aligned with the diagonal reference line, suggesting an approximately linear distribution. This supported the suitability of the data for regression analysis and hypothesis testing.

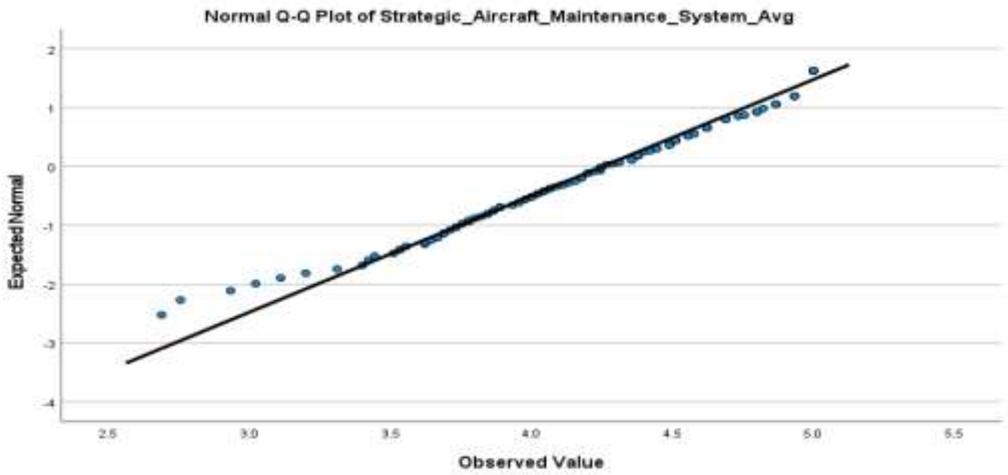

Figure 2

Test of Normality for the Strategic Aircraft Maintenance System

Multicollinearity

Multicollinearity diagnostics presented in Table 3 indicated no evidence of collinearity concerns. The tolerance value was 1.000, while the Variance Inflation Factor (VIF) was also 1.000, confirming that the Strategic Aircraft Maintenance System variable was statistically independent and not highly correlated with other predictors in the model. This ensured the stability and reliability of the regression estimates.

Table 3

Multicollinearity Test for the Strategic Aircraft Maintenance System and SCA

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.888	.256		7.387	.000		
	Strategic Aircraft Maintenance System	.579	.060	.598	9.702	.000	1.000	1.000

a. Dependent Variable: Sustainable Competitive Advantage.

Autocorrelation

Autocorrelation was assessed using the Durbin–Watson statistic. The model reported a Durbin–Watson value of 1.768, which lies within the acceptable range of 1.5 to 2.5, indicating the absence of autocorrelation among regression residuals. This confirms that the independence assumption was satisfied and that the model was appropriately specified. The findings are as shown in Table 4.

Table 4

Autocorrelation for Strategic Aircraft Maintenance System and SCA

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.598[a]	.358	.354	.39389	1.768

a. Predictors: (Constant), Strategic Aircraft Maintenance System

b. Dependent Variable: Sustainable Competitive Advantage

Heteroscedasticity

Heteroscedasticity was examined using the Breusch–Pagan test. Results showed an F-statistic of 9.117 with a p-value of 0.003, indicating the presence of heteroscedasticity. This suggests that residual variances were not constant across observations, potentially affecting estimation efficiency. To address this violation, the application of weighted least squares estimation was recommended.

Table 5

Breusch–Pagan Test for Heteroscedasticity in Strategic Aircraft Maintenance System

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.371	1	.371	9.117	.003[b]
	Residual	6.869	169	.041		
	Total	7.239	170			

a. Dependent Variable: RES_SQ
b. Predictors: (Constant), Strategic Aircraft Maintenance System

Regression Analysis

Regression Output Model

Regression analysis revealed a moderately strong positive relationship between Strategic Aircraft Maintenance Systems and Sustainable Competitive Advantage, with an R-value of 0.598. The R-square value of 0.358 indicates that Strategic Aircraft Maintenance Systems explain 35.8% of the variation in Sustainable Competitive Advantage, while the adjusted R-square of 0.354 confirms the robustness of the model. The standard error of the estimate (0.39389) suggests minimal deviation of observed values from the regression line.

Table 6

Regression Model Summary for Strategic Aircraft Maintenance System and SCA

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.598[a]	.358	.354	.39389	.358	94.121	1	169	.000

a. Predictors: (Constant), Strategic Aircraft Maintenance System

Regression Coefficients

The regression coefficients indicate that Strategic Aircraft Maintenance Systems have a statistically significant positive effect on Sustainable Competitive Advantage. The unstandardized coefficient ($B = 0.579$, $p < 0.001$) implies that a one-unit increase in the Strategic Aircraft Maintenance System leads to a 0.579-unit increase in Sustainable Competitive Advantage, holding other factors constant. The standardized beta coefficient ($\beta = 0.598$) further confirms the strong predictive influence of aircraft maintenance systems. These results suggest that effective hazard identification, systematic safety risk assessment, and efficient maintenance turnaround time significantly enhance operational efficiency, aircraft availability, and customer confidence, thereby strengthening competitive positioning in the aviation industry.

Table 7

Regression Coefficients for Strategic Aircraft Maintenance System and SCA

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.888	.256		7.387	.000	1.384	2.393
	Strategic Aircraft Maintenance System	.579	.060	.598	9.702	.000	.461	.697

a. Dependent Variable: Sustainable Competitive Advantage

Analysis of Variance

The ANOVA results indicate that the regression model is statistically significant ($F = 94.121$, $p < 0.001$), confirming that Strategic Aircraft Maintenance Systems significantly improve the prediction of Sustainable Competitive Advantage. The regression sum of squares was substantially higher than the residual sum of squares, indicating that a significant proportion of the variance in Sustainable Competitive Advantage is explained by aircraft maintenance systems. These findings support the rejection of the null hypothesis (H_{01}) and provide empirical evidence that Strategic Aircraft Maintenance Systems have a significant influence on Sustainable Competitive Advantage among aviation companies in Kenya.

Table 8

ANOVA for Strategic Aircraft Maintenance System and SCA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.603	1	14.603	94.121	.000[b]
	Residual	26.220	169	.155		
	Total	40.822	170			

a. Dependent Variable: Sustainable Competitive Advantage
b. Predictors: (Constant), Strategic Aircraft Maintenance System

Qualitative Findings

Qualitative findings provided deeper insight into how Strategic Aircraft Maintenance Systems translate into sustainable competitive advantage within Kenyan aviation firms. Respondents emphasized that structured hazard identification processes, including routine inspections, digital monitoring tools, and real-time reporting systems, enhance early risk detection and prevent escalation of maintenance issues. Participants highlighted the importance of collaboration across engineering, flight operations, and quality assurance teams in ensuring comprehensive hazard detection.

Respondents further noted that engaging frontline technicians in safety risk assessments improves procedural accuracy due to their practical operational experience. Efficient maintenance turnaround time was repeatedly identified as a critical contributor to aircraft availability, operational flexibility, and customer confidence. Firms that embedded aircraft maintenance systems strategically reported fewer operational disruptions and stronger market positioning, while those treating maintenance primarily as a compliance requirement derived limited strategic value. These qualitative insights reinforce the quantitative findings by demonstrating that Strategic Aircraft Maintenance Systems function not merely as operational necessities, but as strategic resources that enhance organizational resilience and sustainable competitive advantage.

Discussion of Results

The central focus of this section is to interpret how Strategic Aircraft Maintenance Systems (SAMS) contribute to sustainable competitive advantage among aviation companies in Kenya, building on the empirical findings of the study. The results demonstrated that SAMS is a strong and statistically significant predictor of sustainable competitive advantage, confirming that aircraft maintenance is not merely a technical or compliance-driven function, but a strategic capability that shapes long-term organizational performance. By systematically integrating hazard identification, safety risk assessment, and efficient maintenance turnaround time, aviation firms are able to enhance operational reliability, cost efficiency, and service continuity—key determinants of competitive positioning in the aviation industry.

Hazard identification emerged as a critical driver of sustainable competitive advantage by enabling early detection of potential maintenance-related risks and preventing operational disruptions. The findings suggest that structured hazard reporting mechanisms enhance maintenance safety by ensuring timely communication of risks across engineering, safety, and operational departments. This reinforces the argument that proactive hazard identification strengthens organizational resilience by reducing unplanned aircraft downtime and safety incidents. These findings are consistent with Kovrigin and Vasiliev (2020), who observed that airlines that integrate advanced maintenance monitoring systems and structured hazard reporting achieve superior maintenance quality and regulatory compliance. Similarly, Qin and Sun (2024) emphasized that effective information-sharing and continuous skill development within maintenance systems enhance safety culture and operational reliability, thereby supporting competitive advantage.

Beyond hazard identification, the study confirmed that safety risk assessment and identification play a pivotal role in prioritizing maintenance activities and safeguarding long-term operational performance. Respondents indicated that risk assessments are routinely conducted prior to maintenance tasks and are periodically reviewed to reflect evolving operational conditions. This structured, risk-based approach ensures that maintenance resources are allocated efficiently, minimizes exposure to safety incidents, and enhances decision-making accuracy. The findings align with Johnson and Smith (2019), who demonstrated that airlines employing risk-based maintenance frameworks experience reduced operational costs, improved punctuality, and enhanced customer satisfaction. In this regard, safety risk assessment functions as a strategic mechanism through which maintenance systems directly contribute to sustainable competitive advantage.

Another key finding relates to the role of maintenance turnaround time in strengthening competitive outcomes. The results indicate that efficient maintenance planning and prompt resolution of technical issues significantly reduce aircraft downtime, improve fleet availability, and enhance schedule reliability. It may be argued that faster and more predictable maintenance turnaround times improve profitability by optimizing operational schedules and maximizing aircraft utilization. These findings support Adekitan (2020), who highlighted that aviation firms that prioritize high-quality maintenance practices achieve faster turnaround times, improved fleet performance, and superior safety outcomes. Similarly, Wendel, Albers, and Dewulf (2024) found that airlines leveraging advanced fleet and maintenance management systems realized notable improvements in service reliability and customer satisfaction, reinforcing competitive positioning.

The study further revealed that strategic aircraft maintenance systems extend beyond regulatory compliance by embedding maintenance excellence into broader organizational strategy. Firms that prioritize continuous training on hazard reporting and risk assessment cultivate a proactive safety culture, where maintenance personnel are empowered to identify risks and contribute to continuous improvement. This supports the view that SAMS, when implemented strategically, evolve into valuable organizational capabilities that are difficult to imitate and thus provide sustained competitive advantage. These findings resonate with Azevedo et al. (2020), who advocated for maintenance intelligence systems that enable early anomaly detection and support firms in exceeding baseline compliance requirements. Collectively, the findings affirm that strategic aircraft maintenance systems in Kenyan aviation are not peripheral operational tools, but core strategic assets that underpin operational resilience, customer confidence, and long-term competitiveness.

Conclusion

The study concluded that Strategic Aircraft Maintenance Systems are a critical enabler of sustainable competitive advantage among aviation companies in Kenya. Effective hazard identification and reporting mechanisms significantly enhance maintenance safety by mitigating risks and preventing operational disruptions. Additionally, systematic safety risk assessment enables aviation firms to prioritize maintenance activities efficiently, thereby improving aircraft performance, operational reliability, and safety outcomes. Efficient maintenance turnaround time further strengthens competitiveness by minimizing aircraft downtime, optimizing operational schedules, and improving profitability. Overall, the findings demonstrate that aviation companies that strategically integrate aircraft maintenance systems into their broader safety and operational frameworks are better positioned to comply with regulatory requirements, reduce costs, enhance service reliability, and sustain long-term competitive advantage in a highly regulated industry.

Recommendations

The study recommends that aviation companies strengthen their Strategic Aircraft Maintenance Systems by enhancing hazard identification and reporting mechanisms through continuous staff training and the adoption of advanced digital reporting tools. Regular and systematic safety risk assessments should be institutionalized to ensure effective prioritization of maintenance activities and reduction of operational disruptions. Aviation firms should also adopt predictive and data-driven maintenance strategies to optimize aircraft performance and minimize downtime. Furthermore, improving maintenance turnaround time through efficient planning, adequate resource allocation, and streamlined workflows will enhance fleet availability and operational flexibility. Finally, fostering a proactive safety culture through regular audits, real-time communication, and adherence to international maintenance standards will further enhance operational efficiency and support the attainment of sustainable competitive advantage.

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