

Influence of organizational structure and training programs on the implementation of aeronautical information management system

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Abstract

This study investigated the effects of two elements of the McKinsey 7S model on strategic practices (one hard element - organizational structure, and one soft element - staff training programs) on the implementation of Aeronautical Information Management (AIM) in the Kenyan Civil Aviation Authority (KCAA). The objectives of the study were to determine the influence of training programs and organizational structure on the successful implementation of AIM in KCAA. The study draws upon two theoretical frameworks to reinforce the variables under investigation: the Technological Acceptance Model (TAM) and the McKinsey 7S model. TAM delves into technology acceptance, while the McKinsey 7S model provides a comprehensive lens for assessing the impact of strategy, structure, systems, staff, skills, style, and shared values on AIM implementation. The target population for this study was 1,630 individuals directly involved in AIM implementation within KCAA. The sample size, determined based on Krejcie and Morgan's table, comprised 310 respondents who were selected using a clustered random sampling technique. The study utilized an explanatory research design. Bivariate correlation and multiple linear regression analyses were conducted to explore relationships and gain insights into the study variables. The results revealed significant positive effects of organizational structure and training programs on AIM success. This interpretation sheds light on the nuanced dynamics that contribute to the successful implementation of AIM within the Kenyan Civil Aviation Authority. The study concludes that investing in comprehensive training and optimizing organizational structures significantly enhances AIM implementation. The findings affirm the positive impact of training programs and organizational structure on AIM success, emphasizing their intrinsic connection. The study recommends that aeronautical organizations prioritize comprehensive training and the optimization of organizational structures.

Keywords: Aeronautical information management system; Organization structure; Training programs; Kenya; McKinsey 7S model

1. Introduction

The aviation industry is a complex and highly regulated industry that requires effective management practices to ensure safe and efficient operations (Christopher, 2017). Aeronautical Information Management (AIM) is a critical component of the aviation industry, providing vital information to pilots, air traffic controllers, and other aviation stakeholders. AIM involves the collection, processing, storage, and dissemination of aeronautical information, including information on airspace, airports, navigational aids, weather, and other relevant data. This information is essential for safe and efficient aviation operations, and effective AIM is critical to ensuring that this information is accurate, timely, and reliable (Michael, 2018).

The implementation of AIM has been taking place worldwide, and there has been significant progress in recent years. The International Civil Aviation Organization (ICAO) has played a crucial role in promoting the implementation of AIM amongst the contracting states. ICAO has developed a roadmap for the implementation of AIM, which includes a set of guidelines and recommendations for its member states (Oluwole, 2019). Many countries have already implemented AIM systems, while others are in the process of doing so. The implementation of AIM has been driven by several factors, including the need to improve the accuracy and reliability of aeronautical information service, the increasing demand for real-time data, and the need to improve efficiency and safety in the aviation industry.

In Africa, the implementation of AIM is still in its early stages, but there are efforts to improve the collection, processing, and dissemination of aeronautical information (Mutua, 2019). The African Union has developed the Single African Air Transport Market (SAATM) initiative, which aims to promote the development of a harmonized and integrated AIM system across the continent. The implementation of AIM in Africa is a crucial step towards the modernization of the aviation industry and ensuring it keeps up with the other continents. There is scarcity of research work involving the strategic practices on the implementation of AIM both locally and internationally. It is within this context that the researcher deems it necessary to undertake a study proposing two of the factors espoused in the McKinsey 7s model -staff (training programs), and organization structure that are within the control of Kenya Civil Aviation Authority administration.

The Kenya Civil Aviation Authority (KCAA) grapples with formidable challenges in the implementation of Aeronautical Information Management (AIM), presenting serious concerns for the aviation sector. Chief among these issues is the critical need to ensure the accuracy and timeliness of aeronautical information. Delays or inaccuracies in disseminating pivotal data not only compromise safety but also pose a significant threat to operational efficiency (Mark, 2019). Moreover, persistent accessibility issues hinder effective decision-making for pilots, air traffic controllers, and other aviation professionals, creating a cascade of serious consequences. These challenges highlight the urgency of addressing profound issues within the AIM implementation at KCAA to safeguard the integrity and reliability of aeronautical information in the aviation industry (Joyce, 2021)

While there are several studies on the implementation of aeronautical information management in the aviation industry, they have not focused on the role of McKinsey 7s strategic practices in the process. Specifically, there is a research gap in investigating the relationship between McKinsey 7s strategic practices and the successful implementation of AIM. Thus, the study focuses on two parameters within the model- training programs and organizational structure. The existing literature has mainly focused on technical aspects of AIM, such as data quality and interoperability, with limited attention given to McKinsey 7s strategic practices. Moreover, most of the studies have been conducted in developed countries, with little focus on developing countries such as Kenya.

Developed by Fred Davis in 1986, the Technology Acceptance Model (TAM) is a foundational framework in the study of information systems and technology adoption. TAM suggests that users' acceptance of technology is mainly influenced by their perceptions of its ease of use (PEOU) and perceived usefulness (PU). When users find a technology both easy to use and beneficial for their tasks, they are more likely to intend to use it, which in turn leads to its actual adoption. Over the years, TAM has been applied in various fields and has inspired numerous extensions, solidifying its role as a key theory for understanding user behavior in technology adoption.

In the context of change management, TAM can assist in understanding how individuals within an organization perceive and accept changes brought about by the implementation of Aeronautical Information Management (AIM) systems (Barton, 2015). It can provide insights into factors like perceived ease of use and perceived usefulness, which are essential for successful change management. This study can assess whether employees are more likely to accept AIM systems if they find them easy to use and see the benefits they bring to their work. Regarding training, TAM can be employed to evaluate the effectiveness of training programs designed to prepare employees for the implementation of AIM systems. By measuring users' perceptions of ease of use and usefulness, the study can identify if the training efforts are helping in improving user acceptance and readiness (Jennifer, 2017).

The Technology Acceptance Model (TAM), originally designed to explain how individuals accept and adopt new technologies, can find relevance in the context of organizational culture. TAM's insights can extend to the organizational level by recognizing that technology adoption can shape and be shaped by an organization's cultural norms. Leadership's endorsement and utilization of technology can set cultural precedents, while the technology's impact on communication, collaboration, innovation, and adaptability can influence cultural characteristics. TAM's user-centric focus also aligns with cultures valuing employee satisfaction and engagement.

Additionally, in terms of Organization structure, this study can employ TAM to evaluate the impact of AIM systems on Organization structure practices (Kwak, 2021). For instance, the study can examine whether users who accept and use the system as per TAM predictions show better performance outcomes compared to those who do not. This can help establish a

link between user acceptance and system effectiveness within the context of AIM implementation.

While TAM is not the subject of the study itself, it can serve as a valuable framework for understanding and predicting user acceptance and adoption of AIM systems, which is a crucial aspect of the study's investigation into the effects of strategic practices in AIM implementation. However, the study should consider complementing TAM with other relevant frameworks and methodologies for a comprehensive scrutiny of the research topic.

The McKinsey 7S Model, developed by McKinsey in 1980, offers a holistic framework for assessing and enhancing organizational effectiveness through the interconnected analysis of seven key elements, all starting with the letter "S." These elements include Strategy (the plan of action), Structure (organizational arrangement), Systems (work processes and procedures), Skills (employee capabilities), Staff (personnel composition), Style (leadership approach and culture), and Shared Values (core beliefs guiding the organization). The model emphasizes the interdependence of these elements, positing those changes in one area impact others. It serves as a valuable diagnostic tool for organizational analysis, aiding leaders in identifying alignment or misalignment among the elements and informing strategic initiatives for positive organizational change.

The McKinsey 7S Model proves highly pertinent to the study investigating the effect of training programs and organization structure on the Implementation of Aeronautical Information Management (AIM) in the Kenya Civil Aviation Authority (KCAA). The two element delves into the strategic initiatives that KCAA employs to facilitate a successful AIM integration. One is a hard element (organization structure) while as the other is a soft element (staffing)- specific focus on training programs.

Furthermore, the Structure element of the McKinsey 7S Model (Waterman & Peters, 1980s) directly corresponds to one of the study's objectives, exploring how the organization's structure affects the implementation of AIM. This dimension is crucial for understanding the formal arrangement of departments, teams, and individuals within KCAA and its impact on AIM implementation. The Systems component of the model complements the broader context of strategic practices encompassed by the study, especially those related to AIM. It sheds light on the formal and informal processes and procedures within KCAA that influence the effective implementation of AIM.

2. Literature Review and Hypothesis Formulation

2.1 Training Programs

Training can be defined as the process of teaching or learning a particular skill, knowledge, or behavior through instruction, practice, and feedback (Hosseini, 2018). It is an organized effort to help individuals acquire new skills or improve existing ones, with the goal of enhancing their performance and productivity in a specific area or job. Training can take many different forms, including classroom-based instruction, on-the-job training, e-learning modules, simulations, and workshops (Oluwole, 2019). It can be delivered by a variety of

methods, such as lectures, group discussions, role-playing, hands-on exercises, and coaching. The purpose of training is to help individuals develop the knowledge, skills, and abilities they need to perform their job effectively and efficiently, and to support their ongoing professional development. Effective training can also help organizations achieve their goals by improving employee performance, increasing productivity, and enhancing job satisfaction and employee retention (Michal, 2019).

Effective training in the implementation of aeronautical information management (AIM) is essential to ensure the safe and efficient movement of aircraft around the world. AIM training programs provide stakeholders with the knowledge and skills required to collect, process, and disseminate aeronautical information in accordance with regulatory frameworks and technical standards. These programs also promote the standardization of practices and enhance the consistency and reliability of aeronautical information. The International Civil Aviation Organization (ICAO) is the primary organization responsible for the development and promotion of global standards and recommended practices for AIM training (Kim, 2017). ICAO's Annex 1 - Personnel Licensing provides guidelines for the issuance of licenses and ratings for personnel involved in AIM. ICAO's Annex 15 - Aeronautical Information Services provides guidelines for the training of personnel involved in AIM. Additionally, ICAO's Global Air Navigation Plan (GANP) provides a strategic framework for the development and implementation of AIM training programs.

AIM training programs typically cover a range of topics, including the collection, processing, and dissemination of aeronautical information, the format and content of Aeronautical Information Publications (AIPs), Notices to Airmen (NOTAMs), and other aeronautical information products, the use of aeronautical charts, and the application of technical standards and procedures for the provision of aeronautical information (Michal, 2019). Training programs may also cover the use of technology, such as computer systems and databases, in the collection, processing, and dissemination of aeronautical information. Effective AIM training programs must be tailored to the needs of different stakeholders in the aviation industry (Chunlin, 2018). Training programs must address the unique challenges and requirements of different types of stakeholders, including air navigation service providers, airport operators, airlines, and civil aviation authorities. Additionally, training programs must be adapted to the level of experience and knowledge of participants, ensuring that participants receive the appropriate level of training for their roles and responsibilities. AIM training programs should also promote the use of best practices and encourage the adoption of new technologies and techniques.

AIM training should be designed to keep pace with the rapid advancements in technology and the evolving regulatory frameworks for AIM (John, 2018). To achieve this, AIM training programs should be regularly reviewed and updated to ensure they remain relevant and effective. In conclusion, effective training in the implementation of aeronautical information management is critical to ensuring the safety and efficiency of aviation operations. AIM training programs must be tailored to the needs of different stakeholders, adapted to the level

of experience and knowledge of participants, and designed to promote the use of best practices and the adoption of new technologies and techniques (FAA, 2016). Regular review and updating of AIM training programs is essential to ensure they remain relevant and effective in keeping pace with the rapid advancements in technology and regulatory frameworks for AIM.

2.2 Organization Structure

The concept of organizational culture plays a pivotal role in the successful implementation of Aeronautical Information Management (AIM), serving as the underlying framework that defines the ethos and operational dynamics of AIM organizations (Bao, 2016). In this context, it encompasses the collective mindset, professional values, and deeply ingrained practices that guide how these entities gather, process, and distribute aeronautical information critical to aviation safety, navigation, and operational efficiency. The organizational culture within AIM establishments significantly influences not only the accuracy, timeliness, and accessibility of aeronautical data but also the adaptability to technological advancements, collaboration among stakeholders, and the overall resilience in addressing the evolving needs of the aviation industry, thereby safeguarding air travel and enhancing its effectiveness on a global scale (Michael, 2018).

Organizational structure within aviation regulatory bodies plays a pivotal role in shaping the successful implementation of Aeronautical Information Management (AIM). A comparison between a lean organizational structure and a conventional one reveals fundamental differences in their influence on AIM efficiency, adaptability, and collaboration within the aviation industry. In the context of aviation regulatory bodies, a lean organizational structure signifies a departure from traditional hierarchies (Christopher, 2017). It is characterized by an emphasis on efficiency, flexibility, and collaboration, as it streamlines the structural hierarchy to foster a culture of continuous improvement and adaptability to the dynamic nature of the industry. Decision-making processes within lean structures are expedited, ensuring swift responses to dynamic shifts in aeronautical information. The inherent agility of lean structures minimizes bureaucratic impediments, ultimately enhancing the overall effectiveness of AIM systems.

Resource allocation and optimization are central themes in lean organizational structures, aligning seamlessly with the core components of AIM. Lean structures prioritize cost-effectiveness, the reduction of redundancies, and the improvement of overall performance (Kim, 2017). By systematically eliminating unnecessary roadblocks in workflows, lean structures contribute significantly to enhancing the efficiency of AIM processes, allowing for optimal resource utilization.

A study by Kim (2017) found that the availability and reliability of AIM systems are vital responsibilities of organizational structure, especially in managing the system. The study also found that user satisfaction and system response time were important metrics for assessing the overall effectiveness of AIM, and these are attributed to the personnel tasked with the system. Another study by Valentina et al. (2018) examined the use of organizational structure

in the implementation of a new AIM system in the European aviation industry. The study found that workforce determination related to competency was critical for ensuring that the new system met the needs of aviation professionals. The study also highlighted the importance of stakeholder collaboration and communication in ensuring that the organizational structure was properly defined and measured. Generally, these studies suggest that organizational structure plays a critical role in ensuring that AIM systems are effective and efficient in meeting the needs of the aviation industry. However, careful planning and ongoing monitoring are necessary to ensure that the organizational structure is properly defined, measured, and evaluated over time.

While there is limited empirical research specifically addressing the administrative problem of AIM implementation in Kenya, related studies suggest that poor leadership, inadequate communication, inadequate training of personnel, and inadequate change management could be significant barriers to the effective implementation of AIM (Jennifer, 2017). Therefore, there is a need for more research on the effect of training programs and organization structure on the effectiveness of AIM implementation. Therefore, there is a need for empirical research to fill this gap by investigating the two specific elements of the McKinsey 7s strategic practices. It is within this context that this study deems it necessary to research on the role of training programs and organizational hypothesis in the implementation of aeronautical information management in KCAA.

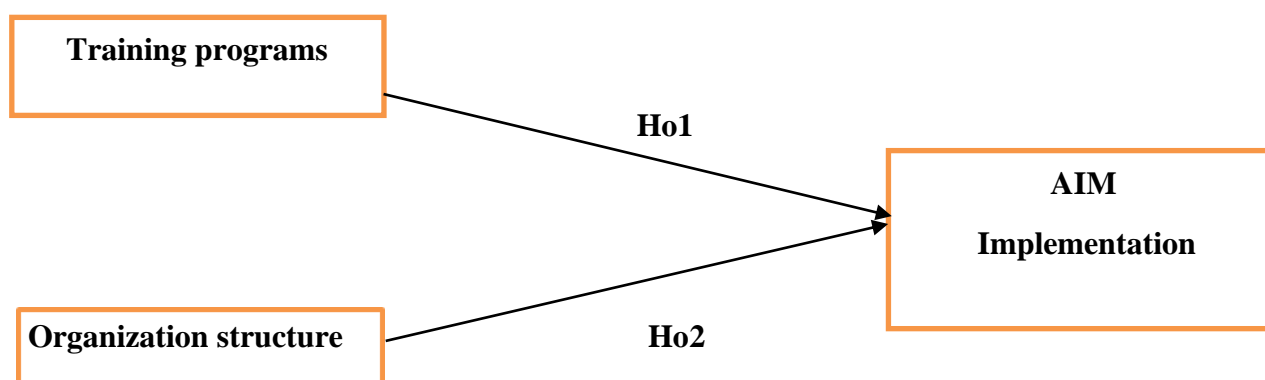
2.2 Research Hypotheses

The following hypotheses guided this research:

Ho1: Training programs at KCAA do not significantly affect AIM implementation.

Ho2: Organization structure at KCAA does not significantly contribute to AIM implementation.

Figure 1 - Conceptual Model



3. Research Methodology

3.1 Study Design

The design adopted for this study was the study employed an explanatory research design,

characterized by systematic observation and documentation without manipulation (Barton, 2015). In examining how training programs and organization structure influenced the successful implementation of aeronautical information management at KCAA.

3.2 Sample

The targeted respondents were 1630 participants. They were selected for the study as a result of their involvement in AIM implementation. Out of the population a sample of 310 was the determination of the sample size was based on the reference of Krejcie and Morgan's table. Data used in the study was collected using a questionnaire as the data instrument.

4. Results and Discussions

Out of the 310 distributed questionnaires, 164 were returned for data analysis, resulting in a response rate of approximately 52.90%.

4.1 Reliability and Correlation Results

Prior to undertaking inferential statistics, reliability of questionnaire was scrutinized and also the correlation of variables.

Table 1 displays the results of a Cronbach's Alpha test assessing the internal consistency reliability of data instrument. Each factor comprised five items, and the associated Cronbach's Alpha coefficients reveal the level of reliability for the measurement scales. Notably, training programs had the highest score ($\alpha = 0.914$), organization structure ($\alpha = 0.815$) and implementation of AIM factor yields a Cronbach's Alpha ($\alpha = 0.755$). They indicate a reasonable level of internal consistency. These findings suggest that the questionnaire items measuring each factor reliably.

Table 1: Results of Pearson Correlation and Cronbach Alpha Test

Variable (n = 164)	Reliability	Correlation		
AIM Implementation	.755	1		
Training Programs	.914	.739**	1	
Organization Structure	.815	.645**	.614**	1

Note: Correlation is significant at ** $p < .01$, (2-tailed)

(Source: developed by authors)

Finally, findings of the correlation analysis show that training programs and organization structure have a positive and significant linear relationship with Aim implementation. Training programs has the highest relationship with $r = .739$, $p < .01$, while organization structure followed at $r = .645$, $p < .01$. Furthermore, the findings show that training programs has significant association with the organization structure, as shown by $r = .614$, $p < 0.01$.

4.2 Regression Results

The influence of the independent factors (change management, and organizational culture) on the dependent variable (AIM Implementation) was determined using regression analysis.

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	Sig. Change
1	.850 ^a	.723	.716	.35988	.723	103.892	.000

a. Predictors: (Constant) TP, OS

b. Dependent Variable: Implementation of AIM

Table 2 shows that the R was 0.850 while the R square was 0.723. This implies that training programs and organization structure accounts for approximately 72.3% of the variation in AIM implementation.

The model in Table 2 was further examined for its significance using ANOVA. The results for ANOVA for training programs, organization structure and AIM implementation are presented in Table 3.

Table 3: ANOVA Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	53.822	4	13.455	103.892	.000 ^b
	Residual	20.593	159	.130		
	Total	74.414	163			

a. Dependent Variable: Implementation of AIM

b. Predictors: (Constant) OC, CM

The F-statistic of 103.892 and the related P value of 0.000 are shown in Table 3. This suggests that organization structure and training programs have a statistically significant effect on AIM implementation at the 95% confidence level.

Table 4: Beta Coefficients

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.318	.227		-1.398	.164
	TP	.228	.079	.191	2.871	.005
	OS	.489	.076	.417	6.390	.000

The multiple regression analysis reveals that the two independent variables—change management and organization culture—are significantly associated with the implementation of AIM. The multiple regression analysis, as depicted in the Beta Coefficient table (Table 4), provides insights into the relationship between the dependent variable, "Implementation of AIM," and a set of independent variables, namely training programs (TP) and organization structure (OS).

Training programs (TP) exhibit a positive impact with a coefficient of 0.191. This implies that an increase of one unit in TP is associated with a 0.191 unit increase in the "Implementation of AIM," suggesting that enhancing training programs contributes to the successful implementation of AIM.

Organization structure (OS) carries the highest coefficient at 0.417, indicating a strong positive influence on AIM implementation. A one-unit increase in OS is associated with a substantial 0.417 unit increase in the "Implementation of AIM." This underscores the importance of a well-structured organization in ensuring the successful implementation of AIM.

4.3 Hypothesis Testing

The first hypothesis (H01), it posits that there is no significant relationship between training programs and the implementation of aeronautical information management. The p-value for this hypothesis test is 0.005. The p-value of 0.005 is less than the chosen alpha of 0.05, leading to the rejection of the null hypothesis (H02). This implies that there is compelling evidence to support a significant relationship between training programs and the implementation of aeronautical information management, the second hypothesis (H02) suggests that there is no significant relationship between organization structure and the implementation of aeronautical information management. The p-value for this hypothesis test is 0.000. Similar to H01 and H02, the p-value of 0.000 is less than the chosen alpha of 0.05. Consequently, the null hypothesis (H04) is rejected, pointing to significant evidence supporting a relationship between organization structure and the implementation of

aeronautical information management.

5. Conclusion, Implications, and Limitations of the Study

5.1 Conclusion

The research indicates that there is a statistically significant relationship between training programs and the implementation of AIM. This suggests that as the level of training programs increases, AIM implementation is expected to be successfully implemented, while all other variables are held constant. This finding highlights the importance of well-structured training programs in enhancing the effective implementation of aeronautical information management systems. The study establishes a statistically significant and positive relationship between a well-designed organizational structure and AIM implementation, providing guidance to organizations on the significance of structuring their operations to support the effective deployment of AIM within the aeronautical industry. This suggests that as organization structure improves, AIM implementation is expected to increase in effectiveness of implementation, with all other influencing factors held constant. This finding underscores the pivotal role of organizational structure in enhancing the successful implementation of aeronautical information management systems.

5.2 Managerial Implications

This research emphasizes the significance of training programs in the successful implementation of aeronautical information management systems. These results hold practical significance for organizations and stakeholders in the aeronautical industry. They imply that investing in effective training programs can lead to more successful and efficient AIM system implementation. Organizations can benefit from designing and implementing comprehensive training initiatives that equip personnel with the necessary knowledge and skills for AIM deployment. This study offers a basis for organizations to improve their strategies for developing and managing training initiatives within the aeronautical industry.

The practical implications of these research findings are significant for organizations operating in the aeronautical industry. It implies that organizations should pay close attention to their structure and design it in a way that supports the effective implementation of AIM systems. This may involve aligning roles, responsibilities, and communication channels to ensure a more efficient and streamlined implementation process. Furthermore, policies should focus on the promotion and incentivization of comprehensive training programs. These programs should be designed to equip individuals with the knowledge and skills required for successful AIM implementation. Policymakers can encourage ongoing professional development and training initiatives to ensure that organizations are well-prepared to navigate the complexities of AIM systems.

5.3 Limitations

The model's explanatory power, while significant, may not capture all relevant factors influencing AIM implementation. Unobserved variables or external factors that were not

considered in the study could contribute to a more comprehensive understanding of the phenomenon.

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