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Applying Technology Integration to Enhance the Economic Sustainability of Kenya Airways, PLC

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Abstract

Kenya Airways has continued to experience financial instability and operational inefficiencies despite implementing various strategic initiatives, raising concerns about the effectiveness of its strategy implementation practices. The objective of the study was to analyze the effect of technology integration on the economic sustainability of Kenya Airways, PLC. The theory that underpinned the study was the technology acceptance model. The study adopted a descriptive research design. The target population was the 2,229 employees of Kenya Airways. The sample size included 339 leaders and employees of Kenya Airways, determined using Yamane's formula. The study applied a stratified random sampling technique to select the respondents. A pilot study was conducted among 10% (n = 34) of employees of Skyward Express to identify and fix potential problems in the questionnaire before conducting the main study. Data was collected using a self-administered electronic questionnaire distributed via the human resource department of Kenya Airways. Data collected was analyzed using the Statistical Package for Social Sciences. The types of tests to be used were mean, standard deviations, t-tests, Pearson's Correlation Coefficient, and p-values. The data analyzed were presented using tables, formulae, and histograms. The study results revealed that technology integration does not have a significant influence on the economic sustainability of Kenya Airways, PLC. Based on the study results, it was recommended that Kenya Airways should enhance technology adoption through targeted training and support systems to improve organizational performance and long-term sustainability.

Keywords: *Technology integration, strategy implementation, operational efficiency, innovation, economic sustainability.*

1.0 Background of the Study

Sustainability is rapidly becoming the mainstay of organizational prosperity in the current wave of intensified ecocentrism. Thiele (2024) explains that sustainability occurs when organizations integrate the three pillars of environmental, social, and economic aspects in pursuit of improved quality of life and a balance between nature and the current pattern of development. Most organizations have remained particularly attentive to economic sustainability since the beginning of the 21st century due to their support for long-term economic growth without compromising communities' social, environmental, and cultural aspects (Farley & Smith, 2020; Jamwal *et al.*, 2021). Corporations operating in developed and developing nations emphasize major growth in terms of revenues and profitability. In the pursuit of profits, corporations may ignore the 'planet'

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and ‘people’ imperatives of the triple bottom-line, thus compromising the ability of nature to meet the needs of future generations (Caradonna, 2022). Di Simone *et al.* (2022) express that while technology integration practices can be costly in the short run, the long-term positive outcomes related to economic sustainability are immeasurable.

The global airline industry is increasingly leveraging technology integration to enhance economic sustainability amid rapid growth driven by globalization, world trade, and expanding business travel (Ali *et al.*, 2021; Liu *et al.*, 2022). Significant technological initiatives include the adoption of sustainable aviation fuels, advanced aircraft designs, alternative propulsion systems, carbon offsetting and reduction schemes, and enhanced air traffic management systems, particularly in the United States, Europe, and Australia (Abrantes *et al.*, 2021; Barke *et al.*, 2022). These efforts are supported by growing global energy investments aimed at achieving net-zero emissions by 2050 (McCollum *et al.*, 2018). Airlines continue to deploy digital and operational technologies as strategic tools to reduce costs, maximize revenues, and improve safety and operational efficiency, thereby strengthening economic sustainability (Deloitte, 2023). In Africa, however, technology integration is constrained by aging infrastructure, high replacement costs, limited financing, and technical capacity gaps, leading to persistent sustainability challenges despite notable progress in countries such as South Africa and collaborative initiatives in Tanzania and Ghana (De Gove, 2019; Samunderu, 2023; Thendu, 2023; Kiswaa, 2020; Awa *et al.*, 2021).

In Kenya, while sustainability practices are emphasized in policy and strategy, actual implementation of technology-driven initiatives remains under-documented, with leadership, human resource capacity, and technological readiness identified as critical success factors influencing the industry’s economic sustainability (Wittmer & Müller, 2021; Mwanzu *et al.*, 2023; Liu *et al.*, 2022). Kenya Airways faces persistent challenges in sustaining operations and profitability amid volatile market conditions influenced by economic recession, exchange rate fluctuations, and imbalances in international passenger arrivals and departures (Wittmer & Müller, 2021). Aviation demand in Kenya is further shaped by ticket prices, economic climate, income per capita, population size, demographics, and socio-cultural factors, which can suppress demand even under favorable economic performance (Liu *et al.*, 2022; Zaki Ahmed & Rodríguez-Díaz, 2020). To address these challenges, Kenya Airways has invested in strategic initiatives, including pilot and technical training, the establishment of the Pride Centre, international training programs, and modern aircraft acquisition, such as Boeing fleets, while operating diversified passenger and cargo revenue streams (Vasigh & Azadian, 2022).

Economic sustainability refers to organizational practices that promote long-term financial growth while balancing social, environmental, and cultural considerations, commonly assessed through profitability, financial stability, cost efficiency, and revenue growth (Elkington, 1997; Schaltegger & Burritt, 2018; Martins *et al.*, 2021). In the aviation sector, recent studies emphasize integrating ESG principles to sustain economic performance (Kumar & Dulloo, 2024; Dinçer *et al.*, 2024). Strategy implementation practices translate plans into action and significantly influence sustainability outcomes through leadership quality, stakeholder involvement, technology integration, and human resource capacity (Mati & Atikiya, 2022; Afonso *et al.*, 2023). Effective alignment of these practices enhances organizational resilience, efficiency, competitiveness, and long-term economic sustainability.

Kenya Airways, established in 1977, has faced persistent challenges, including financial instability, operational inefficiencies, and intense global competition, limiting its economic sustainability despite its strategic importance in Africa's aviation sector (Janes, 2019; Nandwa, 2022; Owuor, 2021). Although employing over 6,800 staff and leveraging advanced aviation technologies through its international operations, the airline struggles with high labor costs, strained industrial relations, and leadership inconsistencies (Liu *et al.*, 2022; Rocket Reach, 2024). Weak stakeholder engagement, slow technology adoption due to financial constraints, and legacy systems further undermine strategy implementation, threatening long-term competitiveness and sustainable performance (Schwab, 2021; Ngari & Mutua, 2024).

1.1 Statement of the Problem

Kenya Airways has experienced persistent financial losses, signaling deep challenges in economic sustainability and strategy implementation. The airline recorded losses for three consecutive years from 2016 to 2019, including Ksh. 8.85 billion in 2018/2019, representing a 49% increase from the previous year despite revenue growth from Ksh. 114.1 billion to Ksh. 128.3 billion (Kenya Airways, 2024). Further losses of Ksh. 36.2 billion in 2021, Ksh. 38.2 billion in 2022, and Ksh. 22.7 billion in 2023 were reported, largely driven by high operating costs, fuel price volatility, foreign exchange losses, and restructuring expenses (Kenya Airways, 2023; 2025). Rising operating costs by 12.4% and increasing debt levels have undermined competitiveness and reliance on government bailouts (Auditor General, 2023). Despite prior studies on restructuring and leadership, limited research links technology integration to economic sustainability, creating a clear research gap that this study seeks to address.

1.2 Objective of the Study

The study aims to examine the influence of technology integration on the economic sustainability of Kenya Airways, PLC.

2.0 Literature Review

The literature review is presented in sections.

2.1 Theoretical Literature

The theory anchoring this study is the Technology Acceptance Model (TAM). The technology acceptance model was advanced by Davis in 1989 (Cardeal *et al.*, 2020). The theory identifies two factors that determine the acceptability of computer systems by the intended users: the perceived usefulness and perceived ease of application. The model emphasizes how end users of an innovation perceive the technology, such that they can accept using it. The Technology Acceptance Model explains the rationale for technology integration in organizations (Sagnier *et al.*, 2020). The theory explains the general determinants of technology acceptance that can inform user behavior when using technology (Saeidi *et al.*, 2024). The initial TAM model tested only the perceived usefulness and perceived ease of use. However, a more detailed version was advanced by Venkatesh and Davis (2000) to include the system's usefulness in time pre-implementation, one month after implementing it, and three months after implementing the technology. The time enables the gaining of the real perception of the end user after applying the technology and hence determines the relevance of the technology in meeting desired goals.

Applications in virtual environments are perceived as hedonic technologies. In essence, hedonic variables are instrumental in technology acceptance (Sagnier *et al.*, 2020). This means that the perceived playfulness and enjoyment of technology have a positive effect on perceived usefulness. The theory applies to this study as it assumes the application of an information system is dependent on the behavioral aim and behavioral intention of an individual's attitude regarding the introduction of new systems in Kenya Airways and the effect of such a system in adopting an innovation. The theory also emphasizes the effect of technology-based innovation and digital utilization on the sustainability of organizations (Saedi *et al.*, 2024). It asserts the importance of ease of application as a factor in developing systems to enhance positive relations between perceived importance and perceived usage. The Technology Acceptance Model is relevant to the current study because it stipulates the quality of the information system in terms of its relevance in influencing users to reuse the technology, thus enhancing the economic sustainability of Kenya Airways. The model was used to interpret findings related to the potential of TAM in influencing technology integration in ways that influence the economic sustainability of Kenya Airways.

2.2 Empirical Review

Ochieng' Ayodo and Deya (2023) sought to establish the relationship between strategic innovation and the performance of airlines in Kenya. The study aimed to determine the influence of technological innovations on the performance of airlines in Kenya. The study included all registered local airline companies (59) in the airline industry. The study employed a descriptive research design to determine the influence of strategic innovation on the performance of airlines. A structured questionnaire was applied to collect primary data, while the companies' audited reports supplemented secondary data. SPSS was used for data analysis, and inferential statistics were applied to determine the associations between variables. The correlation of the variables indicated that strategic innovation was related to 41% of the performance of airlines in Kenya. The study asserts that technological innovations, system development innovations, marketing innovations, and service innovations promote positive performance. The study has limited generalizability because it employed purposeful sampling (methodological gap) and focused on general performance rather than economic sustainability (conceptual gap).

Okwiri (2023) launched an inquiry into *restructuring strategies and performance of air travel agencies in Kenya*. The study focused on several restructuring strategies such as downsizing, outsourcing, and integration of technology. The study aimed at determining three objectives; however, this research focused on the third objective to determine the interrogation of technology on the performance of air travel agencies, whereby variables including digitization of operations, reservation platforms, and social media platforms were analyzed regarding profitability, booking volumes, and size of partnership networks. To this end, the study employed a descriptive survey design whereby 71 respondents identified using stratified random sampling were administered a structured open-ended questionnaire. Descriptive and inferential analysis techniques were used, including mean and standard deviation as well as linear regression. The study found that technological integration positively affected performance by enhancing operational efficiency, speed, and increasing visibility. The study is relevant to the current study; however, it focuses on air travel agencies, which may not have operational activities found in the airline industry, such as Kenya Airways.

Njagi and Ndavula (2020) determined the influence of digital technologies on digital transformation in Kenya Airways. The convergent parallel mixed methods design was employed. Taro Yamane's formula was used to determine the sample from a population of 410 management staff from different levels within the organization. Using a structured questionnaire, the interview was conducted to gain data, which was later analyzed using descriptive and inferential statistics. The study established digitization process varied across the departments of Kenya Airways. The study established that website modernization, employee performance tracking, cloud computing, and other technologies were applied in only 77% of all departments of Kenya Airways. This study also establishes a link between the use of digital technologies and an enhancement in understanding customer needs and developing responsive products. While the study informs the current research on the extent of digitization in Kenya Airways, its independent variable was the digital transformation of Kenya Airways, which is different from the proposed study's conceptual focus.

2.3 Conceptual Framework

Figure 1 below presents a conceptual framework for the study.

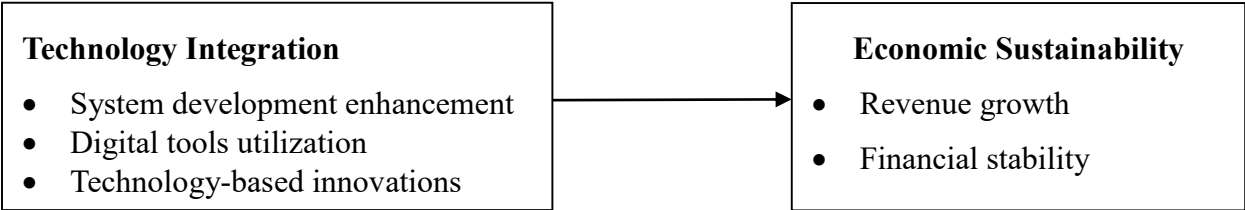


Figure 1: Conceptual Framework

The conceptual framework hypothesizes the influence of technology integration on the economic sustainability of Kenya Airways, PLC.

3.0 Research Methodology

The study adopted a descriptive research design, which is appropriate due to time efficiency, cost-effectiveness, and its ability to characterize patterns in economic sustainability and implementation practices using data collected at a single point in time (Mugenda & Mugenda, 2009; Wang & Cheng, 2020). Although the design does not allow causal inference, it is suitable for providing comprehensive depictions of sustainable implementation practices rather than establishing cause-and-effect relationships. The study targeted permanent employees of Kenya Airways who possess direct knowledge of strategic implementation practices and organizational sustainability. Out of 6,861 employees, 2,229 permanent staff, including board members, senior leadership, departmental heads, and operational personnel across key departments, formed the target population (Kenya Airways, 2025). A sample size of 339 respondents was determined using the Taro Yamane formula at a 95% confidence level and 0.05 margin of error. Proportionate stratified simple random sampling was applied to ensure fair representation of all departments, minimize bias, and enhance the reliability and generalizability of the findings. Table 1 below summarizes the population and sample.

Table 1: Population and sample

Department	Population	Percentage	Sample size
Board members	10	0.45%	1
Business leadership team	6	0.27%	1
Department heads	11	0.49%	2
Operations	225	10.09%	34
Finance	249	11.17%	38
Sales	268	12.02%	41
Engineering & Technical	600	26.92%	91
Marketing	51	2.29%	8
Information technology	775	34.78%	118
Human resource	34	1.52%	5
Total	2,229	100	339

The study used structured electronic questionnaires to collect data from Kenya Airways employees and management, covering demographics, stakeholder involvement, leadership, technology integration, human resource capacity, and economic sustainability. This method was efficient, standardized, and allowed systematic data collection at a specific point in time (Sharma, 2017). Data collection began after obtaining KU-ERC approval and a NACOSTI license. The researcher coordinated with Kenya Airways' HR to disseminate the electronic questionnaire via Google Forms, allowing four weeks for responses. This method was convenient for participants, reduced costs, and saved time compared to printed questionnaires. After data collection, responses from Google Forms were coded, cleaned for errors, and analyzed using SPSS. Descriptive statistics summarized trends, while regression analysis examined the effect of stakeholder involvement, leadership quality, technology integration, and human resource capacity on Kenya Airways' economic sustainability, with significance assessed at $p < 0.05$. The researcher obtained ethical approval from the University, NACOSTI, and the Ethical Clearance Committee, and participants provided signed consent forms to confirm voluntary participation. Respondents were informed of their right to withdraw at any time, and confidentiality of all collected data was strictly maintained.

4.0 Research Findings

The research findings are discussed in sections.

4.1 Response rate and Reliability

The response rate refers to the proportion of administered questionnaires that were completed and returned by respondents. It was assessed in this study to determine the adequacy, representativeness, and reliability of the data for valid statistical analysis and generalization of the findings. Table 2 presents the response rate for this study.

Table 2: Response Rate

Particulars	Number	Percentage
Questionnaires administered	339	100.0%
Questionnaires successfully returned	264	77.9%
Questionnaires not returned (non-response)	75	22.1%

Source: Survey data (2025)

Out of the 339 questionnaires administered, 264 were successfully returned, representing a response rate of 77.9%, while 75 questionnaires, equivalent to 22.1%, were not responded to. A response rate above 70% is considered adequate and sufficient for reliable statistical analysis and generalization of findings in social science research (Mugenda & Mugenda, 2003). Having achieved this acceptable response rate, the researcher proceeded with data analysis.

4.2 Demographic Characteristics

The demographic characteristics analyzed in this study included gender, age, experience in the current position, level of education, and classification within the organization. The results are detailed in Table 3.

Table 3: Analysis of respondents’ demographic characteristics

Variable	Characteristic	Frequency	Percentage
Gender	Male	127	48.1
	Female	137	51.9
Age bracket	18-30 Years	57	21.6
	31-40 years	55	20.8
	41-50 years	53	20.1
	Above 50 years	99	37.5
Number of years in current position	Below 1 year	35	13.3
	1-5 years	106	40.2
	6-11 years	57	21.6
	12-17 years	35	13.3
	18-23 years	19	7.2
	24 years and above	12	4.5
Level of education	Secondary	2	.8
	College	76	28.8
	Undergraduate	118	44.7
	Postgraduate	68	25.8
Classification within the organization	Operational employee	17	6.4
	Middle level	106	40.2
	Top-level	141	53.4

Source: Survey data (2025).

The study’s respondents were predominantly female (51.9%, n = 137) and largely above 50 years old (37.5%, n = 99), indicating mature and experienced perspectives. Most had 1–5 years in their

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current positions (40.2%, n = 106) and held undergraduate qualifications (44.7%, n = 118), reflecting a well-educated workforce. Over half occupied top-level management positions (53.4%, n = 141), ensuring insights were primarily managerial. This distribution demonstrates that the findings are informed by experienced, educated, and senior employees, enhancing the relevance, depth, and generalizability of conclusions regarding strategy implementation practices and economic sustainability within Kenya Airways.

4.3 Descriptive Analysis for Inspirational Motivation

Mean and standard deviations for the variable, technology integration, were computed and the results presented as shown in Table 4.

Table 4: Descriptive analysis for the variable ‘technology integration’.

Rating statements on technology integration	Mean	SD
I intend to continue using the technology systems found in Kenya Airways to discharge my duties.	3.2083	1.06006
I am comfortable using the technology system found in Kenya Airways in performing my daily tasks.	2.9545	1.25987
The integration of technology across departments has streamlined the operations of the company	3.1136	.99922
Technological-based innovations are easier to apply as they enhance the delivery of high-quality service.	3.1667	1.29736
I am satisfied with the functionality of the technological systems found in Kenya Airways.	3.2008	1.24912
Kenya Airways recent development system has enhanced efficiency across departments	3.1364	1.05925
Aggregate mean and standard deviation	3.1300	1.1541

Source: Survey data (2025)

The aggregate means for technology integration was 3.130 (SD = 1.154). This indicates most of the respondents held neutral perceptions of technology use at Kenya Airways. The standard deviation of 1.1541 (below 2) suggests low variability, which means that the respondents held broadly similar views regarding the organization’s technological systems and their effectiveness. It appears that employees show a reasonable intention to continue using existing technology systems, as reflected by the highest means of 3.208 (SD = 1.060), suggesting cautious acceptance of digital tools in daily work. Satisfaction with the functionality of the technological systems followed closely, with a mean of 3.201 (SD = 1.249), indicating that systems generally meet operational needs, though experiences vary slightly. The application of technology-based innovations in enhancing service delivery recorded a mean of 3.167 (SD = 1.297), pointing to

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moderate confidence in technology-driven service quality. Recent system developments were also perceived to enhance efficiency across departments, given the mean of 3.136 (SD = 1.059). Similarly, cross-departmental technology integration was viewed as having somewhat streamlined operations, with a mean of 3.114 (SD = 0.999), reflecting consistent but reserved approval. However, comfort in using the technology systems was comparatively lower, as shown by a mean of 2.955 (SD = 1.260), suggesting that ease of use remains a challenge for some employees.

Past research showed similar patterns, where, for example, Ochieng’Ayodo and Deya (2023) established that technological innovations in the airline industry positively influenced performance, while Okwiri (2023) found that technology integration enhanced operational efficiency and visibility in air travel agencies. Additionally, Njagi and Ndavula (2020) highlighted that digitization at Kenya Airways improved customer responsiveness and performance tracking, though the application varied across departments. The study indicates that technology integration moderately supports operational efficiency and service delivery despite the evident need for improvement due to the neutral score for most of the statements on technology integration.

4.4 Inferential Analysis

The study applied correlation analysis to determine the association between technology integration and the economic sustainability of Kenya Airways, PLC. Table 5 presents the analyzed results.

Table 5: Correlation analysis

	Pearson’s correlation coefficient	Inference
Technology integration	.847**	Strong and positive

A strong positive correlation was observed between technology integration and economic sustainability ($r = 0.847$, $p < 0.01$), suggesting that the adoption and effective application of technological systems and innovations in operations are associated with enhanced financial performance at Kenya Airways. The integration of technology across departments streamlines processes, improves service delivery, and facilitates efficiency in resource utilization, contributing to cost reduction and profitability. This aligns with Ochieng’Ayodo and Deya (2023), who found that technological innovations, including system development and service digitization, positively influenced airline performance in Kenya. Okwiri (2023) similarly observed that technology integration in air travel agencies enhanced operational efficiency, speed, and visibility. Njagi and Ndavula (2020) further established that digital technologies in Kenya Airways improved customer responsiveness and department-specific efficiency, highlighting the role of digitization in organizational performance. Overall, the correlation indicates that technology integration is critical for promoting economic sustainability through efficiency, innovation, and competitive operations. Regression analysis was used to determine the significance of the influence of technology integration on the economic sustainability of Kenya Airways, PLC. Table 6 presents a detailed analysis of the study’s coefficients.

Table 6: Regression analysis

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.202	.106		-1.915	.057
	Technology Integration	.103	.071	.099	1.447	.149

a. Dependent Variable: Economic Sustainability

The constant (B = -0.202, t = -1.915, p = 0.057) represents the predicted value of economic sustainability when all independent variables, stakeholder involvement, leadership quality, technology integration, and human resource capacity, are equal to zero. Although it is slightly negative and not statistically significant (p > 0.05), it indicates that without the influence of the predictors, economic sustainability would be minimal.

$$Y = -0.202 + 0.103X_3 + \varepsilon_i$$

The equation can be used to predict the changes in the dependent variable (economic sustainability) when there is a change in any of the independent variables.

Technology integration has a positive but statistically non-significant effect on economic sustainability (B = 0.103, t = 1.447, p = 0.149). This indicates that while technological systems facilitate operational efficiency, their current implementation may not yet substantially influence financial outcomes at Kenya Airways. The Technology Acceptance Model (TAM) provides a theoretical lens, asserting that perceived usefulness and ease of use determine the adoption and effectiveness of technological innovations (Davis, 1989; Venkatesh & Davis, 2000; Saeidi *et al.*, 2024). Studies by Ochieng’Ayodo and Deya (2023), Okwiri (2023), and Njagi and Ndavula (2020) confirm that while digital innovations increase efficiency, they require consistent application and user competence for meaningful financial impact. Therefore, to leverage technology as a driver of economic sustainability, Kenya Airways should focus on comprehensive training, user-friendly systems, and cross-departmental integration, ensuring that technological investments translate into improved productivity, cost savings, and long-term profitability.

5.0 Conclusion

The study concludes that technology integration exhibits a positive but statistically non-significant influence on economic sustainability (B = 0.103, t = 1.447, p = 0.149). The descriptive statistics indicate moderate perception among employees, with an aggregate mean of 3.130 and SD = 1.1541, suggesting familiarity with technological systems but highlighting variability in usage comfort and adoption across departments. Correlation analysis shows a strong positive association with economic sustainability (r = 0.847, p < 0.01), suggesting that technology integration is linked to improved financial outcomes, even if its regression influence is currently limited. The Technology Acceptance Model (TAM) explains this relationship, emphasizing that perceived usefulness and ease of use determine the adoption and effectiveness of technology systems (Davis,

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1989; Venkatesh & Davis, 2000; Saeidi *et al.*, 2024). Previous studies highlight that technology enhances operational efficiency, service delivery, and process visibility but requires proper training and integration to influence sustainability outcomes (Ochieng' Ayodo & Deya, 2023; Okwiri, 2023; Njagi & Ndavula, 2020). Improved cross-departmental integration, user-friendly platforms, and continuous training are necessary for technology integration to positively influence economic sustainability.

6.0 Recommendations

Kenya Airways should enhance technological adoption by providing comprehensive training programs, user support systems, and mentorship for employees. Simplifying interfaces, offering practical guides, and establishing help desks will build confidence and competence in using systems. Promoting cross-departmental collaboration in technology utilization and monitoring usage regularly ensures effective application. Strengthening these practices will optimize operational efficiency, improve service delivery, and ensure that technological resources contribute meaningfully to organizational goals.

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