Eastern African Journal of Humanities and Social Sciences
Vol. 5 No. 2 (2026): ISSN (Online): 2958-4558
DOI: https://doi.org/10.58721/7f9xnc08
Strategic Safety Management System and Sustainable Competitive Advantage in Kenya's Aviation Companies

Strategic Safety Management System and Sustainable Competitive Advantage in Kenya's Aviation Companies

Ali Ibrahim Roba
United States International University – Africa, Kenya

Article History
Received: 22.02.2026
Revised: 04.08.2026
Accepted: 08.08.2026
Published: 13.08.2026

Keywords
Aviation safety
Flight operations
Regulatory compliance
Management system

How to cite:
Roba, A. I. (2026). Strategic Safety Management System and Sustainable Competitive Advantage in Kenya's Aviation Companies. *Eastern African Journal of Humanities and Social Sciences, 5*(2), 396-410.

Copyright © 2026

Abstract
Kenya's aviation companies operate under intensifying regulatory scrutiny, rising operational costs, and mounting competition from heavily capitalised regional carriers, yet most treat safety management as a compliance obligation rather than a source of competitive strength. This study examined the influence of Strategic Safety Management Systems (SSMS) on Sustainable Competitive Advantage (SCA) in Kenya's aviation industry. SSMS comprised four components—Strategic Aircraft Maintenance System (SAMS), Strategic Flight Operations Management (SFOM), Strategic Quality Management System (SQMS), and Strategic Human Resource Planning (SHRP)—with Regulatory Compliance (RC) as a moderator. Anchored on Stakeholder and Total Quality Management (TQM) theories, it adopted a positivist, sequential mixed-methods design integrating quantitative and qualitative evidence through triangulation. Quantitative data were collected from 192 managers across all 60 Kenya Civil Aviation Authority (KCAA)-licensed firms, yielding an 89% response rate (n = 171), and qualitative data from 21 key informants. Separate regressions showed SQMS (R^2 = 0.413), SFOM (R^2 = 0.389), SAMS (R^2 = 0.358), and SHRP (R^2 = 0.374) each significantly predicted SCA ($p < 0.001$). A stepwise multiple regression with RC explained 53.0% of the variance (Adjusted R^2 = 0.519), RC significantly moderating all SSMS–SCA relationships. Qualitative findings triangulated these results, underscoring proactive safety culture, structured audits, management commitment, and competent workforces as enablers. The study advances Stakeholder and TQM theory by showing that strategically embedded safety and quality practices become stakeholder-legitimising capabilities yielding durable competitive value. It recommends integrated SSMS implementation, real-time safety monitoring, HR capability audits, and repositioning regulatory compliance as a strategic asset.

Introduction
Business organisations today operate in an increasingly dynamic and competitive environment marked by rapid technological change, digital innovation, shifting consumer expectations, and global competition (Möller, Nenonen & Storbacka, 2020; Newman, Rand, Tarp & Trifkovic, 2020). These forces have reshaped the aviation industry, where performance is tied to reliability, service quality, and customer satisfaction across operations from cargo handling and ground services to in-

flight experience and punctuality (Abate, Christidis & Purwanto, 2020; Pauchant, Mitroff & Lagadec, 2019). Global air travel has rebounded strongly, with passenger traffic surpassing 9 billion in 2024, an 8.3% year-on-year increase driven by the revival of international travel (ACI World, 2025). This growth has intensified safety scrutiny, raised regulatory expectations, and elevated safety management beyond mere compliance. Many states, including Kenya, have thus embedded Safety Management System (SMS) obligations into their regulatory frameworks, recognising that structured safety systems spanning aircraft maintenance, flight operations, quality management, and human resource planning are essential drivers of sustainable competitive advantage rather than optional standards (KCAA, 2024; IATA, 2025). This study distinguishes the conventional SMS—the regulatory, compliance-oriented set of safety policies, risk management, promotion, and assurance functions—from a Strategic Safety Management System (SSMS), in which those functions are deliberately designed, resourced, and integrated to build competitive capability rather than satisfy regulatory minima.

Globally, leading jurisdictions and carriers have demonstrated the strategic value of embedding SSMS frameworks. In Australia, CASA developed SMS guidelines aligned with global standards, enabling superior safety performance and operational credibility (Bieder, 2021). Singapore's Civil Aviation Authority implemented SMS regulations that enhanced safety outcomes, efficiency, and customer satisfaction (CAAS, 2020). In the UK, the International Airlines Group (IAG) championed advanced SMS, reducing operational costs, improving safety, and boosting customer satisfaction and competitive positioning (Smith & Reynolds, 2018). In the Middle East, Emirates and Etihad have shown that advanced Quality Management Systems (QMS) embedded within SMS frameworks enhance satisfaction, efficiency, and safety (Nasaj & Al-Marri, 2022), with Etihad's ISO 9001 certification yielding streamlined scheduling, reduced delays, better resource management, and multiple Skytrax and World Travel Awards (Emil, 2021; Kucsera, 2021). These exemplars underscore a shift: aviation safety management has evolved from a regulatory obligation into a strategic capability generating measurable competitive differentiation.

In Africa, aviation is expanding rapidly, and South Africa, Nigeria, Ethiopia, and Kenya have increasingly embraced SMS frameworks to leverage safety for sustainable competitive advantage (Mtigwe, 2023; Gossling, 2022). Kenya ranks fourth in Africa and first in East Africa in air transport development, with five international airports and 21 additional airstrips serving domestic, regional, and international flights (Abbamonte, 2019; Onyango, 2023). Aviation contributes about 3.1% of Kenya's GDP (USD 3.3 billion) and supports nearly 460,000 jobs, while traffic is forecast to grow 249% over twenty years, potentially adding 11.8 million passenger journeys by 2037 and supporting an estimated USD 11.3 billion of GDP and 859,000 additional jobs (IATA, 2018; 2025). These projections derive from pre-pandemic IATA (2018) forecasts and should be read with caution, since the 2020–2023 disruption materially reset global demand; they indicate long-run structural growth potential rather than precise post-pandemic estimates, and are complemented by more recent evidence (ACI World, 2025; IATA, 2025). Kenya scored 91.77% in ICAO's 2019 mandatory security audit, ranking best in the region for air safety (Onyango, 2023). The Civil Aviation (Safety Management) Regulations, 2018 mandate that all service providers implement SMS in line with international standards, with KCAA overseeing compliance across 60 licensed aviation companies (GoK, 2018; KCAA, 2024). The goal of SMS implementation—encompassing aircraft maintenance, flight operations, quality management, and human resource planning—is to establish reliability as the cornerstone of operations, reduce costs, build reputation, and position Kenyan aviation companies for sustainable competitive advantage in regional and international markets.

Despite the regulatory mandate and strategic potential of SSMS, Kenyan empirical literature has largely concentrated on safety management compliance, regulatory performance, or individual dimensions of operational risk, without comprehensively examining how the full spectrum of SSMS components collectively influences sustainable competitive advantage (Njeru, 2019; Mwikya, Sabina & Mwaura, 2018; Thendu et al., 2023). Of the 60 KCAA-licensed companies, Kenya Airways remains the only carrier benchmarked against international safety management standards across strategic flight operations and aircraft maintenance (Irandu, 2019), revealing a significant industry performance gap. Moreover, the moderating role of regulatory compliance in the SSMS–SCA relationship has received no empirical attention in Kenya. This study therefore examines the influence of Strategic Aircraft Maintenance System (SAMS), Strategic Flight Operations Management (SFOM), Strategic Quality Management System (SQMS), and Strategic Human Resource Planning (SHRP) on Sustainable Competitive Advantage, with Regulatory Compliance (RC) as a moderating variable, among all KCAA-licensed aviation organisations in Kenya.

Specifically, the study sought to: (i) determine the influence of Strategic Aircraft Maintenance System on Sustainable Competitive Advantage; (ii) assess the influence of Strategic Flight Operations Management on SCA; (iii) evaluate the influence of Strategic Quality Management System on SCA; (iv) examine the influence of Strategic Human Resource Planning on SCA; and (v) establish the moderating effect of Regulatory Compliance on the relationship between SSMS components and SCA among KCAA-licensed aviation companies in Kenya.

Globally, the implementation of SMS is considered important in achieving SCA in the aviation industry (Molchanova et al., 2021). By enhancing safety, reducing costs, ensuring regulatory compliance, building a strong reputation, and supporting key economic sectors, an effective SMS enables aviation companies to thrive in a competitive global market (Mugo, 2020). Implementing a strategic SMS significantly enhances aviation safety and the sustainable competitive advantage of aviation companies. Additionally, recruitment, motivation, and retention policies in place have a significant effect on aviation safety management (Njeru, 2018).

Kimotho (2019) observed that there is a significant positive relationship between capacity building in safety management services and airline safety performance, which in turn impacts on sustainable competitive advantage. Investing in capacity building through training and development could enhance safety performance, boost customer confidence and satisfaction, operational efficiency, and assure SCA. Njeru (2019) underscores the importance of safety policy, safety risk management, safety promotion, safety training and education, adoption of safety management systems, as well as safety audits and inspections, ensuring that risks in the aviation sector are identified and mitigated.

Evidently, regulatory compliance, organisational culture, and leadership are fundamental components of safety management systems in the aviation sector (Thendu et al., 2023). Adhering to stringent regulations ensures that airlines meet international safety standards, critical for maintaining operational integrity and gaining customer trust. A positive safety culture, driven by committed leadership, ensures that safety protocols are not only implemented but also embraced by all levels of the organisation. This is likely to lead to a proactive approach to risk management, continuous improvement in safety practices, and ultimately, a reduction in accidents and incidents (Jumi, 2019).

Njeru (2019) identified four key drivers of SMS: Safety Policy, Safety Risk Management, Safety Promotion, and Safety Assurance. Mwikya, Sabina, and Mwaura (2018) emphasise the role of monitoring and evaluation in ensuring compliance with aviation safety regulations. Thendu et al. (2023) further noted that organisational culture and leadership significantly enhance safety management systems. These studies, however, evaluate the traditional, defensive pillars of SMS —

safety policy, risk management, promotion, and assurance — and stop short of explaining how safety management can be organised strategically to build competitive advantage. The consequences of this omission are not merely academic: aviation firms that treat SMS as a defensive compliance cost, rather than a strategic capability, face escalating operational and audit-remediation costs, avoidable flight delays, erosion of regional market share to heavily capitalised competitors, and exposure to down-ratings during KCAA safety audits that can threaten their operating credibility. It is this gap — between defensive compliance and strategic capability, and the tangible competitive costs of remaining on the wrong side of it — that motivated the present study, which examines how SSMS components, both collectively and individually, influence SCA, including the moderating role of regulatory compliance.

Strategic Aircraft Maintenance System and SCA

Aircraft maintenance is essential to aviation operations, given that aircraft systems gradually deteriorate under demanding operating conditions and require systematic monitoring to prevent failure (Basora et al., 2021). Wendel, Albers, and Dewulf (2024) found that strategic aircraft management systems enhance operational efficiency by optimising flight schedules, maintenance routines, and fuel consumption, contributing directly to customer satisfaction and competitive advantage. Johnson and Smith (2019) demonstrated that airlines employing advanced fleet management technologies enjoy reduced operational costs and improved punctuality. Qin and Sun (2024) proposed collaborative maintenance models with interorganisational information exchange that lead to significant reductions in operational costs and improved safety outcomes.

Azevedo, Cardoso, and Ribeiro (2020) established that advanced diagnostic analytics and predictive maintenance tools can forecast potential failures, minimising unplanned downtime and enhancing safety. Adekitan (2020) found that the aviation industry in Moscow places high value on maintenance integrity and quality because of their critical role in ensuring flight safety and operational performance, while demonstrating that high-quality maintenance methods help firms exceed regulatory requirements, thereby improving safety records and customer satisfaction. Kovrigin and Vasiliev (2020) confirmed that airlines that maintain the highest standards of maintenance quality through careful outsourcing management, cutting-edge technology integration, and regulatory adherence achieve a superior competitive standing. In the Kenyan context, the growing air traffic across Africa has intensified the need for effective maintenance regulations and standards that can underpin both safety and sustainable competitiveness (Njoya & Ragab, 2022).

Strategic Flight Operations Management and SCA

Strategic flight operations management encompasses dispatch reliability, management commitment to safety, and clearly defined safety accountability. Emani (2024) found that effective flight operations management boosts operational effectiveness and reduces costs in Caribbean airlines, directly affecting competitive ability. Johnson and Parker (2020) demonstrated that advanced flight operations practices, including optimised flight scheduling, fuel economy measures, and real-time data analytics, result in enhanced operational performance and cost reductions. Liu et al. (2020) confirmed that optimisation of scheduling and live monitoring reduces costs and enhances operational efficiency, thereby offering lasting competitive advantage.

Merkert and Swidan (2019) found that improved flight operations management—encompassing on-time performance, high-quality in-flight amenities, and efficient communication—improves customer satisfaction and loyalty, essential for gaining SCA. Echwa and Murigi (2019) established a statistically significant and substantially beneficial link between strategic leadership in-flight operations management and performance of domestic airline firms in Kenya. The study further identified

leadership, integrated safety management, continuous improvement, technological advancement, and adherence to best practices as pivotal elements contributing to the effectiveness of SSMS. Ak-Kwifi et al. (2020) demonstrated through Ethiopian Airlines' experience that international best practices in-flight operations management, when embraced consistently, contribute to sustainable competitive advantage on both continental and global scales.

Strategic Quality Management System and SCA

The aviation industry's commitment to quality management systems is paramount, not only for regulatory compliance but also for securing SCA in the global market (Stolzer, Sumwalt, & Goglia, 2023). Quality assurance processes ensure that services and operations satisfy rigorous industry standards, improving reliability and fostering consumer trust (Elrich et al., 2020). Safety assurance involves continuous monitoring, reporting, and feedback mechanisms ensuring that risk controls function as intended and that the organisation remains responsive to new safety challenges. Stolzer, Sumwalt, and Goglia (2023) argue that safety assurance plays a central role in protecting both the organisation and its customers in high-risk industries, with a strong safety assurance framework leading to fewer incidents, better regulatory compliance, and lower liability exposure.

El-Souri, Gao, and Simmonds (2019) established that QMS improves operational efficiency by standardising procedures and decreasing variability, enabling compliance with international regulatory requirements. Smith et al. (2018) found that a properly executed QMS improves customer happiness, ensures regulatory compliance, and boosts operational efficiency, resulting in a stronger market position and lasting competitive edge. Shin and Shin (2023) confirmed in South Korea that integrating quality and environmental management standards into aviation QMS strengthens competitive advantage and guarantees long-term success. Tong (2022) found that South African aviation authorities with extensive QMS frameworks achieved enhanced competitiveness and safety records. In Kenya, Mokaya and Nyaga (2019) noted that challenges in SMS implementation, stemming from a weak safety culture and insufficient management support, underscore the strategic importance of genuinely embedding SQMS rather than pursuing superficial compliance.

Continuous improvement of the Safety Management System (SMS) is a key strategic approach that not only keeps safety protocols relevant but also enables aviation companies to adapt to changing regulatory, technological, and market conditions (Singh, Vaibhav, & Sharma, 2021). Customer feedback incorporated into quality processes further strengthens competitive positioning through improved Net Promoter Scores, stronger brand loyalty, and steady market share gain (Mbugua & Nyambura, 2023). When strategically aligned, quality assurance, safety assurance, and continuous improvement lead to increased operational efficiency, enhanced stakeholder trust, reduced costs of non-compliance, and an improved safety culture, positioning aviation firms to outperform competitors in safety, service reliability, and brand strength.

Strategic Human Resource Planning and SCA

In the very competitive aviation industry, gaining a competitive edge requires matching strategic business goals with human resource strategies. Alfawaire and Atan (2021) argue that strategic alignment makes it easier to build a workforce receptive to the company's objectives, thereby improving operational effectiveness and customer satisfaction. Al-Hawary and Al-Rasheedy (2021) found that strategic learning significantly enhanced the dynamic capabilities of HR staff in Kuwaiti aviation firms, thereby improving competitive market positioning. Alserhan and Shbail (2020) demonstrated that sustainable competitive advantage varies statistically significantly in response to HRM practices, with organisational commitment serving as a partial mediator.

Singh and Kumar (2021) found that comprehensive HR planning, encompassing effective talent acquisition, training, and development, is crucial for building a competent and motivated workforce, fostering innovation and a long-lasting competitive advantage. Mehta (2017) confirmed, using data from 200 HR professionals in India, that comprehensive human resource planning, encompassing talent acquisition, training, and development, is imperative for maintaining a competitive edge in the ever-changing aviation industry. Mati and Atikiya (2022) established, in the Kenyan context, that aviation companies can gain a competitive edge by investing in staff development and fostering an innovative culture, thereby enabling them to adapt more quickly to market opportunities and technological advancements.

Key indicators of effective SHRP include training and development, gap analysis, supply and demand forecasting, and HR capability auditing. Kapur and Parveen (2021) found that investment in employee development boosts staff confidence, adaptability, and commitment, essential in high-pressure aviation environments, translating into lower operational errors, higher productivity, and enhanced service delivery. Ahmed and Khan (2020) argued that workforce forecasting enables firms to plan recruitment pipelines, manage wage structures, and allocate resources more efficiently. Muthoni and Karanja (2023) asserted that HR auditing helps aviation companies close compliance and performance gaps by comparing their personnel practices against industry best practices and legal requirements.

Regulatory Compliance as a Moderating Variable

Regulatory compliance serves as a crucial moderating variable between safety management systems and sustainable competitive advantage in aviation companies (Gisario et al., 2019). By adhering to stringent regulatory standards, aviation companies can ensure that their SSMS components are robust and effective. Consistent implementation of an SMS policy enhances transparency and accountability, significantly reducing safety incidents, legal liability, and operational disruptions, thereby fostering customer confidence and stakeholder trust (Gisario et al., 2019). Kowalski and Szpytko (2021) posit that firms institutionalising regulatory compliance practices develop a more disciplined and standardised operational culture, improving risk management and reducing redundancy.

Chang, Shao, and Chen (2018) found that Taiwanese airports with well-implemented safety risk management components and safety policies achieved strong regulatory alignment and operational credibility. Judi (2019) confirmed in Kenya that meeting operational aircraft regulations, personnel licensing, air operator, and administration requirements are key to fostering growth of the domestic airline industry. Bellamy et al. (2019) found that strict regulatory adherence reduces operational disruptions caused by safety breaches or legal penalties, with aviation firms that routinely undergo regulatory audits experiencing higher safety ratings, which translate into customer loyalty and financial growth. The Resource-Based View (Barney, 1991) and TQM theory underscore that when quality and safety practices are deeply embedded within organisational processes, they evolve into strategic capabilities yielding durable competitive value. Regulatory compliance, when embraced proactively beyond minimum legal requirements, fosters a culture of accountability, transparency, and continuous improvement that enhances stakeholder trust and positions compliant airlines as credible market leaders.

Theoretical Framework

The study is anchored on two theories. Stakeholder Theory (Freeman, 1984) posits that organisational performance reflects the expectations of multiple stakeholders, including regulators, customers, employees, and investors. Applied to aviation, SSMS implementation addresses the safety and service expectations of these diverse stakeholders, generating trust, regulatory legitimacy, and competitive differentiation. Total Quality Management (TQM) Theory (Deming, 1986) emphasises continuous

improvement, customer satisfaction, process optimisation, employee involvement, and data-driven decision-making as foundations for organisational excellence. When TQM principles are embedded within SSMS through structured audits, continuous improvement cycles, documentation integrity, and proactive quality assurance, organisations are better positioned to sustain competitive advantage in dynamic, regulated environments.

Methodology

The study adopted a positivist paradigm and sequential mixed-methods design. A census was applied organisationally: all 60 KCAA-licensed aviation organisations as of December 2024—airlines, MROs, flight training institutions, and air service operators—were included. Within these firms, the target population was 360 managers across six functional categories (technical, human resources, security, safety, quality assurance, and flight operations). At the respondent level, a stratified random sample was drawn: Slovin's formula (Tejada & Punzalan, 2012) at 95% confidence and 0.05 margin of error gave a minimum of 189, plus a non-response buffer, yielding 192 managers allocated proportionately across the six strata. For the qualitative component, 21 key informants were purposively selected from KCAA, the State Department of Transport, trade unions, insurance companies, and company directors—a number consistent with thematic saturation in a specialised sector with a limited pool of senior experts.

Quantitative data were collected via a structured five-point Likert questionnaire (1 = Strongly Disagree to 5 = Strongly Agree). Cronbach's alpha values—0.713 (SAMS), 0.746 (SFOM), 0.777 (SQMS), 0.817 (SHRP), 0.706 (RC), and 0.710 (SCA)—all exceeded the 0.70 threshold. Validity was established through expert review, content validity mapping, and exploratory factor analysis, with Pearson correlations confirming construct validity for all SSMS components against SCA ($r = 0.62–0.75$). Qualitative data were gathered via semi-structured interviews and analysed in NVivo 14 through open, axial, and selective coding, with themes aligned to research questions for triangulation.

Prior to regression, diagnostics confirmed model assumptions: Q-Q plots supported approximate normality; Tolerance and VIF values (Tolerance = 1.000, VIF = 1.000–1.002) confirmed no multicollinearity; and Durbin-Watson statistics (1.692–1.819) confirmed no autocorrelation. Heteroscedasticity was detected (Breusch-Pagan $p < 0.05$) and addressed through robust estimation. Five simple linear regressions were estimated for each SSMS component against SCA, and a stepwise multiple regression with all four predictors, RC, and interaction terms examined moderation.

Response Rate and Respondent Profile

Of 192 distributed questionnaires, 171 were fully completed and returned, a response rate of 89%, exceeding the 70% threshold recommended for excellent reliability (Mugenda & Mugenda, 2014). The returned sample retained representation across all six sampled functional categories; Safety Managers (21%) and Human Resource Managers (19%) were most represented, with the rest distributed across the technical, security, quality assurance, and flight operations functions. By seniority, respondents comprised managers (40%), supervisors (27%), and directors (22%), the balance holding other designations; this profile is reported separately from the functional stratification used in sampling and does not substitute for it. A plurality (42%) had 6–10 years of industry experience, indicating mid-level professionals with operational and strategic perspectives on aviation management.

Descriptive Statistics

Table 1 summarises the descriptive statistics for all study variables. All constructs recorded mean scores above 4.20 on the five-point Likert scale, with low standard deviations, reflecting consistent, high-level implementation of SSMS practices across Kenya's licensed aviation companies.

Table 1: Descriptive Statistics for All Study Variables

Variable / Dimension	Aspects of Measurement	M	SD
SAMS	Hazard Identification	4.24	0.53
	Risk Assessment & Safety Identification	4.23	0.56
	Maintenance Turnaround Time	4.28	0.59
	Aggregate	**4.25**	**0.56**
SFOM	Dispatch Reliability	4.30	0.50
	Management Commitment	4.22	0.55
	Safety Accountability & Responsibilities	4.26	0.54
	Aggregate	**4.26**	**0.53**
SQMS	Quality Assurance	4.25	0.53
	Continuous SMS Improvement	4.26	0.55
	Safety Assurance	4.24	0.56
	Aggregate	**4.25**	**0.55**
SHRP	Training & Development	4.30	0.49
	Gap Analysis	4.26	0.55
	Supply & Demand Forecasting	4.31	0.61
	HR Capability Auditing	4.25	0.62
	Aggregate	**4.28**	**0.57**
Regulatory Compliance (RC)	SMS Policy Implementation	4.27	0.53
	Compliance with Regulatory Requirements	4.32	0.51
	Training & Certification Compliance	4.31	0.55
	Aggregate	**4.30**	**0.53**
SCA (Dependent)	Low Operation Cost	4.22	0.58
	Advanced Safety Technologies	4.35	0.52
	Employee Competence & Engagement	4.38	0.50
	Low Staff Turnover Rate	4.18	0.60
	Improved Staff Motivation	4.27	0.57
	Customer Satisfaction & Brand Loyalty	4.42	0.48
	Aggregate	**4.30**	**0.54**

n = 171. SAMS = Strategic Aircraft Maintenance System; SFOM = Strategic Flight Operations Management; SQMS = Strategic Quality Management System; SHRP = Strategic Human Resource Planning; SCA = Sustainable Competitive Advantage. Likert scale: 1 (Strongly Disagree) – 5 (Strongly Agree).

Regression Results: Individual SSMS Components

Table 2 presents the regression results for each SSMS component against SCA. All four models were statistically significant ($p < 0.001$), with SQMS emerging as the strongest predictor ($R^2 = 0.413$), followed by SFOM ($R^2 = 0.389$), SHRP ($R^2 = 0.374$), and SAMS ($R^2 = 0.358$).

Table 2: Regression Results for Individual SSMS Components on Sustainable Competitive Advantage

Variable	R	R^2	Adj. R^2	B	SE B	β	F	p
SAMS → SCA	.598	.358	.354	.579	.060	.598	94.12	< .001
SFOM → SCA	.623	.389	.385	.640	.062	.623	107.44	< .001
SQMS → SCA	.643	.413	.410	.639	.059	.643	119.01	< .001
SHRP → SCA	.612	.374	.371	.615	.061	.612	101.17	< .001

. n = 171. Dependent variable: Sustainable Competitive Advantage. SAMS = Strategic Aircraft Maintenance System; SFOM = Strategic Flight Operations Management; SQMS = Strategic Quality Management System; SHRP = Strategic Human Resource Planning.

Stepwise Multiple Regression with Regulatory Compliance as Moderator

Table 3 presents the stepwise regression model build-up. SQMS entered as the strongest first predictor (Model 1, $R^2 = 0.413$), with each subsequent variable incrementally increasing explanatory power. The final model incorporating all SSMS components and RC explained 53.0% of the variance in SCA.

Table 3: Stepwise Multiple Regression Summary

Model	R	R^2	Adj. R^2	ΔR^2	F Change	df1	df2	p (ΔR^2)
Model 1: SQMS	.643	.413	.410	.413	119.014	1	169	< .001
Model 2: + SFOM	.659	.434	.428	.021	6.266	1	168	.013
Model 3: + SHRP	.691	.477	.469	.043	9.880	1	167	.002
Model 4: + SAMS	.710	.504	.495	.027	6.540	1	166	.011
Model 5: + RC (Moderator)	.728	.530	.519	.026	6.210	1	165	.014

n = 171. Dependent variable: Sustainable Competitive Advantage. SQMS = Strategic Quality Management System; SFOM = Strategic Flight Operations Management; SHRP = Strategic Human Resource Planning; SAMS = Strategic Aircraft Maintenance System; RC = Regulatory Compliance.

Table 4 presents the regression coefficients for the final model including all SSMS components, Regulatory Compliance, and interaction terms.

Table 4: Regression Coefficients for Final Model with Moderation Effects

Predictor	B	SE B	β	t	p	95% CI for B
SAMS	.312	.098	.265	3.184	.002	[.118, .506]
SFOM	.428	.121	.318	3.537	.001	[.189, .667]
SQMS	.501	.110	.384	4.559	< .001	[.284, .718]
SHRP	.205	.095	.152	2.158	.033	[.017, .393]
RC	.298	.089	.223	3.348	.001	[.123, .473]
SQMS × RC	.115	.040	.145	2.875	.005	[.036, .194]
SFOM × RC	.092	.037	.118	2.486	.014	[.019, .165]
SHRP × RC	.058	.032	.073	2.812	.043	[.002, .114]
SAMS × RC	.067	.035	.082	1.964	.047	[.001, .133]

n = 171. Dependent variable: Sustainable Competitive Advantage. R^2 = .530, Adjusted R^2 = .519 for the full model. SAMS = Strategic Aircraft Maintenance System; SFOM = Strategic Flight Operations Management; SQMS = Strategic Quality Management System; SHRP = Strategic Human Resource Planning; RC = Regulatory Compliance. CI = confidence interval.

Qualitative Findings

Thematic analysis of qualitative data collected from 21 key informants through NVivo 14 produced five dominant thematic clusters aligned to the research questions, providing rich triangulation of the quantitative results.

Theme 1: Proactive Hazard Detection and Maintenance Culture

Respondents stressed proactive hazard detection through digital monitoring, real-time reporting, and frontline technician involvement. Faster, more predictable maintenance turnaround was linked to aircraft availability, client satisfaction, and competitive edge, with hazard detection relying on collaboration across engineering, flight operations, and quality assurance.

Theme 2: Dispatch Reliability and Management Commitment to Safety

Dependable dispatching reduces delays and builds passenger loyalty. Respondents cited visible top-management commitment, training, decision-support systems, review meetings, clear job descriptions, and audit checklists as drivers of punctuality, fewer incidents, compliance, and a culture of operational excellence and trust.

Theme 3: Quality Systems as Strategic Assets

Structured quality assurance (internal audits, documentation reviews, prompt corrective actions) surfaces operational gaps. Where SQMS is embedded strategically, continuous improvement, feedback loops, and benchmarking drive innovation and reliability that customers notice; where treated as a formality, it yields little strategic value.

Theme 4: Human Capital as a Competitive Driver

Safety-focused training, gap analysis, workforce forecasting, and regular HR audits align staff competencies with safety and service demands, strengthening internal capacity, innovation, and long-term competitiveness.

Theme 5: Regulatory Compliance as an Enabler of Competitive Strategy

Strict SMS adherence enhances safety culture, accountability, and credibility while reducing sanctions and reputational risk. Firms that exceed minimum compliance investing in safety technologies, advanced training, and integrated reporting position themselves as reliable market leaders, securing sustainable competitive advantage.

Discussion of Findings

SAMS and SCA

The analysis indicated a moderately strong, positive, and significant relationship between SAMS and SCA (as reported in Table 2). Effective hazard identification, systematic risk assessment, and efficient maintenance turnaround time emerged as the primary drivers. These findings align with Kovrigin and Vasiliev (2020), who demonstrated that meticulous outsourcing management, advanced technology integration, and regulatory adherence support superior maintenance quality, and with Adekitan (2020), who found that efficient maintenance turnaround reduces aircraft downtime and improves fleet utilisation. Qualitative evidence reinforced these results through the proactive hazard detection theme: respondents noted that digital monitoring tools, real-time reporting systems, and cross-functional collaboration enhance the precision of hazard detection, consistent with Wendel et al.

(2024), who linked maintenance systems that embed predictive safety evaluations to brand trustworthiness and operational agility.

SFOM and SCA

SFOM demonstrated a strong, positive and significant relationship with SCA (Table 2). Dispatch reliability emerged as the most critical dimension, minimising operational disruptions and enhancing customer satisfaction. These results are consistent with Emani (2024), who found that effective flight operations management boosts operational effectiveness and reduces costs, and with Liu et al. (2020), who established that optimised flight scheduling and live monitoring yield lasting competitive advantage. Management commitment to safety and clearly defined safety accountability structures were also identified as vital, corroborating Wu et al. (2019), who found that leadership-driven safety cultures reduce incident rates. The qualitative theme of dispatch reliability and management commitment further validated these findings, with participants emphasising that visible senior management commitment to safety creates a culture of operational excellence that permeates all organisational levels.

SQMS and SCA

SQMS emerged as the strongest individual predictor of SCA (Table 2). Quality assurance, safety assurance, and continuous SMS improvement were the primary dimensions. These findings resonate with El-Souri et al. (2019), who argued that effective quality assurance mechanisms reinforce service reliability and passenger confidence, and with IATA (2018), which linked robust quality assurance to brand positioning by minimising safety incidents. The qualitative distinction between proactive and reactive quality cultures was particularly illuminating: respondents in organisations with strategically embedded SQMS reported stronger safety cultures, lower operational risks, and improved stakeholder confidence, while those treating SQMS as a compliance formality reported superficial quality processes. This aligns with Stolzer et al. (2023), who contended that strategically implemented SMS frameworks enable airlines to consistently meet ICAO and IATA standards.

SHRP and SCA

SHRP showed a strong, positive and significant relationship with SCA (Table 2). Training and development, gap analysis, supply and demand forecasting, and HR capability auditing collectively drove this relationship. These findings are consistent with Singh and Kumar (2021), who established that comprehensive HR planning is crucial for building a competent, motivated aviation workforce, and with Balaraman and Kamalakannan (2016), who demonstrated that skill-gap analysis is essential in aviation given rapidly evolving technology and safety protocols. The qualitative theme on human capital as a competitive driver further reinforced these results: respondents highlighted that comprehensive training programmes equip employees with the competencies needed to maintain operational excellence, minimise errors, and support innovation.

Moderating Influence of Regulatory Compliance

The stepwise model confirmed that Regulatory Compliance both directly enhanced SCA and significantly moderated all four SSMS–SCA relationships, with the SQMS×RC interaction the strongest and the SAMS×RC interaction the weakest (full coefficients in Tables 3 and 4). Qualitative findings on regulatory compliance as a strategic enabler enriched these results: key informants emphasised that companies exceeding minimum compliance thresholds — through investment in safety technologies and integrated reporting systems — position themselves as market leaders. Read through the study's theoretical lenses, these results extend Stakeholder Theory (Freeman, 1984) by showing that compliance-embedded SSMS simultaneously satisfies the safety and service expectations of regulators, customers, employees, and investors, converting stakeholder legitimacy

into competitive differentiation; and they extend TQM Theory (Deming, 1986) and Barney's (1991) Resource-Based View by demonstrating that continuous improvement and quality routines, once embedded and regulation-reinforced, become inimitable strategic resources that generate durable competitive value rather than mere conformance.

Limitations and Directions for Future Research

Four limitations frame future work: the cross-sectional design (longitudinal studies could track how SSMS–SCA relationships evolve); reliance on self-reported manager perceptions (objective audit indicators could reduce bias); a Kenya-only KCAA sample (multi-country studies could improve generalisability); and unexplained variance beyond the 53% captured (future models could add factors like market structure, capital intensity, and technological capability).

Conclusion

All four SSMS components positively influence Sustainable Competitive Advantage, with SQMS strongest, and together with Regulatory Compliance as moderator, they explain 53% of SCA variance. Qualitative themes triangulate these results. The study reframes SSMS as a strategic capability system rather than a compliance toolkit, advancing Stakeholder and TQM theory and suggesting that KCAA and firms can treat regulatory compliance as a competitiveness lever rather than a defensive obligation.

References

Abate, M., Christidis, P., & Purwanto, A. J. (2020). Government support to airlines in the aftermath of the COVID-19 pandemic. Journal of Air Transport Management, 89, 101931. https://doi.org/10.1016/j.jairtraman.2020.101931

Adekitan, A. I. (2020). Safety integration with quality management as operational excellence tool in the aviation industry. International Journal of Aviation Engineering, 9(2), 12–24.

Ahmed, S., & Khan, M. (2020). Risk-based maintenance strategies in aviation safety management. Journal of Airworthiness Studies, 7(1), 31–45.

Airports Council International [ACI] World. (2025). Global air traffic and passenger traffic forecast 2025. ACI World.

Ak-Kwifi, N., et al. (2020). Safety accountability structures in flight operations: Evidence from Ethiopian Airlines. Journal of Aviation Safety Review, 3(4), 112–128.

Al-Hawary, S. I. S., & Al-Rasheedy, H. K. (2021). The effect of strategic learning for human resources on dynamic capabilities of airline companies in Kuwait. International Journal of Innovation, Creativity and Change, 15(2), 1–22.

Alfawaire, M., & Atan, T. (2021). The effect of human resource management, knowledge management on competitive advantages through organizational innovation. Sustainability, 13(21), 1–21.

Alserhan, H., & Shbail, M. (2020). The role of organizational commitment in the relationship between HRM practices and sustainable competitive advantage in Jordanian aviation. International Journal of Innovation, Creativity and Change, 13(1), 1–22.

Azevedo, A., Cardoso, A., & Ribeiro, C. (2020). Estimation of health indicators using advanced analytics for prediction of aircraft systems remaining useful lifetime. Journal of Aircraft Maintenance Technology, 5(2), 45–60.

Balaraman, V., & Kamalakannan, R. (2016). Skill gap analysis in the aerospace and aviation sector. International Journal of Human Resource Management, 12(3), 45–60.

Barney, J. B. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99–120.

Basora, J., et al. (2021). Aircraft fleet health monitoring with anomaly detection techniques. Journal of Aerospace Engineering, 14(1), 22–36.

Bellamy, W., et al. (2019). Regulatory adherence and operational stability in aviation. Journal of Air Transport Safety, 12(1), 25–41.

Chang, Y.-H., Shao, P.-C., & Chen, H. J. (2018). Performance evaluation of airport safety management systems in Taiwan. Journal of Air Transport Management, 69, 100–111.

Deming, W. E. (1986). Out of the crisis. MIT Press.

Doganis, R. (2019). Flying off course: Airline economics and marketing (5th ed.). Routledge.

Echwa, M., & Murigi, M. (2019). Strategic leadership in flight operations management and performance of domestic airline firms in Kenya. Eastern Africa Journal of Contemporary Research, 1(2), 144–152.

El-Souri, M., Gao, J., & Simmonds, C. (2019). Integrating manufacturing knowledge with the design process to improve quality in the aerospace industry. Procedia CIRP, 84, 374–379.

Elrich, A., et al. (2020). Quality assurance processes in aviation. International Journal of Aviation Quality, 8(2), 77–93.

Emani, L. (2024). Flying towards sustainability: The role of leadership in airline operations. Journal of Airline Operations and Aviation Management, 3(1), 1–7.

Freeman, R. E. (1984). Strategic management: A stakeholder approach. Pitman.

Gisario, A., Kazarian, M., Martina, F., & Mehrpouya, M. (2019). Metal additive manufacturing in the commercial aviation industry. Journal of Manufacturing Systems, 53, 124–149.

International Air Transport Association [IATA]. (2018). IATA safety report 2018. IATA.

International Air Transport Association [IATA]. (2025). Annual review 2025. IATA.

Johnson, R., & Parker, T. (2020). Flight operations management and sustainable competitive advantage: Evidence from U.S. airlines. Journal of Aviation Studies, 8(1), 44–62.

Johnson, R., & Smith, T. (2019). Risk-based maintenance frameworks in aviation. Aviation Maintenance Science Quarterly, 12(3), 90–108.

Judi, J. K. (2019). Effect of civil aviation regulations on the growth of the domestic airline industry in Kenya. University of Nairobi.

Jumi, J. (2019). Air transport regulatory compliance and airline growth in Kenya. Kenya Journal of Aviation Policy, 3(1), 18–34.

Kapur, R., & Parveen, S. (2021). Employee development and performance in aviation. Journal of Aviation Human Resource Studies, 9(1), 55–70.

Kenya Civil Aviation Authority [KCAA]. (2024). Kenya National Aviation Safety Plan 2023–2025. KCAA.

Kenya Law. (2018). Civil Aviation (Safety Management) Regulations, 2018. National Council for Law Reporting.

Kimotho, F. (2019). Factors influencing aviation safety performance in Kenya [MBA thesis]. University of Nairobi.

Kovrigin, A., & Vasiliev, A. (2020). Trends in digital quality management systems in aerospace manufacturing. Asian Journal of Aviation Research, 4(1), 22–35.

Kowalski, T., & Szpytko, J. (2021). Operational compliance and safety culture in aviation. International Journal of Aviation Regulation, 9(2), 118–135.

Liu, X., Zhang, Y., & Chen, H. (2020). Flight operations management and sustainable competitive advantage: Evidence from Chinese aviation enterprises. Journal of Aviation Management, 6(2), 33–50.

Mati, J., & Atikiya, R. (2022). Human resource strategy implementation practices and performance of Kenyan aviation industry. International Journal of Business and Management, 17(3), 44–60.

Mbugua, T. K., & Nyambura, L. M. (2023). Integrating customer feedback in quality management systems. Journal of Service Quality and Customer Experience, 5(2), 60–75.

Mehta, A. (2017). Human resource planning and competitive advantage in Indian aviation. Journal of Aviation HR Studies, 3(2), 18–33.

Merkert, R., & Swidan, H. (2019). Flying with the wind: Scale, scope and profitability in international airlines. Journal of Air Transport Management, 76, 54–63.

Möller, K., Nenonen, S., & Storbacka, K. (2020). Networks, ecosystems, fields, market systems? Industrial Marketing Management, 90, 380–399. https://doi.org/10.1016/j.indmarman.2020.07.013

Mokaya, F., & Nyaga, M. (2019). Challenges in SMS implementation in the Kenyan aviation industry. Journal of Aviation Safety Studies, 5(2), 22–38.

Molchanova, K. M., Trushkina, N. V., & Katerna, O. (2021). Digital platforms in aviation operations. Journal of Aviation Technology and Development, 8(2), 55–70.

Mugenda, O. M., & Mugenda, A. G. (2014). Research methods: Quantitative and qualitative approaches. African Centre for Technology Studies.

Mugo, P. (2020). Porter's five forces and competitive advantage in aviation. European Journal of Business and Strategic Management, 5(2), 30–49.

Muthoni, A. G., & Karanja, T. K. (2023). HR capability auditing in aviation firms. African Journal of Strategic Human Resource Management, 6(2), 52–68.

Mwikya, P. M., Sabina, M., & Mwaura, P. (2018). Safety management systems, regulatory compliance and performance of Kenyan aviation firms [Unpublished thesis]. University of Nairobi.

Njeru, L. M. (2019). Safety management systems and performance of airlines in Kenya. United States International University–Africa.

Njeru, E. W. (2018). Factors influencing aviation safety: The case of Kenya Civil Aviation Authority. University of Nairobi.

Njoya, E. T., & Ragab, A. M. (2022). Public air transport investment. Sustainability, 14(5), 2651. https://doi.org/10.3390/su14052651

Qin, H., & Sun, J. (2024). Service accessibility strategy for aircraft maintenance routing with interorganizational collaborations. Journal of Aviation Management, 8(1), 22–40.

Singh, R., & Kumar, A. (2021). The impact of human resource planning on the sustained competitive advantage of aviation enterprises. Journal of Human Resource Management in Aviation, 6(2), 15–29.

Singh, V., Vaibhav, S., & Sharma, S. K. (2021). Competitive advantage factors in Indian low-cost carriers. Journal of Indian Business Research, 13(1), 43–77.

Smith, L., Brown, T., & Yates, K. (2018). Quality management systems and competitive advantage in European aviation. International Journal of Aviation Quality Management, 11(2), 88–104.

Stolzer, A. J., Halford, C. D., & Goglia, J. J. (2021). Safety management systems in aviation (3rd ed.). Routledge.

Stolzer, A. J., Sumwalt, R. L., & Goglia, J. J. (2023). Safety management systems in aviation (4th ed.). CRC Press.

Thendu, B. K., Kariuki, P., Muturi, W., & Wanjohi, A. (2023). Strategic safety management systems and sustainable competitive advantage of aviation companies in Kenya.

Tong, M. (2022). Performance evaluation of safety management systems in South African aviation. Journal of Airline Economics, 14(2), 55–73.

Vasigh, B., Fleming, K., & Tacker, T. (2018). Introduction to air transport economics (3rd ed.). Routledge.

Wendel, C., Albers, S., & Dewulf, W. (2024). Architectures for airline management: Integrating safety, quality, innovation and digitalisation. Journal of Air Transport Management, 118, 102373.

Wu, P. J., Cavuoto, L., & Mehran, J. (2019). Leadership-driven safety culture and operational performance in aviation. Safety Science, 118, 567–578.

Yilmaz, M. K., & Flouris, T. (2019). Proactive safety management and safety culture in aviation organisations. In T. Flouris & D. Lock (Eds.), Aviation risk and safety management (2nd ed.). Routledge.

Zhou, L., & Liu, H. (2022). Gap analysis and workforce readiness in aviation. Journal of Human Resource Analytics, 4(2), 66–80.