EFFECTS OF NATIONAL CIVIC AVIATION SECURITY PROGRAM ON AIRCRAFT SAFETY IN KENYA

BY

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DECLARATION

Declaration by the Student:

This thesis is my original work and has not been presented for a degree in any other university.

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DEDICATION

I dedicate this thesis to my late Mother, Father, Wife, Son and my daughter for the motivation that they gave me at a time when balancing between works, family and studies was a big challenge.

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ABSTRACT

Aircraft safety is paramount in ensuring the efficient operation of air transport systems. The National Civic Aviation Security Program (NCASP) in Kenya has been instrumental in enhancing aviation safety standards. The framework for preventing acts of unauthorized interference with civil aviation is outlined in this program. The NCASP was developed to enhance security framework within the aviation industry by addressing exposures and ensuring compliance with international standards. The general objective of this study was to examine the effect of national civic aviation security program on aircraft safety in Kenya. The study was guided by the following specific objectives: to investigate the effects of security measures on aircraft safety in Kenya, to determine the effects of information sharing on aviation safety in Kenya, to investigate the impact of technological advancements on aircraft safety in Kenya and to determine the effects of international collaborations on aircraft safety in Kenya. This study examined the domino theory of aviation safety, Swiss cheese model in aviation safety and flight safety theory to understand the effect of national civic aircraft security program on aviation safety in Kenya. The strategy known as explanatory research design was created to investigate a phenomenon that had either never been researched before or had not been adequately explained in the past. Its primary goal was to give specifics about where to locate a limited quantity of information. The study's target population comprised of 111 airlines (air operator certificate holders) in Kenya in charge of national aviation security program on aviation safety. The International Civil Aviation Organization (ICAO) has directed the aviation service providers in Kenya to apply the national aviation security programs in their institutions. These are the; international airlines, domestic airlines, commercial helicopter operators and balloon operators. The study was a census of the entire population of all airlines (air operator certificate holders) in Kenya. The census was conducted in all the 111 airlines (air operator certificate holders) in Kenya. The respondents in the chosen establishments were surveyed using structured questionnaires in order to gather primary data. The goals of the study were guided by the progress of the questionnaires' questions. There are two segments to structured questionnaires. Version 25 of the Statistical Package for Social Sciences (SPSS) was used to examine the data that had been gathered. Also, a model summary, regression, ANOVA, and correlation was produced. Tables and figures were also used to display the data. The high response rate of 79.7% that was achieved in this survey made it possible to generalize the findings of the study to the entire population that was the focus of the study. The reliability and validity of the research methods resulted in the collection of data that was appropriate for the presenting of factual information. In addition, the majority of respondents are male, between the ages of 30 and 35, and have a bachelor's degree or above, according to the findings of demographic research. While conducting the research, the researcher arrived at the conclusion that security measures play a critical role in maintaining aviation safety in Kenyan airlines. Rigorous passenger screening, thorough baggage checks, and improved surveillance systems were identified as key contributors to reducing security breaches and potential threats. The researcher recommended that Kenyan airlines should ensure the consistent and effective implementation of National Civil Aviation Security Program (NCASP) standards.

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ACI	Airports Council International
API	Advanced Passenger Information
CAPPS	Computer Aided Passenger Pre-screening System
CCTV	Closed Circuit Television
CE	Critical Elements
EDS	Electronic Data Systems
FAA	Federal Aviation Administration
FBI	Federal Bureau of Investigation
GASP	Global Aviation Safety Plan
GDP	Gross Domestic Product
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
JKIA	Jomo Kenyatta International Airport
KAA	Kenya Airports Authority
KCAA	Kenya Civil Aviation Authority
KCAR	Kenya Civil Aviation Regulations
RPAS	Remotely Piloted Aircraft Systems
SSP	State Safety Program
SPSS	Statistical Package for Social Sciences
TSA	Transportation Security Administration
USOAP	Universal Safety Oversight Audit Program

CHAPTER ONE

INTRODUCTION

1.0 Overview

This chapter presented the background of the study, statement of the problem, study objectives, research hypothesis, significance of the study and scope of the study.

1.1 Background of the Study

Aircraft safety is paramount in ensuring the efficient operation of air transport systems. The National Civic Aircraft Security Program (NCASP) in Kenya has been instrumental in enhancing aircraft safety standards. The framework for preventing acts of unauthorized interference with civil aircraft is outlined in this program (ICAO, 2019). The NCASP was developed to enhance security framework within the aircraft industry by addressing exposures and ensuring compliance with international standards. One key area of improvement has been the enhancement of airport security measures, which includes the installation of advanced screening technologies, the training of security personnel, and the establishment of stringent access control protocols. These measures have reduced the likelihood of security breaches and have added to a safer aircraft environment in Kenya (KCAA, 2020).

Moreover, the NCASP has enabled better coordination and cooperation among various investors within the aircraft industry, including airport operators, commercial airlines and security agencies. This collective approach has been instrumental in enhancing the efficiency and effectiveness of security operations. For instance, the establishment of joint security boards and regular security audits have ensured that all parties remain vigilant and proactive in addressing potential security threats (TSA, 2019). This has not

only improved the response to security incidents but also fostered a culture of continuous improvement in aircraft security practices.

According to studies, there has been a noticeable drop in instances of illegal interference in Kenyan airspace since the NCASP was implemented (European Union Aircraft Safety Agency (EASA), 2019). For instance, a study published by the Kenya Civil Aircraft Authority (KCAA) noted a major decline in the quantity of security-related events at airports, including Moi International Airport and Jomo Kenyatta International Airport (JKIA). According to the report, this increase can be attributed to the NCASP's effective implementation, which has improved the aircraft industry's overall security posture (KCAA, 2020).

Similar national aircraft security systems have been shown to have a good impact, according to case studies from other nations. For instance, the adoption of comprehensive security systems has improved aircraft safety for both the European Union's Common Aircraft Area (ECAA) and the United States' Transportation Security Administration (TSA). These initiatives and Kenya's NCASP are similar in that they both incorporate cutting-edge technology and implement risk-based security measures. Kenya can use these global programs as a baseline, and their performance attests to the NCASP's ability to improve aircraft safety (ECAA, 2021).

Additionally, the NCASP has played a crucial role in enhancing passenger confidence in the safety of air travel within Kenya. The visible presence of security measures, coupled with effective communication strategies, has reassured travelers that their safety is a top priority. This has had a positive impact on the aircraft industry by encouraging more people to use air travel, thereby contributing to the growth of the sector. A survey conducted by the KCAA indicated that passenger satisfaction with

airport security had improved significantly since the enactment of the NCASP, additionally highlighting its positive effect on aircraft safety (KCAA, 2020). The National Civil Aircraft Security Program has had a profound impact on enhancing aircraft safety in Kenya. Through the enactment of advanced security measures, improved coordination among investors, and the adoption of best practices from international programs, the NCASP has successfully mitigated security risks and fostered a safer aircraft environment. The positive outcomes observed in Kenya's aircraft sector serve as a testament to the effectiveness of the NCASP and its critical role in safeguarding the industry against potential security threats (Civil Aircraft Administration, 2021).

Legislation, guidelines and regulations withstand the program's requirements (Civil Aircraft Administration, 2021). The imagined fear of terrorism has many people concerned about flying. Some people might altogether shun flying. However, one must weigh the risks associated with hijacking and flying in general. Flying is extremely safe, especially when it's commercial aircraft. In 2017, there were just 0.01 deaths per million passengers, or one death per 100 million, when we consider the sheer number of individuals that fly. Since the 1970s, when there were about 5 deaths per million passengers, this has greatly improved (CAA, 2021).

The body responsible for civil aircraft security will make sure that all national airports, heliports, and air navigation facilities both those that are part of the airport grounds and those that are not

adhere to the standards outlined in it. Every operator offering services at airports, including airlines (NCASP, 2019). All organizations using aircraft security standards that conduct business from locations within or outside of airports and deliver goods and/or services to or via airports. Other measures will be used in compliance with

additional regulations to guarantee a sufficient degree of safety when the adoption of certain measures is not possible at certain airports or heliports. Whatever the situation, these airports and/or heliports will apply for the competent authority's approval of their Security Program (NCASP, 2019).

Over a long time and with the ever-increasing level of globalization, civil aircraft as an industry has become a central factor of international trade. Aircraft allows interconnection of countries to a point that the airports mainly international airports have of late become the gateways or borders of countries (Air Traffic Organization, 2018). The necessity and prestige the aircraft industry has received is attracting many criminals especially terrorists, drug traffickers and human traffickers who seek to use civil aircraft to further their criminal deeds and promotion of different interests. Efforts towards protection of the aircraft industry have not been left behind and measures are strengthened to ensure both the safety and reliability in the industry internationally (Air Traffic Organization, 2018).

Terrorism is a relatively rare crime event in most airport set ups; it is however one of the few crimes which have the ability to escalate into interstate war (Ben-Yehuda, 2015). It is also a kind of crime that is usually committed by people who cannot be easily identified physically and this calls for other ways like profiling which help have data about the passengers. Since September 11 2001, attention to terrorist deeds and their prevention has increased on Internationally (Pedersen, 2014). On September 11, 2001, the aircraft industry was found by surprise by four airplane hijackings that resulted in the worst terrorist attack in the existence of aircraft. Unfortunately, the precautions taken to make aircraft safer from terrorist threats and other criminal activity also make flying less convenient and, for the majority of customers, far more expensive. Plans for increased airport security now neither adequately account for nor fully

comprehend the inevitable tension between the advantages of increased security and the expenditures that go along with it (Vazquez, 2019).

A significant volume of individual's traverse's airports on a daily basis. This condition poses likely vulnerabilities to terrorism and other criminal activities due to the concentration of individuals in a single location. Moreover, the dense population on board large commercial airplanes amplifies the risk of a significant number of casualties in the event of an attack. Additionally, the potential to exploit a hijacked aircraft as a deadly weapon presents an attractive opportunity for acts of terrorism, as demonstrated during the September 11 attacks (Taylor & Booth, 2017). The primary objective of airport security is to proactively mitigate any likely threats or hazardous circumstances from materializing or infiltrating the nation. Successful airport security significantly diminishes the likelihood of any hazardous circumstances, illicit objects, or threats into an aircraft, country, or airport. Airport security serves many objectives, including safeguarding the airport and nation from potential threats, instilling confidence in the traveling public regarding their safety, and protecting the country and its citizens (Taylor & Booth, 2017).

1.1.1 Global Perspective on Aircraft Safety

Furthermore, the program states that Republic of China abides by the terms and provisions of the pact on the marking of plastic explosives for the purpose of detection, the Protocol Supplementary to the Montreal Convention, and the Tokyo, Hague, and Montreal Conventions. In the Republic of China, the terms and provisions of the aforesaid agreements are enforceable by the Criminal Code, the National Security Law, the Civil Aircraft Law, and other appropriate regulations. Therefore, the National Civil Aircraft Security Program is the highest guiding concept for aircraft security measures

in the People's Republic of China, and its requirements are supported by law (Civil Aircraft Administration, 2021).

A number of incidents have happened as a result of tourists bringing weapons or potentially weaponry onto airplanes with the goal of taking over the aircraft. Metal detectors and/or millimeter wave scanners are used in passenger security screening (Federal Aircraft Administration, 2020). X-ray machines and explosives trace-detection portal machines, also mentioned to as 'puffer machines,' are among the devices used in explosives detection. In particular configurations, the identification of explosives can be automated by utilizing machine learning techniques. In order to prevent embarrassing images of passengers in undress from being displayed, the Transportation Security Administration (TSA) in the United States is currently developing sophisticated scanning devices that retain their efficacy in detecting prohibited items on airplanes. Both carry-on and checked baggage can have bombs scanned and identified by explosive detection equipment. As the Federal Aircraft Administration showed in 2020, gas chromatography is used to detect volatile compounds released by explosives (Federal Aircraft Administration, 2020).

The application of backscatter X-rays has advanced significantly, which has generated debate. These X-rays are used to locate bombs and hidden weapons on people. These devices work with Compton scattering and require the passenger to be close to a flat screen in order to produce an upscale image (ATO, 2019). Using an Israeli invention that was unveiled in the beginning of 2008, travelers can pass through metal detectors without removing their shoes. This is required because metal in shoes and on the borders of the lower body cannot be detected by walk-through gate detectors. Instead, in less than 1.2 seconds, the travelers place their fully-shod feet onto a scanner that quickly searches for objects as small as a razor blade. Rather than relying solely on

equipment for threat detection, several nations employ specially trained personnel who engage in talks with passengers in order to detect hazards (ATO, 2019). The radiation dose applied to the target during a single backscatter scan range from 0.05 to 0.1 micro-sievert. On the other hand, a standard chest x-ray exposes you to roughly 100 times more radiation.

In the United States, the practice of allowing non-passengers to access the concourses in order to greet friends or family at their gates has been significantly limited as a result of terrorist acts. Individuals who are not passengers are required to acquire a gate pass in order to gain access to the restricted area of the airport (Bradshaw & Kelsey, 2019). Non-passengers are typically granted gate passes for two main purposes: to provide assistance to children and the elderly, and to attend business meetings held in the secure area of the airport. Typically, anybody intending to participate in a business meeting within the restricted section of the airport must provide a minimum of 24 hours' advance notice in the United States. In contrast to certain nations, including Australia, non-travelers are not banned from entering the airside area. However, non-travelers are often required to undergo the same security scans as travelers (Bradshaw & Kelsey, 2019).

Airport ramps and operational spaces are among the critical areas where restricted access is enforced to keep the general public out. These places, known as SIDAs (Security Identification Display Areas), have entry restrictions. Physical access control gates or passive systems that watch people moving through restricted areas and sound an alert when they enter them are two possible types of systems (FAA, 2020). While airport security measures are essential for ensuring passenger safety, they inadvertently lead to hygienic problems. During the 2015–2016 flu season, research conducted at Helsinki–Vantaa airport found that plastic security screening trays, which are often

used for security checks, were a major source of respiratory virus transmission. The report stresses how these areas need better sanitary practices (FAA, 2020).

The chart below shows the annual deaths from commercial airliners, and the number specifically from hijackings from 1945 to 2021;

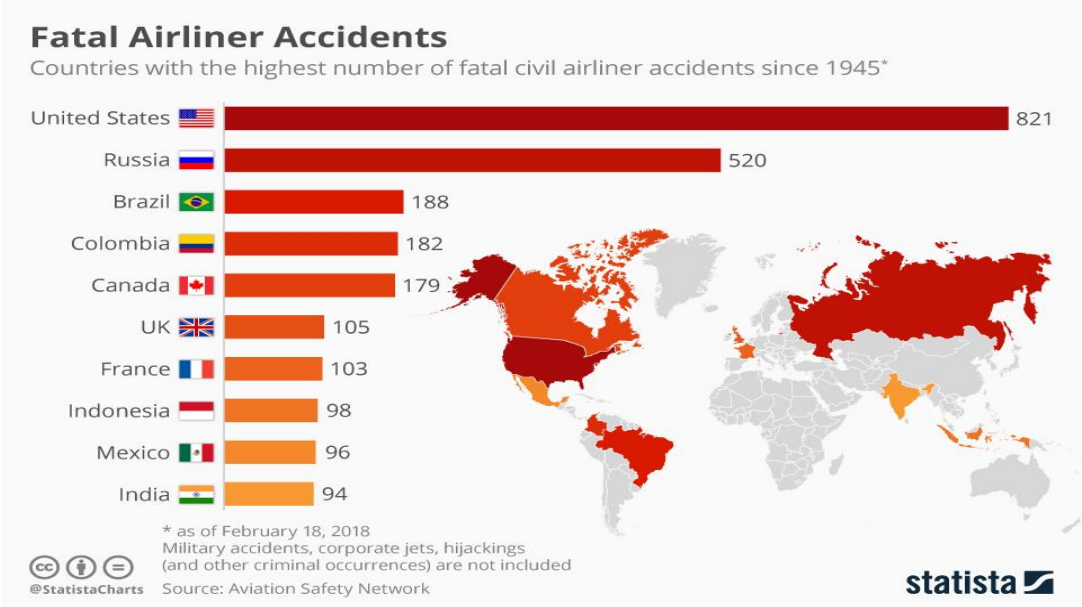

Figure 1.1: Global Accidents and Hijackings
Source: (Aircraft Safety Network, 2023)

Only a very small portion of the overall number of deaths that happen in aircraft are caused by hijackings. The number of deaths that occur per annum on commercial airplanes, as well as the number that are directly caused by hijackings, in this chart. This reveals once more that fatalities caused by hijackings are extremely uncommon; since the year 2001, when safety precautions were enhanced, there have been nearly no fatalities.

1.1.2 Regional Perspective on Aircraft Safety

During this time, there were 55 hijackings or attempted hijackings; 45 were successful, while 10 were stopped or abandoned by security staffs. The most common weapons used in the hijackings were pistols and grenades, and the majority of the incidents had

political or ideological undertones. African governments have sanctioned international accords that have led to the creation of anti-sabotage and anti-hijacking legislation in their nations. However, the lack of technological know-how, outdated security and surveillance equipment, faulty inspection and screening procedures, inadequate training for airline crews, and inadequate airport infrastructure are the main reasons why hijackings continue to occur in Africa. Enhancements to preventive measures include: armed guards at all times at airport terminals and gates; specially trained units to neutralize hijackers; updating equipment and personnel training; checking and screening all travelers and cabin baggage before departure; limiting the amount of cabin baggage allotted to each passenger; forbidding the mixing of controlled passengers and uncontrollable individuals after security gates; and instituting documentation procedures.

Ugandans awoke on June 29, 1976, to learn that commandos from the Popular Front for the Liberation of Palestine (PFLP) had taken control of a French plane and forced it to land at Entebbe Airport. Two days earlier, on June 27, 238 passengers and a 12-person crew took off from Athens for Paris on Air France Flight 139, an Airbus A300 that was headed from Tel Aviv, Israel. The PFLP commandos took control of the aircraft shortly after takeoff and used it to travel to Benghazi, Libya. Ultimately, a flight to Entebbe was necessary. President Amin ordered the jet to be allowed to land at Entebbe for humanitarian reasons. He moved quickly to make measures for the crew's and the aircraft's safety by contacting high-ranking government and security officials. Moreover, he gave the order to provide food and refreshments to every passenger (Bamuturaki & Musinguzi, 2009).

No Ugandan security personnel should approach the aircraft from within 50 meters, according to the hostage takers. For security purposes, the aircraft was parked at the

eastern end of the former Entebbe airport. According to the spokesperson, President Amin made the request, which was granted, for the workers and passengers to be relocated within the Old Entebbe Airport structure. Voice of Uganda said on June 30 that the commandos had issued an ultimatum for the release of all 54 Palestinians who had been detained and taken prisoner while fighting for their country's independence. 39 Palestinians were incarcerated in Israeli prisons; five were held in Kenya; seven were in West Germany; two were in Switzerland; and one was in France. In exchange, commandos within the former Entebbe airport facility would release all captives. They agreed those exchanges must be completed by tomorrow at noon. At that time, the aircraft and captives were traded for the Palestinian freedom fighters at Entebbe International Airport (Bamuturaki, 2009).

Three Ethiopians took control of Ethiopian Airlines Flight 961 on November 23, 1996, while it was traveling from Addis Ababa to Nairobi. They were later termed as ‘young (mid-twenties), untested, mentally fragile, and intoxicated’ in one report. According to Stuart and Kennedy (2014), it proved to be the bloodiest hijacking in history up until 9/11. If the pilots defied their demands, the men threatened to blow up the jet while it was in the air. They threatened to blow up the flight with their device if anyone attempted to interfere, saying so in Amharic, French, and English. Later, detectives discovered that the alleged explosive was, in fact, a whiskey bottle with a cover. The captain attempted to explain that they had only enough fuel for the planned flight and could not even get a quarter of the way, but the hijackers did not trust him when they demanded that the plane be flown to Australia, where they requested refuge (Stuart & Kennedy, 2014).

The captain flew along the African coast rather than towards Australia. After forcing the pilot to veer east, the hijackers saw that land was still visible. Stealthily, the skipper

set out for the Comoros Islands, which are sandwiched between Madagascar and the African shore. The hijackers ignored the captain's warnings even though the jet was almost out of fuel (Brown & Loyford, 2015). When the captain realized he had no other choice but to dump the plane and crash into the Indian Ocean at 200 miles per hour, he started to circle the area in the hopes of landing at the main airport of Comoros. Just 50 people, with US Ambassador Frank Huddle, survived the flight's 175 passengers and crew members. Harold W. Geisel, the ambassador to Mauritius, arranged for the repatriation of the American citizens who had died to the United States by flying to the little island. This was no easy task, considering the incompetence of the local authorities, who made the bodies arrive at the airport on a dump truck; the dearth of facilities; and the obstinacy of a single NSC official, which led the ambassador to respond less than diplomatically (Harrison *et al*, 2014).

1.1.3 Local Perspective on Aircraft Safety

Since the US withdrawal of its combat forces from Somalia completed in January there has been an increase in militant activity in the country by an apparently emboldened al-Shabab. Still, it remains unclear whether this will extend into Kenya (Alexandra & James, 2021). While Al-Shabab has proved the pedigree for terrorist attacks against aircraft, the group’s current capabilities and specific intent to carry out attacks of this nature remain unclear. However, in October 2016, a UN report noted that the group established a training camp during 2015 in Somalia to train operatives in attacking civil aircraft targets. The group claimed to have used an improvised explosive device concealed in a laptop that a passenger had brought on board with the help of an airport insider to assault a Daallo Airlines flight from Mogadishu to Djibouti in February 2016 (Alexandra & James, 2021).

More recently, the alleged plan to hijack a flight in a 9/11-style attack in the US would represent an escalation in the group's ambition. While it is unclear from where the operatives had intended to begin their hijack plans, Kenya's high levels of air connectivity with the rest of the world would make the country an attractive target, particularly given that the operatives were Kenyan nationals (Alexandra & James, 2021). But, the level of security at Kenyan aircraft facilities is significantly higher than at Somali airports, as demonstrated by Kenya's Category 1 designation under the US FAA IASA program. Additionally, hijacking a commercial airliner is a significant undertaking requiring considerable resources. While at least one operative is still at large having received some pilot training, it is unknown if aircraft remains his intended target or whether he has a support system that could enable him to defeat Kenyan aircraft security (Alexandra & James, 2021).

Kenya's security architecture has evolved over the past ten years as a result of initiatives to adopt a Multi-Agency Cooperation (MAC) strategy for countering security threats. For example, through support partnerships, the government has drawn and secured the support of regional and worldwide businesses at both the mutual and multilateral levels to combat terrorism (US Department of State, 2017). Kenya and the United States partnered in April 2018 to implement automated technologies that enable the sharing of passenger data ahead of time through the Personal Identification Secure Comparison and Evaluation System (PISCES). Concurrently, multiagency Joint Operation Centers (JOCs) were established at chosen entry points, such as airports, to promote information exchange and sustain relationships with stakeholders. Kenya's approach to MAC in aircraft security has been aligned by these initiatives (US Department of State, 2017).

In this instance, Kenya's aircraft sector is not an exception. For example, in 2002, after an incident in which missiles were fired at an airplane carrying 261 passengers and 10

crew members after it took off from Moi International Airport, Mombasa, the nation's major airports were placed on high alert (Baker & David, 2019). If the event had been fruitful, it would have led to enormous economic losses and casualties in addition to the usual psychological and political strain that these kinds of events entail. In addition to the recent Al Shabaab terrorist attack on the Lamu military airport, the nation has received more advisories from US government intelligence, alerting it of an impending terror attack in Kenyan skies. This demonstrates clearly how very susceptible the nation's aircraft sector is to terrorist acts (Baker & David, 2019).

Kenya's vulnerabilities and threats to civil aircraft security are ever-present, unpredictable, and always changing. Every aspect of Kenya's civil aircraft industry is in danger, including airports, air freight, passenger airplanes, and related services and acts. Threats that are new and developing include cyberterrorism, suicide bombers, transnational crime (drug and people trafficking), and the use of airplanes as WMDs (KCAA, 2021). Aircraft security audits reveal numerous states with significant shortcomings, notwithstanding advancements. Unfortunately, the steps taken to protect aircraft from potential terrorist threats and illegal activity also make flying less convenient and, for the majority of patrons, significantly more expensive (KCAA, 2021). There is now a lack of understanding and inadequate consideration of the inherent trade-off between increased security and associated expenses in the plans already in place for airport security measures. Raising public knowledge of the national aircraft security program and pressuring the Kenyan government to give it more consideration in its planning are two other significant reasons for this study effort (KCAA, 2021).

1.2 Statement of the Problem

In order to successfully improve airplane safety, Kenya must overcome numerous obstacles in the form of a strong National Civic airplane Security Program (NCASP). The restricted funds allotted to airplane security procedures are one of the major obstacles. It becomes tough to invest in state-of-the-art technologies, frequent staff training, and upholding a high standard of vigilance across all airports and aviation facilities underprivileged of enough funds (KCAA, 2021). For example, an International Civil Aircraft Organization (ICAO) research from 2018 showed a link between inadequate funding and security protocol violations at a number of Kenyan airports. This included problems including inadequate staff training and antiquated security screening equipment, which resulted in weaknesses in the aviation security framework (ICAO, 2019).

The fact that security threats are ever-changing presents another formidable obstacle. Because

criminal networks and terrorist groups are always changing their strategies, airplane security solutions must also change quickly. The 2013 Westgate shopping mall incident in Nairobi, Kenya, highlighted the necessity of improved security measures for the entire aircraft ecosystem, including cargo handling and airport perimeter security, in addition to airports (KCAA, 2021). NCASP also faces difficulties with enforcement and regulatory compliance. It is a difficult obligation to make sure that all parties involved in aircraft, such as airlines, ground handlers, and airport authorities, follow strict security procedures. Researchers identified weaknesses that could jeopardize aircraft safety in a report published in the Journal of Transportation Security, mentioning examples of non-compliance and lax execution of security procedures at Kenyan airports (ECAA, 2021).

The geopolitical environment of Kenya poses particular difficulties. There are worries about potential repercussions for airplane security because the country borders areas that are notorious for instability and violence. Al-Shabaab's presence in adjacent Somalia, for instance, has sparked worries about possible threats to Kenyan airports and airspace, necessitating increased security measures and intelligence cooperation with regional partners (ICAO, 2019). Limited budget, changing security threats, regulatory compliance, and geopolitical dynamics are some of the issues facing Kenya's National Civic Aircraft Security Program. A complex strategy including additional funding, ongoing training, strong regulatory frameworks, and robust regional support is needed to address these issues and improve aviation safety and security in the nation (KCAA, 2021).

From the literature reviewed, no study has been conducted to critically examine how the national aircraft security program is functioning to safeguard aircraft security in Kenya. This study thus sets out to empirically examine the effects of national civic aircraft security program on aircraft safety in Kenya.

1.3 Research Objectives

1.3.1 General Objective:

The general objective of this study was to examine the effects of national civic aircraft security program on aircraft safety in Kenya.

1.3.2 Specific Objectives:

The study was guided by the following specific objectives:

i. To investigate the effects of security measures on aircraft safety in Kenya.

ii. To determine the effects of information sharing on aircraft safety in Kenya.

iii. To investigate the effects of technological advancements on aircraft safety in Kenya.

iv. To determine the effects of international collaborations on aircraft safety in Kenya.

1.4 Research Hypothesis

The researcher sought to measure the objectives of the study and came up with the following hypotheses:

Ho_1: Security measures have no significant effect on aircraft safety in Kenya.

Ho_2: Information sharing have no significant effect on aircraft safety in Kenya.

Ho_3: Technological advancements have no significant effect on aircraft safety in Kenya.

Ho_4: International collaborations has no significant effect on aircraft safety in Kenya.

1.5 Significance of the Study

1.5.1 Kenya Civil Aircraft Authority

The management team might employ the findings as a basis for evaluating airplane safety in the country. A crucial element for airline companies entails assessing their current management and safety systems. This evaluation would facilitate the identification of flaws that hinder the effective implementation of aircraft safety measures. The study will facilitate the adoption of a novel safety strategy by Kenyan airline firms to mitigate airplane hijackings, taking into account the prevailing technology dynamics.

1.5.2 The Stakeholders

The findings may potentially impact other enterprises, especially those in the aviation sector with established safety protocols, as they could gain from checking their current

operational procedures. This may enable these organizations to assess their training models to improve their efficacy regarding airplane safety. The study's conclusions would hold considerable worth for the regime in developing safety initiatives inside Kenya's commercial aviation sector. The data would enable them to evaluate their training manual by including developing issues.

1.5.3 Scholars and Academicians

Because the study may advance aircraft expertise, academics and scholars will also benefit from it. The study will make it possible to improve Kenya's national aircraft safety initiatives.

1.6 Scope of the Study

This study investigated the effects of national civic aircraft security program on aircraft safety in Kenya. The study focused on security measures, information sharing, technological progress and universal collaborations as its variables. The study also adopted explanatory research design and collected data from the airlines in Kenya that have been mandated by ICAO to implement the national aircraft safety programs. The independent variables linked with the dependent variable to establish any major relationships. This study was carried out in the environs of Wilson Airport and Jomo Kenyatta International Airport (JKIA) and the target population for the study was the aircraft service providers that have been authorized by ICAO to implement the national civic aircraft security programs who have the appropriate structures to elucidate the effect of national civic aircraft security program on aircraft safety in Kenya. The study collected its data within the months of August and November 2024.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter examined into detail the effects of national civic aircraft security program on aircraft safety in Kenya. The specific objectives utilized in the study were; security measures, information sharing, technological advancements and international alliances. This segment also covered the study's theoretical and conceptual background.

2.1 The Concept of Aircraft Safety

Aircraft hijacking refers to the unlawful seizure and control of an airplane by individuals or groups with the intention of using the aircraft for their own purposes, often involving threats, coercion, or violence (Klein & Wallace, 2022). This act poses a serious threat to aircraft security and passenger safety. Historically, hijackings gained prominence during the late 20th century when political and ideological motivations drove certain groups or individuals to resort to such extreme measures as a means of drawing attention to their causes or achieving specific objectives. The motives behind aircraft safety vary extensively, ranging from political demands and ransom requests to seeking asylum or expressing discontent with government policies (Shaw & Jones, 2021). The perpetrators, commonly referred to as hijackers, typically carry weapons or other hostile devices to gain control of the aircraft, putting passengers, crew members, and ground staffs at risk. The unpredictability of hijacking incidents has led to stringent security measures and protocols at airports worldwide (Klein & Wallace, 2022).

Governments and aircraft authorities have executed a range of measures to prevent and respond to hijackings. These include the installation of security screening ways, air marshals on selected flights, and the development of comprehensive emergency

response plans (Lavine & Williams, 2020). With agreements and norms in place to ease collaboration in handling hijacking situations, international alliance of governments has also played a significant part in addressing the global scope of this menace. The aircraft industry continues to be plagued by dread notwithstanding a recent reduction in the rate of aircraft safety. To reduce the possibility of hijackings and guarantee the safety of air travel for both passengers and crew, it is imperative that security technologies, intelligence sharing, and crisis management procedures be continuously improved (Lavine & Williams, 2020).

Aircraft safety have occurred for various reasons throughout history, often stemming from political, ideological, or criminal motivations. Political motives have been a significant driver, with hijackers seeking to draw attention to political causes, demand the release of prisoners, or protest against perceived injustices. Ideological hijackings may be driven by extremist beliefs, with people using aircraft as a means to make a dramatic statement or advance their ideological agenda (FAA, 2021). Moreover, some hijackings have been carried out for financial gain, with criminals looking for ransom or to execute elaborate schemes. The prevalence of hijackings has decreased in recent years due to improved security measures, but the core factors remain complex and multifaceted. Enhancing international support, intelligence sharing, and addressing root causes such as political instability and economic disparities are crucial steps in preventing future hijackings and ensuring aircraft security (FAA, 2021).

2.2 The Concepts on National Civic Aircraft Security Program on Aircraft Safety

2.2.1 The Concept of Security Measures

Security measures on aircraft have evolved in response to the persistent threat of hijackings, aiming to ensure passenger safety and protect aircraft infrastructure.

Following high-profile hijackings in the 20th century, such as the attacks in the 1970s, airports and airlines effected comprehensive security protocols (Global Aircraft Safety Plan, 2019). These measures include rigorous passenger screening processes, the introduction of metal detectors, X-ray scanners, and the enactment of strict baggage screening procedures. Additionally, air marshals, armed personnel trained to handle in-flight security threats, have become a key component of security. Cockpit security has been boosted with reinforced doors and ways to prevent unauthorized access. Advanced technologies, like biometric identification and behavioral analysis, contribute to the detection of suspicious persons. Furthermore, international collaboration has become essential, with countries sharing intelligence and coordinating efforts to address potential threats. While these measures have significantly reduced the occurrence of hijackings, the aircraft industry continues to adapt and innovate to stay ahead of emerging security defies. Constant evaluation, technological progresses, and a proactive approach are crucial in maintaining the effectiveness of security measures and ensuring the continued safety of air travel (Global Aircraft Safety Plan, 2019).

Another critical element is the fortification of cockpit security. Following the 9/11 attacks, rules

were enacted to reinforce cockpit doors and restrict access to authorized personnel only. This measure is designed to prevent unauthorized individuals from gaining control of the aircraft, a key factor in many historical hijackings (FAA, 2021). Besides, intelligence-sharing and collaboration among international aircraft authorities have been strengthened to identify and respond to potential threats in advance. Improved communication and coordination allow for a more proactive approach to security, foiling potential hijackings before they can be executed. Passenger awareness and involvement in security have also been emphasized. Through public awareness

campaigns and security drills, passengers are encouraged to report suspicious activities and be vigilant during their travels. This collaborative effort creates an additional layer of defense against potential hijackings (FAA, 2021).

2.2.2 The Concept of Information Sharing

Information sharing plays a pivotal role in preventing and responding to aircraft safety. The aircraft industry recognizes the importance of timely and accurate information exchange among various stakeholders, including airlines, intelligence agencies, law enforcement, and international organizations (Caruso & Rose, 2021). Sharing data allows for a comprehensive understanding of prospective threats and facilitates proactive measures to enhance security. One critical aspect of information sharing is intelligence association. Intelligence agencies around the world must share relevant data and analyses to identify prospective hijacking threats before they materialize. This involves sharing information on individuals with known extremist or criminal backgrounds, as well as intelligence on emerging trends and tactics employed by potential hijackers. Establishing secure and efficient channels for intelligence sharing is vital to enable a rapid response to evolving threats (Caruso & Rose, 2021).

Airlines also play a crucial role in information sharing. They are on the front lines and can add valuable insights into passenger behavior, apprehensive activities, or any unusual circumstances (Drummond & Green, 2020). Creating a culture that boosts open communication between airline staff and security authorities is essential. Reporting mechanisms for airline personnel to share concerns without fear of reprisal can further strengthen the collective ability to identify and address potential hijacking threats. International alliance is paramount in addressing the global nature of aircraft security threats (Drummond & Green, 2020). Countries must work together to share data on known threats, coordinate response tactics, and harmonize security measures.

International organizations, such as International Civil Aircraft Organization (ICAO), facilitate this alliance by providing a platform for member states to exchange best practices and coordinate efforts to enrich global aircraft security (ICAO, 2019).

In conclusion, the concept of information sharing on aircraft safety is a cornerstone of effective aircraft security. Collaboration between intelligence agencies, airlines, and international partners is essential to create a robust and unified system capable of identifying and mitigating potential threats before they deteriorate. As technology advances and security challenges evolve, ongoing obligation to information sharing remains crucial to ensuring the safety and security of the aircraft industry.

2.2.3 The Concept of Technological Advancements

Technological advancements have played a major role in shaping the scenery of aircraft safety. Over the years, innovations in aircraft security have aimed to thwart potential threats and enhance passenger safety. One prominent technological advancement is the growth of more sophisticated screening and surveillance systems at airports (CAA, 2019). Progressive scanning technologies, such as full-body scanners and explosive detection devices, have been installed to identify likely threats more effectively, reducing the likelihood of hijackers successfully smuggling weapons or explosives onboard. Communication technology has also evolved to improve the response devices during potential hijackings (Mendy & Kalidou, 2021). Advanced communication systems, with secure channels for cockpit communication and real-time tracking of aircraft, enable quicker and more coordinated responses from authorities. This enhanced communication infrastructure enables better coordination between the flight crew, ground control, and security personnel, allowing for more rapid and precise decision-making in the event of a hijacking attempt (CAA, 2019).

Moreover, the implementation of biometric authentication systems has added an extra layer of security. Biometric identifiers, such as fingerprints or facial recognition, can be used to verify the identity of passengers, making it harder for individuals with malicious intent to board an aircraft using deceitful characteristics (ICAO Safety Management Manual, Fourth Edition, 2018). These technological advancements contribute to creating a more robust and secure aircraft environment, deterring potential hijackers and providing authorities with the tools needed to respond effectively to any intimidations. However, it is important to note that technological advancements also present challenges, as hijackers may adapt and find new ways to exploit exposures in emerging systems. As technology continues to evolve, the ongoing growth and application of all-inclusive security measures will be crucial in staying ahead of potential threats and ensuring the safety of air travel for passengers worldwide (ICAO Safety Management Manual, Fourth Edition, 2018).

2.2.4 The Concept of International Collaborations

The concept of international collaborations on aircraft safety is a dire aspect of global efforts to guarantee aircraft security. In an interlocked world where air travel spans borders, effective teamwork among nations becomes authoritative to address the complex and evolving nature of hijacking threats (Ismail & Jakobs, 2021). One key part of these collaborations is the sharing of intelligence and information related to potential threats. Timely and accurate information exchange enables countries to stay informed about individuals, groups, or activities that may pose a risk to aircraft security. Another crucial aspect of international alliance is the progress and enactment of standardized security protocols and procedures. Harmonizing security measures across countries helps create a steady and robust framework for protecting air travel. This includes shared standards for passenger screening, cargo scrutiny, and aircraft security

measures, raising a collective style to mitigating hijacking risks (Ismail & Jakobs, 2021).

Cooperation between member states is significantly assisted by international organizations like the International Civil Aircraft Organization (ICAO). The International Civil Aircraft Organization (ICAO) sets universal standards and best practices for aircraft security, giving nations an agenda to coordinate their approaches and policies (ICAO, 2018). Besides, collaborative resourcefulness may involve joint training exercises, capacity-building programs, and the sharing of best practices, allowing nations to learn from one another's understandings and boost their abilities in preventing and reacting to hijacking incidents. In the event of a hijacking, effective international collaboration is essential for synchronized responses. Nations must work together to share information about hijacked aircraft's location, the identity of the culprits, and any demands they may have made. This support enables a swift and synchronized response, involving relevant authorities from multiple countries, to ensure the safety of passengers and the successful resolution of the incident (ICAO, 2018).

2.3 Theoretical Framework

This study examined the domino theory of aircraft safety, Swiss cheese model in aircraft safety and flight safety theory to understand the effects of national civic aircraft security program on aircraft safety in Kenya.

2.3.1 The Domino Theory of Aircraft Safety

Herbert Heinrich, an American industrial safety advocate, developed the domino hypothesis of accident causation, sometimes known as domino safety theory (Pryor & Capra, 2012). According to this idea, one's social setting which he compared to the

first domino in a series is what causes injuries. After the first domino fell, it immediately set off a chain reaction of ensuing falls, which resulted in an accident and subsequent injuries (Rocky, 2014). Frank Bird just renamed some of the dominoes to further refine this idea from the 1930s through the 1970s. Bird believed that a lack of management controls or bad management choices were the primary cause of the majority of accidents. As a result, the first domino came to represent 'Absence of Safety Controls'. In an attempt to better understand and prevent severe mishaps, highly dependable industries that face ongoing threats to the safety of consumers, employees, or the general public have embraced these models (Rocky, 2014).

Theorists of the domino effect contend that a series of circumstances lead to an accident (Rocky, 2014). There is a domino effect. Imagine five dominoes in a row. The first domino is the related, and it symbolizes the nature and way of life of a worker. This will help you understand the sequence. The second domino is personal characteristics, which stand for an employee's mindset, degree of expertise, and physical and mental health. The third domino is risky acts and unsafe environments, which are indicated by a worker's actions and dangerous working conditions. The accident, which is an unforeseen event brought on by a dangerous deed or circumstance, is the fourth domino. The injury that results from someone becoming hurt is the fifth domino (Pryor & Capra, 2012).

Pryor and Capra (2012) assert that the domino hypothesis upholds that little can be done regarding a worker's personal traits and background for each particular incident. dangerous behaviours and dangerous environments need to be the first domino to be addressed. When a worker engages in risky behaviour, they should be stopped, the problem should be examined, a safer method of doing the task must be discovered, the worker should be instructed and trained to do it safely, the person should be checked

and retrained as essential, and, as a last resort, the worker should be disciplined. When anything is found to be unsafe, it must be fixed, avoided, or cautioned against. Heinrich is adamant that the boss has the primary responsibility. According to Heinrich, a manager who is genuinely concerned about safety will ensure that his foremen and workers follow instructions, apply their authority to get compliance, and ensure that harmful situations are removed. Strict monitoring, remedial training, and discipline are Heinrich's remedies for such non-compliance (Leeson & Dean, 2009).

2.3.2 Swiss Cheese Model in Aircraft Safety

According to Wiegmann and Shappell (2013), Professor James Reason's straightforward but graphically potent model, which offered a way to grasp how aircraft functions well or veers into failure, enabled the industry to embrace the idea of the organizational accident. A model used in risk analysis and risk management, including engineering and aircraft, is the Swiss Cheese model of accident causation (Perneger, 2015). Dante Orlandella and James T. Reason established the model (Taylor, Easter & Hegney, 2014). The model compares human systems to several Swiss cheese slices stacked side by side, with varying layers and types of defences 'layered' behind each other to reduce the likelihood of a danger materializing. Because there are other defences in place to avoid a single point of weakness, gaps and defects in one defence do not allow a risk to occur (Wiegmann & Shappell, 2013).

Reason (2007) postulated that four failure domains organizational effects, supervision, conditions, and specific acts can be linked to one or more of the accidents. Scarce communications procedures or fatigued flight crew members are prerequisites for dangerous behaviour. For instance, pairing untrained pilots for a night flight into known bad weather is a case of unsafe control (Wiegmann & Shappell, 2013). Organizational influences include things like cutting back on pilot training costs during

lean financial periods. The Swiss Cheese model describes an organization's defences against failure as a sequence of barriers, symbolized as slices of cheese, with holes in the slices signifying specific systemic vulnerabilities that frequently vary in size and location. According to Wiegmann and Shappell (2013), the system fails when a hole in each slice momentarily aligns, allowing for ‘a trajectory of accident chance’ to occur. This means that a hazard can pass through holes in all of the percentages, ultimately resulting in a failure.

According to Perneger (2015), mishaps involving the Swiss cheese model require the cooperation of several supporting elements, each of which is necessary but insufficient on its own to overcome system defences. According to Professor Reason, single-point failures in complex systems like aircraft are seldom significant as the system is so well-defended by multiple levels of defences. Safety defence breaches are never the result of equipment faults or human error; rather, they are caused by triggers (Wiegmann & Shappell, 2013). The fear of decisions taken at the highest levels of the system, which lie dormant until certain operational events trigger their consequences or devastating potential, is the cause of breaches in safety defences. In these certain conditions, operational or human errors serve as catalysts for latent settings that allow a breach of the system's built-in safety safeguards (Taylor *et al*., 2014).

2.3.3 Flight Safety Theory

James Reason's flight safety theory, published in 1990, discusses aircraft flying characteristics and the fundamental theoretical framework namely, the inevitable nature of flight. Although many of the topics covered in this category are taught to pilots, many of them do not apply some of the underlying principles until much later in their careers. Failure to raise vital aspects of the theory of flight may result in a final loss of control over the aircraft, maybe following an abrupt first loss of control. Good understanding

of flight theory and simulator experience in those areas of the flight envelope or certain lift/drag conditions that are uncommon in routine flying are defenses against this (O'Connor & Johnson, 2017).

Flight safety theory is a field of study that seeks to understand the factors that contribute to aircraft accidents and how to prevent them. It draws on a variety of chastisements, including engineering, psychology and human factors. One of the most significant concepts in flight safety theory is the idea of risk management (Hung-Sying & Jing, 2015). This contains identifying and assessing risks, developing controls to mitigate those hazards, and monitoring the effectiveness of those controls. Another important concept is the idea of resilience. This refers to the ability of an organization to recover from an accident or incident. Resilient organizations are able to learn from their mistakes and make changes to improve safety (Hung-Sying & Jing, 2015).

There are many different models of flight safety theory. One of the most well-known is the Swiss cheese model. This model sees accidents as the result of multiple failures, each of which is like a slice of Swiss cheese by John H. Weener (2013). The holes in the slices represent the hazards, and the cheese signifies the controls that are in place to alleviate those dangers. An accident occurs when the holes in the slices line up, permitting a hazard to reach the aircraft. Another well-known model is the Just Culture model. This model emphasizes the importance of learning from accidents and incidents, and of holding people accountable for their actions without blaming them. Flight safety theory is a complex and developing field. However, it has played a vital role in the advance of aircraft safety. By understanding the factors that contribute to accidents, we can develop better ways to prevent them.

Some of the key principles of flight safety theory are hazard identification and assessment where the first step in flight safety is to identify and evaluate the hazards that could lead to an accident. This can be done by conducting hazard analysis and risk assessment studies. Risk mitigation where once the hazards have been accepted, controls must be put in place to mitigate them. These controls can include engineering clarifications, procedures and training. Safety management where flight safety is not just about preventing accidents. It is also about managing safety on an ongoing basis (Kaplan, 2009). This involves monitoring the efficacy of the safety controls, and making changes as needed. Human factors where human factors play a significant role in flight safety. This includes the design of the aircraft, the procedures, and the training. Learning from accidents where accidents are a valuable chance to learn and improve safety. By accepting the causes of accidents, personnel in aircraft can develop better ways to prevent them from happening again. Flight safety theory is a complex and ever-evolving field. Still, it is crucial for guaranteeing the safety of aircraft. By understanding the principles of flight safety theory, the patrons can make flying safer for everyone (Kaplan, 2009).

2.4 Review of Study Variables

A literature review examines scholarly articles, books, and other materials related to a certain topic, area of study, or theory and offers an overview, critical analysis, and description of these works. Reviews of the literature are meant to give readers an overview of the sources that were used to examine a specific topic and to reveal how the research fits into the larger field of study (Creswell, 2016). This section covered; security measures, information sharing, technological advancements and international collaborations on aircraft safety in Kenya.

2.4.1 Security Measures on Aircraft Safety

In response to the ongoing danger posed by hijackings, increased security measures have been implemented on aircraft. These procedures are designed to protect aircraft set-up and secure the safety of passengers within the aircraft. Airports and airlines employed rigorous security systems in response to high-profile hijackings that occurred in the 20th century, such as the incidents that occurred in the 1970s (Global Aircraft Safety Plan, 2019). These steps include the implementation of stringent procedures for screening passengers, the installation of metal detectors and X-ray scanners, and the implementation of stringent procedures for screening passenger baggage. Air marshals, who are armed experts who have been taught to deal with threats to the security of planes while they are in flight, have also become an essential component of heightened security.

In order to prevent unwanted access, the cockpit security has been fortified by installing reinforced doors and implementing protocols. A number of cutting-edge technologies, for instance biometric identification and behavioral analysis, are utilized in the process of identifying individuals who may be suspect. Still, global support has become a crucial component, with nations exchanging intelligence and coordinating their efforts to deal with potential dangers (Global Aircraft Safety Plan, 2019). The aircraft sector continues to adapt and develop in order to remain ahead of initial security challenges, despite the fact that these measures have reduced the number of hijackings that have occurred because of them. In order to preserve the effectiveness of improved security measures and to assure the constant safety of air travel, it is crucial to conduct regular assessments, to make technological augmentations, and to take a proactive style.

A further essential component is the strengthening of the cockpit's security perimeter. In the wake of the attacks that occurred on September 11, 2001, regulations were put

into place to strengthen cockpit doors and restrict access to only authorized personnel. This defense is intended to prevent unauthorized personnel from obtaining control of the aircraft, which has been a significant factor in a number of hijackings that have occurred in the past (FAA, 2021). Aside from that, the universal aircraft experts have enhanced their ability to share intelligence and collaborate with one another in order to anticipate prospective risks in advance and respond appropriately. Enhancements in communication and coordination make it possible to take a more preventative approach to security, so preventing prospective hijackings from taking place before they can be carried out. The need of passenger awareness and participation in security measures has also been underlined. Passengers are stimulated to report suspicious activity and to remain attentive while they are traveling through the use of public awareness programs and security drills. This coordinated effort establishes an additional line of protection against the possibility of hijackings (Federal Aircraft Administration, 2021).

Kenya achieved a major aircraft milestone last year when it received the highest-ever score for the region 91.77 percent in a necessary universal safety audit conducted by the International Civil Aircraft Organization (ICAO). For Kenya's civil aircraft industry as well as that of East Africa and the rest of Africa, this is an important accomplishment. With the highest score in East, Central, and Southern Africa and second in Africa, this result awarded the nation a clean sheet of health in terms of aircraft safety (Arao, 2023). The account of an airport worker finding a tiny bag holding approximately Shs2.3 million ($19,000), thousands of Kenyan shillings, the tourist's wallet, and credit cards which he had dropped when picking up his luggage at the airport made headlines in November of that same year.

Since its founding 20 years ago, the Kenya Civil Aircraft Authority has been tasked with oversight the implementation of civil aircraft safety. Through a variety of tactics,

the authority has been methodical, consistent, and strategic in solidifying the best international standards and practices that are advised. The authority has been providing training so that everyone operating at the airside and landside is routinely aware of safety measures through the work of its aircraft safety auditors. Furthermore, it is mandatory by regulation for individuals to complete safety awareness training in order to obtain an airside permission or access (Arao, 2023).

It is not unusual to witness prominent figures in the aircraft industry, such as chief executive officers, medicinal doctors, or director generals, submitting to screening when entering airport restricted areas and adhering to the guidelines set forth by the screeners, including taking off their shoes and belts. All safety service providers, including screeners, tutors, inspectors, controlled agents, aircraft safety training facilities, airports, and ground handlers, are eligible for certification by KCAA. Additionally, ICAO-accredited trainers at the East African School of Aircraft provide training and certification to all national aircraft safety instructors. Currently, there are more than 4,000 certified aircraft safety screeners in Kenya, and their certification is renewed every two years. Another effort is to continuously raise industry awareness of safety issues and the constantly evolving global safety trends by holding frequent in-person and virtual conferences, seminars, and workshops (Nickolson, 2023).

Africa's airspace is viewed by both public and private investors as the next frontier for expansion. A number of countries have announced plans in the last year to revive or establish domestic carriers in order to gain a portion of cross-country traffic (Mwangi, 2021). This occurs in the wake of fears expressed over the same space's safety. Kenya Airways pledged to keep up its safety initiatives for both airport and passenger safety, involving all ground operators and airline firms operating out of the nation's primary

airport. The airline always improves its safety operational events, according to the chief executive officer, to guarantee customer satisfaction and safety.

The IATA Safety Audit for Ground Operations (ISAGO) documents and the IATA Operational Safety Audit (IOSA) are the certifications (Mwangi, 2021). There is a need to improve safety at Jomo Kenyatta International Airport because it serves approximately 4,000 KQ passengers and handles over 100 aircraft arrivals and departures every day. The objective of ISAGO is to reduce ground accidents and injuries to a significant degree in order to increase safety and reduce airline costs. IOSA is a universal known evaluation method designed to examine an airline's operational management and control systems.

2.4.2 Information Sharing on Aircraft Safety

Sharing information is an essential component in both the prevention of hijackings of aircraft and the response to such incidents. According to Caruso and Rose (2021), the aircraft sector concedes the significance of the fast and correct transmission of information among its different investors. These investors include airlines, intelligence agencies, law enforcement, and international firms. By exchanging information, it is possible to gain a thorough awareness of potential dangers and to ease the operation of preventative steps to strengthen security. The association of intelligence is a vital component of the process of information sharing. It is imperative that intelligence agencies all around the world collaborate and share pertinent data and analyses in order to identify potential hijacking threats before they become actual dangers. In order to achieve this, it is necessary to exchange information regarding persons who are known to have a history of extremism or criminal activity, as well as intelligence regarding emerging patterns and strategies utilized by potential hijackers. It is essential to establish channels for the sharing of intelligence that are both secure and efficient in

order to enable a timely reaction to threats that are constantly evolving (Caruso & Rose, 2021).

In addition, airlines play an important part in the dissemination of information. Due to the fact that they are on the front lines, they are able to provide vital insights regarding the behavior of travelers, activities that cause anxiety, or any odd circumstances (Drummond & Green, 2020). Establishing a culture that encourages open communication between the workers of airlines and the authorities in charge of security is absolutely indispensable. Further strengthening the collective capacity to recognize and respond to potential hijacking threats can be accomplished through the enactment of reporting procedures that allow airline personnel to voice their concerns without fear of reprisal. The status of international alliances cannot be overstated when it comes to addressing the global character of threats to aircraft security (Drummond & Green, 2020). It is imperative that nations collaborate in order to share information about recognized dangers, coordinate response strategies, and come to a consensus on security measures. This alliance is made possible by international organizations such as International Civil Aircraft Organization (ICAO), which serves as a policy for member governments to share their most effective practices and coordinate their efforts to improve aircraft security on a global scale (ICAO, 2019).

Certain information found in security occurrence and incident reports may need to be treated as sensitive aircraft security information, depending on the conditions. This might contain the report writers' identities. In order to address vulnerabilities and enhance the aircraft security system, security-related data and information contained in security reports must be shared with those who require access. Further information on sensitive aircraft security information can be found in Chapter 2 of the ICAO Aircraft Security Manual. The handbook contains this info.

In order for a security official or manager to identify threats and liabilities in the aircraft security system, as well as potential precursors to security incidents or final acts of unlawful interference, it is necessary for individuals, entities, and organizations operating in the aircraft system to report security occurrences. (KCAA, 2017). Notifying the entity to update its risk assessment and any updates thereto; notifying location-specific and national risk assessments and any updates thereto; keeping an eye on aircraft security trends and patterns; delving into the underlying causes and contributing factors of security events or incidents; promoting the sharing of relevant information between industry investors and authorities to improve individual risk assessments; and supporting the security culture among all aircraft investors. The National Civil Aircraft Security Programs clearly outline the processes that have been devised and/or mandated by the relevant authority, and they should be followed in a systematized and synchronized manner when it comes to reporting (KCAA, 2017).

Following the designation of a security event as a security incident, a number of steps must be taken. Suda and Torpey (2015) recommend that prompt remedial measures be applied to mitigate the vulnerabilities that were highlighted in the paper. A security incident report should be created using the information from the security occurrence report, analysis, and corrective actions taken by the security manager or official. This report should be spread to the relevant authorities, and all reports and actions should be kept on file for quality assurance and auditing needs (FAA, 2019). When an event is classified as a security incident, it is important to notify it as soon as possible to the relevant authorities. By doing this, you will make it easier to address vulnerabilities by prompt remedial action and/or additional information exchange, as needed. In the event that other security incidents occur locally, nationally, or globally that are connected and/or serve as indicators that a security danger is evolving, it is likewise imperative

that the occurrences be reported right once to the relevant authorities. Still, several reporting systems could impose varying reporting timeframe requirements and classify security events according to their severity (FAA, 2019).

As a conclusion, the idea of information sharing on hijackings of airplanes is an essential element of successfully implementing aircraft security measures. It is necessary for intelligence agencies, airlines, and foreign partners to work together in order to develop a robust and unified system that is capable of identifying and neutralizing possible dangers before they become more severe. The need to share information on a constant basis continues to be essential for safeguarding the safety and security of the aircraft industry, despite the fact that technological advancements and new security concerns are always emerging (Hoffman, 2018).

2.4.3 Technological Advancements on Aircraft Safety

Changes in the landscape of aircraft safety have been significantly influenced by technological improvements in recent years. Throughout the years, advancements in aircraft security have been made with the intention of preventing potential dangers and improving the safety of passengers (Mendy & Kalidou, 2021). According to the Canadian Airports Authority (CAA), one of the most notable technological advancements is the increase of more advanced screening and surveillance technologies at airports. Full-body scanners and explosive detection systems are examples of the progressive scanning technologies that have been installed in order to identify potential threats in a more efficient manner. This has resulted in a reduction in the possibility that hijackers will be successful in carrying weapons or explosives onboard. Moreover, innovations in communication technology have been made to enhance the capabilities of reaction devices in the event of probable hijackings (Mendy & Kalidou, 2021).

By providing authorities with secure channels for communication in the cockpit and the ability to follow aircraft in real time, advanced communication systems make it possible for authorities to respond more quickly and in a more synchronized manner. This improved communication set-up enables greater coordination between the flight crew, ground control, and security officers, which in turn enables more rapid and precise decision-making in the event that an attempt is made to hijack the aircraft (CAA, 2019).

In addition, the use of biometric authentication systems has resulted in the addition of an additional layer of security layer. According to the International Civil Aircraft Organization's Safety Management Manual, Fourth Edition (2018), biometric identifiers, which include fingerprints and facial recognition, can be used to authenticate the identification of passengers. This makes it more difficult for those who have harmful intents to board an aircraft by employing false characteristics (Luke & Shaw, 2019). These technical improvements contribute to the creation of an aircraft setting that is more resilient and secure, which dejects individuals who might attempt to hijack commercial aircraft and gives authorities the resources they need to suitably retort to any threats that may occur. It is vital to keep in mind, however, that technical developments also bring about obstacles, as it is possible for hijackers to adjust their strategies and discover new ways to exploit vulnerabilities in developing systems. As technology continues to advance, it will be crucial to continue growing and executing comprehensive security measures in order to stay one step ahead of potential dangers and assure the safety of air travel for travelers all over the world (ICAO Safety Management Manual, Fourth Edition, 2018).

The advent of highly developed technology in conjunction with information technology has brought about a profound transformation in the global economic behavior with the concepts of globalization, commercialization, and freedom. One of the most widely

utilized and networked universal infrastructures in the world, air travel connects everyone, everywhere, and at all times. The economic engines that drive a nation's development and growth are its airports and airlines (Rajaguru, 2016). Information systems that are misused make civil aircraft a threat to the safety of passengers, crew, and the aircraft industry at large. These days, intelligent transport systems, or information and communication technology, constitute the foundation of every airport, airline and Air Traffic Control System (ATCS).

Our global economy now depends heavily on flying to get people to work, tourists to vacation destinations, and goods to markets. The aircraft industry is an industry dedicated to liberty. A total of 3.8 billion passengers and 54.9 million tons of cargo were transported by air in 2016. Despite aircraft's vital position in the world, investors have not received satisfactory returns by focusing solely on financial performance to yet. However, recent airline reform and reengineering attempts have produced hitherto unheard-of bottom-line growth (Rajaguru, 2016).

The industry's return on capital invested in 2016 was 9.9%, exceeding its cost of debt (estimated at 6.6%). Comfortable travel is the primary concern when it comes to safety, and although the industry fiercely competes for each passenger, there is no rivalry when it comes to ensuring safety. Aircraft security claims that threats relating to terrorism and other security-related issues continue to target the aircraft sector. Air travel is always closely related to Information and Communication Technologies (ICT), both growing and benefiting from technological advances (Sandada, & Matibiri, 2016). Due to their increased knowledge of IT and information availability, modern consumers are more sophisticated and demanding, requiring specialized and interactive services. The worldwide aircraft industry has seen major changes due to the advancements in information and communication technologies. The airline industry is a very diverse and

fragmented industry that connects passengers from all over the world with a worldwide supplier network. The growth of ICTs has demonstrated that the expansion of air travel and tourism, as well as the transformation of transmission into online commerce, depend on the centralization of data (Sandada, & Matibiri, 2016).

Because of the advancements in social media and technology, clients now have higher expectations for the establishment and maintenance of their relationship with the business. By overcoming industry obstacles and challenges, airlines can re-engineer their business operations and adapt their duties to a customer-centric plan by embracing client likings, IT innovation, and modernization. While current software programs provide customers with real-time value, this antiquated policy increases connectivity to make clients happy (Smith, 2018). Aircraft security is a combination of methods, personnel, and material resources used to safeguard civil aircraft against acts of unlawful intrusion. Examples of unlawful interference include bombings, sabotage, threats against people and property, false threat communication, and terrorist acts (Kos *et al*, 2017).

A number of incidents have happened as a result of passengers attempting to hijack aircraft by bringing weapons or tools intended for use as weapons into the aircraft. Passengers are screened using millimeter wave scanners or metal detectors. Examples of explosive identification machines (also known as puffer machines) are bomb trace-detection portal machines and X-ray devices. In certain situations, explosives detection can be automated with machine learning approaches (Kos, Kukar & Vegelj, 2017).

2.4.4 International Collaborations on Aircraft Safety

The idea of international collaboration on airplane hijackings is crucial to ensuring the safety of aircraft on a worldwide scale. Effective support between governments is

essential to managing the complex and constantly evolving hijacking threats because of the connection of the world and the cross-border nature of air travel (Ismail & Jakobs 2020). One of the most vital aspects of this rapport is the exchange of intelligence and information about potential dangers. Countries are able to maintain their awareness of individuals, groups, or activities that may signify a threat to aircraft security when they transmit information in a timely manner and are accurate in their reporting. In addition to being a vital component of international alliances, the development and implementation of standardized security standards and processes is critical.

The establishment of a consistent and comprehensive framework for the protection of air transport is facilitated by the harmonization of security measures across countries. Ismail and Jakobs (2021) state that this involves the establishment of uniform standards for the screening of passengers, the inspection of cargo, and the implementation of security measures for airplanes for the purpose of reducing the chance of hijackings. This article describes some of the important roles that universal organizations, like the International Civil Aircraft Organization (ICAO), do in promoting support between member states. The International Civil Aircraft Organization (ICAO) offers a framework for countries to coordinate their approaches and policies regarding aircraft security by establishing international standards and recommended practices (ICAO, 2018).

Additionally, collaborative ingenuity may encompass joint training exercises, capacity-building programs, and the sharing of best practices. This provides nations with the opportunity to learn from one another's understandings and enhance their capabilities in preventing hijacking situations and retorting to them when they do (ICAO, 2018). If there is a hijacking, it is imperative that there is good universal collaboration in order to ensure that reactions are synchronized. Countries need to work together in order to

provide evidence regarding the location of the hijacked aircraft, the identities of those liable for the hijacking, and any demands that the hijackers may have made. According to the International Civil Aircraft Organization (ICAO), this support makes it possible to have a prompt and matched reaction, which involves relevant authorities from multiple nations, in order to pledge the safety of passengers and positively resolve the issues (ICAO, 2018).

Many nations have endorsed the Hague hijacking agreement, also referred to as the pact for the suppression of illegal seizure of airplanes, in an effort to make hijacking an illegal act that carries severe penalties (Caruso & Rose, 2021). The pact only applies to commercial aircraft; it does not apply to police enforcement, customs, or military aircraft. Only conditions in which an aircraft leaves or arrives at a location different from its country of registration are covered by the treaty. A party to a treaty is required to either extradite or prosecute an airplane hijacker if no other state requests that they be extradited for the same offense. This principle, known as aut dedere aut judicare, was issued by treaty. On December 16, 1970, at the Hague, the International Conference on Air Law reached a treaty. On October 14, 1971, the law went into effect after being ratified by eleven states. As of 2013, there were 185 state parties to the convention (IATA, 2021).

Among the former state parties that lacked a formal successor state are Czechoslovakia, East Germany, South Vietnam, and Yugoslavia. Many republics that ratified the Beijing Protocol in 2010 have since been replaced by new states, with Belarus (formerly known as the Byelorussian SSR), Ukraine (formerly known as the Ukrainian SSR), Russia (formerly known as the Soviet Union), and Serbia (formerly known as the Federal Republic of Yugoslavia). Both Yemen's northern and southern regions had formally approved the treaty prior to the country's unification. The agreement was ratified and

signed by the People's Republic of China. The agreement was ratified by the People's Republic of China in 1980, but the country declared its actions under it to be "null and void." In Beijing in 2010, the protocol auxiliary to the treaty for the suppression of unlawful aircraft seizure was adopted. The original convention is supplemented and modified by the protocol. 27 states had ratified the protocol as of September 2018. On January 1, 2018, it came into force (Beijing Protocol, 2010).

IATA launched its safety talks series to keep this topic visible and guarantee that safety is the primary consideration in all decision-making. Industry leaders from various backgrounds and cultures share their distinct viewpoints and emphasize the critical roles that safety leadership and safety culture play in fostering a safer, more productive, and resilient business. The IATA Safety Leadership charter was created by the trade to assist and motivate business executives in fostering a strong safety culture inside their companies by implementing doable steps, as part of the Safety Leadership safety strategy pillar. Creating a safety culture takes time to implement. It is the result of coordinated efforts made by all members of the organization over time. Trust is the foundation of it. Understanding the current state of the organizational safety culture, identifying gaps, putting changes into place, and tracking progress are key, just like with any growth. Using a standardized policy and performance indicators, the IATA Aircraft Safety Culture survey (I-ASC) was created to assist aircraft stakeholders in evaluating and comprehending their safety culture.

With more than 50 safety issues discovered and published in 2022, IATA's Global Safety Risk Management Framework (GSRMF), now known as IATA's Safety Issue Hub, underwent a major evolution. Guidance material and best practice documentation were also added (IATA Annual Safety Report, 2022). In order to facilitate the evaluation of safety issues inside an airline's own safety management system, generic

safety risk assessments have been developed for a variety of safety issues. By giving risk images to the auditor and IOSA-affiliated airlines, the safety problem hub has contributed to the IOSA's shift to a risk-based methodology. The operator may be exposed to systemic, global, and regional safety hazards within their area of operation, as depicted in these risk pictures (IATA Annual Safety Report, 2022).

2.5 Research Gaps

Author & Year	Focus of the Study	Findings	Research Gaps
Ombasa and Ngugi, (2014)	Effects of reporting safety concerns on aircraft safety in the general aircraft industry; A case study of Wilson Airport Kenya.	The study concluded an improvement on the level of implementation of reporting systems and organizational commitment on reporting systems, however, there is need to further improve aircraft safety.	This study only looks at reporting of safety concerns.
Njeru, (2015)	Factors influencing aircraft safety in Kenya: The case of Kenya Civil Aircraft Authority.	The study established that professional qualification has a major effect on aircraft safety at the KCAA as the authority had few qualified technical inspectors and technical safety staff in the safety management system.	This study only looks at aircraft safety.
Beer (2015)	Developing an aircraft safety strategy within the Southern African context: A stakeholder perspective.	The maintenance of adequate training standards and practices, or the lack thereof, has been identified as an important element in an effective safety strategy.	This study looked at safety strategy and more so in South Africa.

2.6 Summary of Literature

This chapter examined the literature pertaining to the empirical examination of the effects of national civic aircraft security program on aircraft safety in Kenya. By evaluating the pertinent literature, this chapter examined the impact of the four objectives from a global perspective down to the research scope region. The objectives utilized were; security measures, information sharing, technological progresses and international collaborations on aircraft safety in Kenya. Within the scope of this study, the authority accountable for the civil aircraft security ensures the compliance with the measures contained in it at all national airports, heliports and air navigation facilities, both those included and not included in the airport premises. Every operator offering services at the airports, including airlines. Also, this chapter discussed the conceptual framework, the relations between the variables, and the research gaps. The methodology of the research that was conducted for this study was described in detail in chapter three.

2.7 Conceptual Framework

According to Varpio *et al,* (2020), a conceptual framework is comprised of a set of general ideas and hypotheses that assist a researcher in precisely finding the problem, phrasing their enquiries, and selecting articles that are pertinent to the topic at hand. A conceptual framework, according to Miles and Huberman (2014), is a written or visual output that outlines the key topics to be studied, either narratively or visually, the focal elements, concepts, or variables, and the probable relations between them. The topic of this study was to examine the effects of national civic aircraft security program on aircraft safety in Kenya. The independent and dependent variables in this research were as follows;

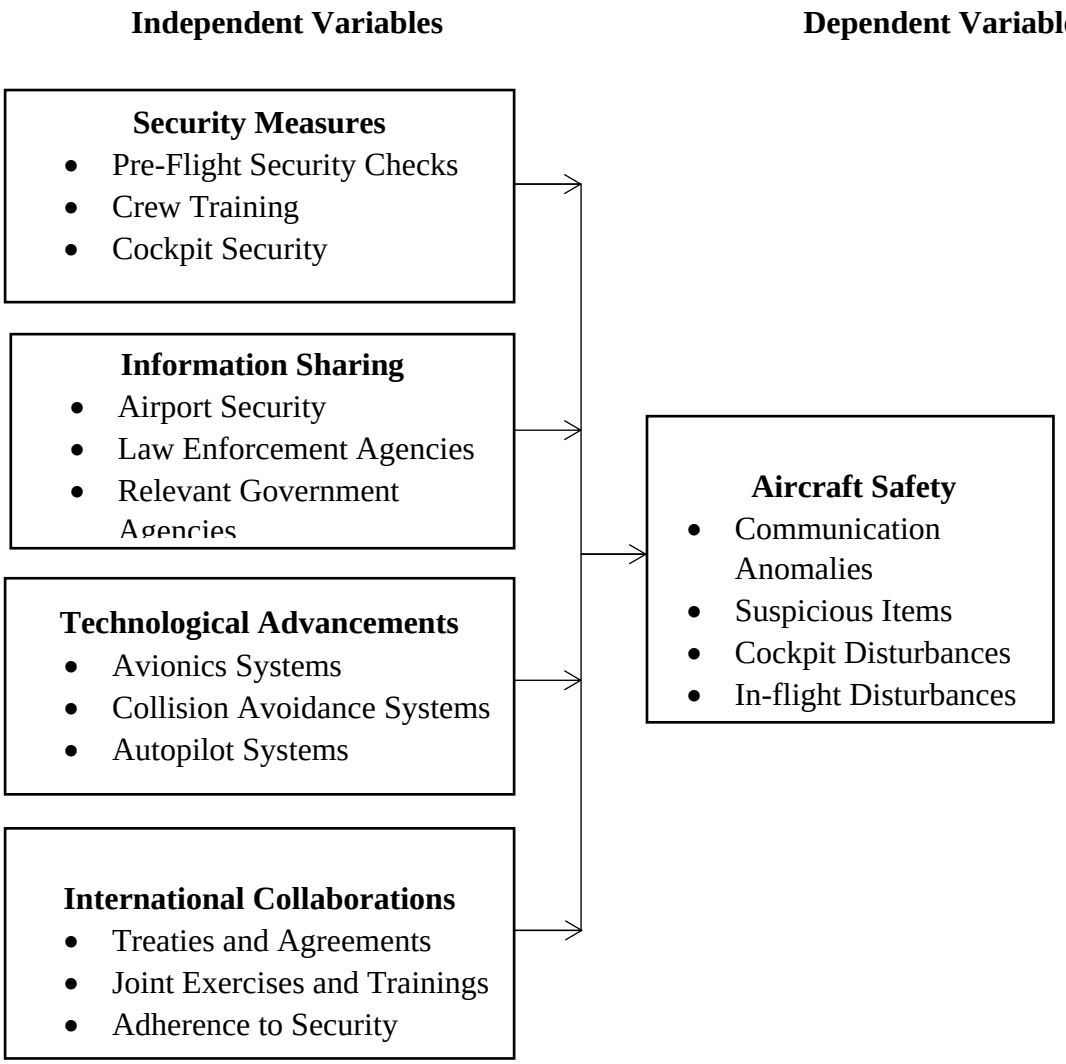

Figure 2.1: Conceptual Framework

Source: (Researcher, 2025)

Based on literature reviewed, the conceptual framework above showed how security measures, information sharing, technological progresses and international collaborations that are independent variables related to aircraft safety which was the dependent variable and was displayed in figure 2.1 above.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The various research approaches that are used in the study were covered in this chapter. This part was broken down into sections on research design, which focused on overall study design, target population description, sample size, and other sampling methods, and also research instruments. The methods for gathering data, multiple regression analysis, and ethical issues were also covered in this section.

3.2 Research Design

A research design is the setup of parameters for data collection and analysis with the mission of balancing procedural economy with relevance to the research question. The study was carried out within this conceptual framework. The plan for data collection, measurement, and analysis must be followed (Kumar, 2019). The strategy known as explanatory research design was created to investigate a phenomenon that had either never been researched before or had not been adequately explained in the past. Its primary goal is to give specifics about where to locate a limited quantity of information. By using this approach, the student has a general understanding and can utilize research as a tool to direct them more rapidly to potential future study topics. Finding the what and why of a subject of research is its aim (Fowler, 2017).

3.3 Study Area

This study was carried out in Nairobi County within the surroundings of Wilson Airport and Jomo Kenyatta International Airport (JKIA) and the target population for the study were aircraft service providers that have been authorized by ICAO to implement the national civic aircraft security programs who have the appropriate structures to clarify

the effect of national civic aircraft security program on aircraft safety in Kenya (KCAA, 2021).

3.4 Target Population

According to Neuman (2016), the population of a study refers to a defined group of persons from

which a sample is drawn and whose characteristics are used to make inferences about the sample's results. The study's target population comprised of 111 bodies (air operator certificate holders) in Kenya in charge of national aircraft security program on aircraft safety. The International Civil Aircraft Organization (ICAO) has directed the aircraft service providers in Kenya to apply the national aircraft security programs in their firms. These are the; international airlines, domestic airlines, commercial helicopter operators, balloon operators and ground handling agencies. ICAO has agreed on managers liable for performance of safety management system in these institutes (ICAO, 2019). The accessible population for the study were the personnel working at the aircraft service providers in Kenya. The following table 3.1 displayed the organizations;

Table 3.1: Target Population

S/N	Organization	Target Population
1.	International Airlines	59
2.	Domestic Airlines	5
3.	Commercial Helicopter Operators	6
4.	Balloon Operators	7
5.	Ground Handling Agencies	34
	Total	**111**

Source: (KCAA, 2025)

3.5 Census and Procedures

The study utilized a census of the entire population of all airlines (air operator certificate holders) in Kenya.

3.5.1 Census Procedures

The census method is a complete enumeration approach in which data is collected from every individual or item within a population. Unlike sampling, which only examines a subset, the census method aims for all-inclusive coverage, offering a detailed understanding of the entire population's characteristics. This method is frequently used in fields where thorough data is crucial, such as demographic research, public health, and educational assessments (Kothari, 2014). The census was done in all the 111 bodies (air operator certificate holders) in Kenya.

3.5.2 Unit of Analysis and Unit of Observation

The unit of analysis were; international airlines, domestic airlines, commercial helicopter operators and balloon operators. The unit of observation were the pilots of 111 bodies in Kenya.

3.6 Data Collection Instruments and Procedures

3.6.1 Data Collection Instruments

The respondents in the chosen establishments were surveyed using structured questionnaires in

order to gather primary data. The objectives of the study guided the progress of the questionnaire queries. There were two sections to the structured questionnaires. While part two focused on the questions pertaining to the dependent and objective variables, part one focused on the respondents' general information. A 5-point Likert scale, with

items ranging from (1) strongly disagree to (5) strongly agree, is used in the design of the questions in section two (Saunders *et al* 2009).

3.6.2 Data Collection Procedures

To implement the effects of the national aircraft security program on aircraft safety in Kenya, a letter from NACOSTI requesting authorization to conduct research was distributed before visiting the approved domestic and international airlines, commercial helicopter operators, and balloon operators in Kenya. Structured questionnaires that respondents can self-administer was utilized to gather primary data. The questionnaires were spread to all of Kenya's aircraft service providers by the researcher, who had the support of two research assistants.

3.7 Pilot Test

The data collection technology was piloted at the Kenya Wildlife Service in Nairobi. The selection of the Kenya Wildlife Service (KWS) for the pretesting of the questionnaire was appropriate for the researcher's convenience and was excluded from the actual investigations, so eliminating bias. The pilot study identifies anticipated issues, minimizes the likelihood of errors, and evaluates the research methodology and ethical guidelines. Furthermore, this assesses the adequacy of the study resources, encompassing time and financial considerations. Another advantage is the identification of ambiguous or deceptive questions, so ensuring that objectives are met in accordance with the study variables. The pilot study provided data for the evaluation of the validity and reliability of the research questionnaires.

3.7.1 Validity Test

According to Cooper and Schindler (2014), validity is the degree to which a study is successful in measuring expected values and the degree to which variations identified across respondents imitate true adjustments. One kind of validity called content validity

investigates how well the instrument addresses the research questions that develop the basis of the research. Proficient opinions from the supervisors evaluated content validity.

3.7.2 Reliability Test

Reliability is the extent to which methods for gathering and analyzing data produce consistent outcomes (Mugenda, 2013). It seeks to determine whether the techniques applied would produce comparable outcomes in various scenarios or whether several researchers would arrive at the same findings given the same initial data. Cronbach's coefficient alpha was utilized in this study to assess the data measuring instrument's internal consistency. A test is deemed reliable by Hair, Black, and Tatham (2016) if its question or scale measures an idea consistently. Alpha values go between 0 and 1, where 1 denotes perfect internal consistency and 0 represents none at all.

3.8 Data Processing, Analysis and Presentation

The data gathered was in two formats: qualitative and quantitative, and it was arranged in its raw form. Tables and charts are used in descriptive statistics, but multiple regression and no charts are used in inferential statistics.

3.8.1 Data Processing

Data processing is the process of transforming data into a format that is desired and useful. This conversion or processing is done automatically or manually by following a predetermined set of steps. The data was initially coded, cleaned, equated, and summarized before being input into the computer to enable SPSS to carry out the analysis.

3.8.2 Data Analysis and Presentation

The process of examining all the available data and selecting the pertinent information to aid in more informed decision-making is known as data analysis (Silvia & Skilling, 2012). Version 25 of the Statistical Package for Social Sciences (SPSS) was used to examine the data that had been gathered. Moreover, a model summary, regression ANOVA, and correlation were also produced. Tables and figures were utilized to display the data.

3.8.3 Correlation Analysis

The relationship between two variables, such as an independent and a dependent variable or between two independent variables, can be measured using correlation analysis. The correlation coefficients have values between +1.00 and -1.00, showing really flawless affairs. Determining the impact of every independent variable on dependent variable becomes challenging when there is a major correlation between the independent variables (Hair *et al*, 2013). The Pearson Product Moment correlation was utilized in this study to examine the link between; information sharing, security measures, technological advancements and international collaborations which were the (independent variables) and aircraft safety (dependent variable). Pearson's moment correlation was also tested at 5% level of significance.

3.8.4 Multiple Regression Analysis and its Assumptions Testing

The effects of each independent variable (factor) on the dependent variable were determined using a multiple regression analysis model. Determining and assessing the relationship between a given variable and one or more other variables is the focus of regression analysis. Regression is more precisely the process of trying to use movements in one or more variables to explain variations in another variable. The t-test was used to test the regression analysis at the 5% significant level. The model's

relevance was calculated using analysis of variance (ANOVA). The regression model's degree of goodness of fit was also evaluated using R2.

3.9 Testing the Assumptions of Multiple Regression Model

Autocorrelation, homoscedasticity, linearity, and normality were the underlying assumptions of the multiple regression model that was being tested. A normality test was employed to ascertain if the statistical sets were regularly distributed. With a mean of 0 (zero), a standard deviation of 1, and a symmetric bell-shaped curve, the test's distribution is bell-shaped in accordance with the definition of normalcy (Saunders et al., 2015). The normality test was done using the Kolmogorov-Smirnov test. If test results are significant (specified as $p<0.05$), then rejecting the null hypothesis requires rejecting the assumed normality of the distribution (Field, 2009). The data was found to be regularly distributed.

This was how the regression model was displayed:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where:

α: is the intercept.

Y: is aircraft safety

X_1: is security measures

X_2: is information sharing

X_3: is technological advancements

X_4: is international collaborations

ε**:** Error term.

β_1- β_4: coefficient of the independent variable in which measures the responsiveness of **Y** to changes in i.

3.9.1 Linearity

The dependent variable was plotted against the independent variable in a scatter plot made with SPSS statistics, and the scatter plot was visually checked to authenticate linearity. The residuals ought to be spread equally around the regression line, or zero line, according to the scatter diagram. The data was spread linearly, as it was concluded.

3.9.2 Multi-Collinearity

The inter-correlations between the independent variables will be determined in order to test this. When the independent variables have a strong correlation with one another, a multi-collinearity problem arises (Hair *et al.*, 2013). The Variance Inflation Factor, or VIF, is a statistical test used to determine multi-collinearity. Additionally, tolerance and the Variance Inflation Factor (VIF) are examined with verges of greater than 0.1 and a VIF of 10 to test for multi-collinearity (Hairr *et al.*, 2013). Each construct had a VIF factor specially between 0.1 and 10 or higher. Multi-collinearity won't cause any issues.

3.9.3 Shapiro-Wilk Test

The Shapiro-Wilk (S-W) normality test was used to determine the degree of normalcy in the source data. The data was regularly distributed if the p-value is greater than 0.05, as per the Shapiro-Wilk (S-W) test. The purpose of the test was to determine whether aircraft safety which is the dependent variable application is normal. The hypothesis that desires to be verified is whether the data is normally distributed. It is represented by H0 and H1, and it is set at $\alpha = 0.05$. If the p-value is less than α, H0 is rejected; if not, H0 is not rejected (Garson, 2014).

3.9.4 Heteroscedasticity Test

Heteroscedasticity was tested to see if the regression model has a heteroscedasticity issue or not. It is common for heteroscedasticity to result in smaller-than-expected p-

values. The rule states that there is no heteroscedasticity matter if the significance value is over 0.05, but heteroscedasticity issues arise if the significance value is less than 0.05.

Table 3.2: Hypotheses Testing

Objective	Null Hypothesis	Type of Analysis	Interpretation
To investigate the effect of security measures on aircraft safety in Kenya.	**$H0_1$**: Security measures have no significant effect on aircraft safety in Kenya.	Pearson Correlation Regression Analysis	If p-value < 0.05, Reject the null hypothesis.
To determine the effect of information sharing on aircraft safety in Kenya.	**$H0_2$**: Information sharing has no significant effect on aircraft safety in Kenya.	Pearson Correlation Regression Analysis	If p-value < 0.05, Reject the null hypothesis.
To investigate the effect of technological advancements on aircraft safety in Kenya.	**$H0_3$**: Technological advancements have no significant effect on aircraft safety in Kenya.	Pearson Correlation Regression Analysis	If p-value < 0.05, Reject the null hypothesis.
To determine the effect of international collaborations on aircraft safety in Kenya.	**$H0_4$**: International collaborations have no significant effect on aircraft safety in Kenya.	Pearson Correlation Regression Analysis	If p-value < 0.05, Reject the null hypothesis.

Table 3.3: Variable Description and Measurement

Variable	Source
Security Measures	Five-Likert Scale
Information Sharing	Five-Likert Scale
Technological Advancements	Five-Likert Scale
International Collaborations	Five-Likert Scale
Aircraft safety	Five-Likert Scale

3.10 Ethical Considerations

The nature and goals of the study, the methods to be followed, and the anticipated advantages for both the participants in the aircraft industry was all fully disclosed to the respondents. The chance to ask questions and receive any clarification anticipated was provided to the respondents. They voluntarily provided permission to partake in this study. The data obtained from the respondents was kept confidential and utilized exclusively for this research. Since the names of the responders was not recorded, anonymity and discretion were also ensured. Since the employees were involved in the data collection process, a research permit from NACOSTI and an introduction letter from Moi University was made accessible upon request.

CHAPTER FOUR

DATA ANALYSIS, INTERPRETATION AND PRESENTATION

4.0 Introduction

This chapter entailed an analysis of the study response rate, demographic analysis entailing age of respondents, gender, name of airline and level of education for study participants.

4.1 Response Rate

The researcher issued 111 questionnaires to staffs who operate within the global airlines, domestic airlines, commercial helicopter operators, balloon workers and ground handling agencies. The response rates were presented in the table below;

Table 4.1: Response Rate

Response	**Frequency**	**Percentage**
Responded	63	56.7%
Not responded	48	43.2%
Total	**111**	**100%**

Source: Research Data (2025)

As shown in table 4.1 above; 63 study participants filled and returned questionnaires for analysis while 48 participants failed to fill the research questionnaires. The study's response rate, at 56.7%, was considered suitable because the results were generalized to the study's target group. A high response rate was accomplished thanks in large part to the time of data collection, which involved distributing the questionnaires during business hours.

4.2 Demographics Analysis

Age, gender, name of the department and level of education of the respondents are among the demographics recorded in this study. The many subjects listed below each presents the analysis findings;

4.2.1 Age of Respondents

The study sort to understand the age of the respondents working with the airline companies, age

brackets were provided for participants to indicate where they belong at. The findings are discussed below;

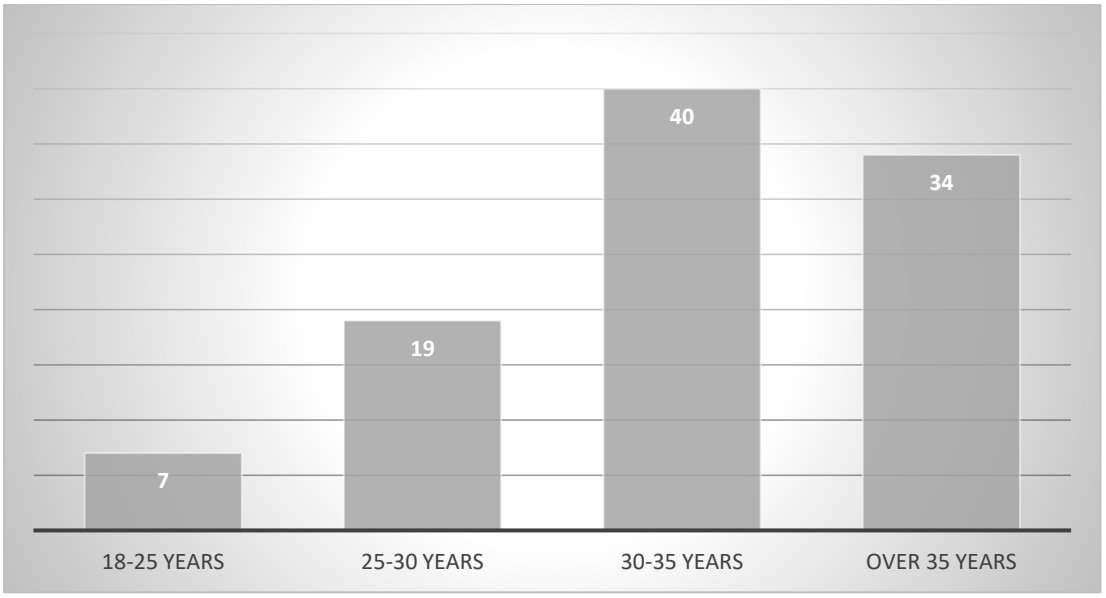

Figure 4.1: Age of Respondents
Source: Research Data (2025)

Majority of study participants at 40% are aged 30-35 years; followed by over 35 years at 34%; 25-30 years at 19% while 18-25 years had a 7% representation. It has been noted that many employees working for the airline companies have experience. Younger personnel usually begin their careers by comprehending about the national civic aircraft security program in the aircraft industry. Besides, there is a strong link

between aircraft safety and security measures in aircraft industry. The average age of workers is gradually getting older because of this evolution.

4.2.2 Gender of Respondents

The study sort to comprehend the gender composition of employees working for the airline companies in Nairobi County. The findings are as presented in figure 4.2 below;

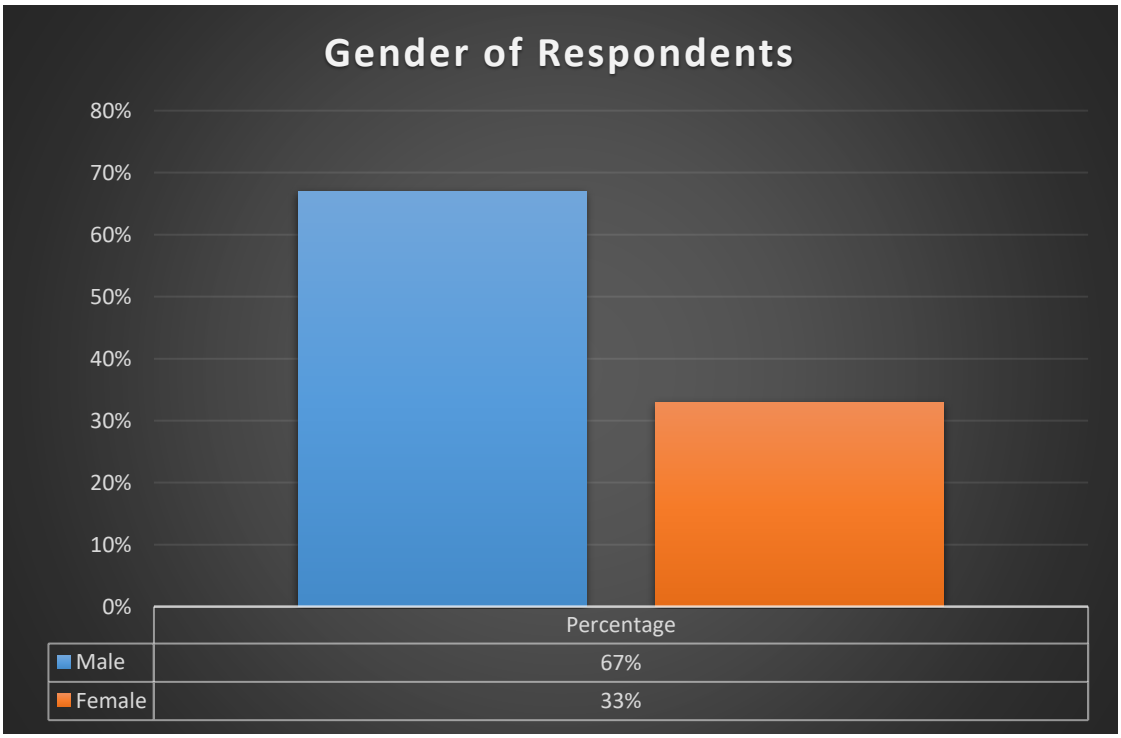

Figure 4.2: Gender of Respondents

Source: Research Data (2025)

As shown in figure 4.1; 67% were men, compared to 33% of women, making men the majority of employees at their respective airline companies. Participants in the study accredited to the low presence of female to gender differences in security measures, information sharing, technological advancements and international collaborations which are necessary aircraft safety in Kenya.

4.2.3 Education Level

The research sort to understand the level of education for the respondents dealing with aircraft safety of national civic aircraft security program in Nairobi County. The findings are as presented in figure 4.4 below;

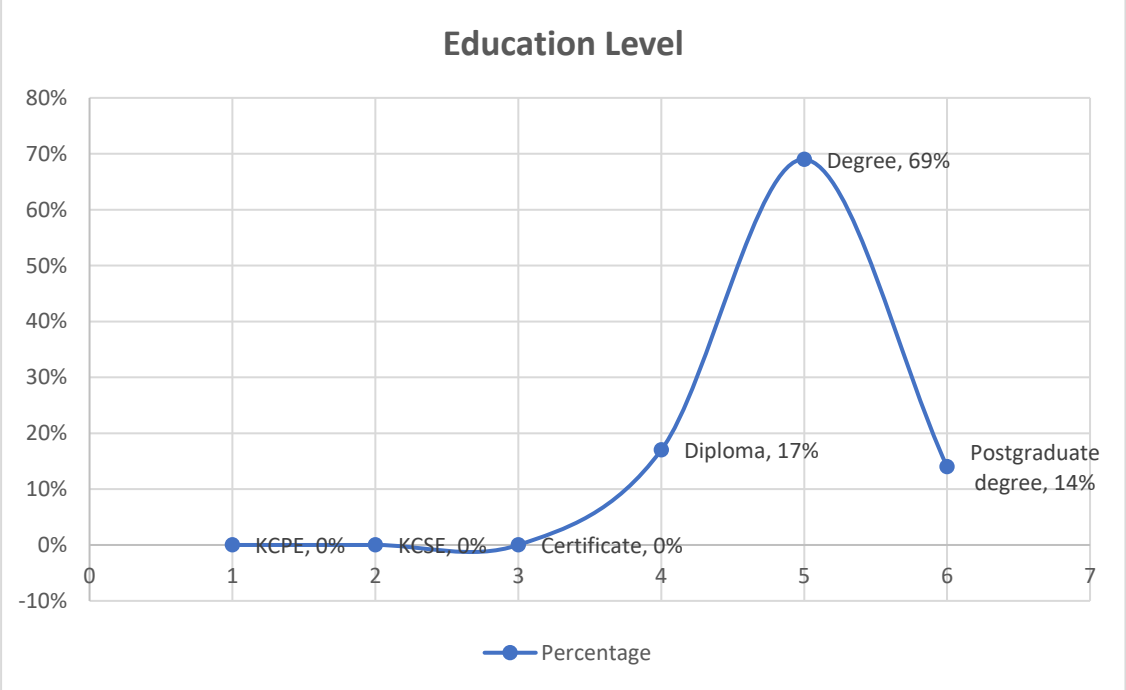

Figure 4.3: Education Level

Source: Research Data (2025)

As shown in figure 4.4' 69% of research participants had a degree, 14% had a postgraduate degree, and 17% had a diploma, which represents most of the educational attainment. The study found that because the aircraft industry is so competitive, respondents need to have higher levels of education to get hired at the airline companies i.e., at the international airlines, domestic airlines, commercial helicopter operators or balloon operators.

4.3 Research Validity and Reliability

4.3.1 Validity Results

A category of validity called content validity examines how well the questionnaire addresses the research questions that establish the basis of the study. The supervisors' professional judgment was used to determine the legitimacy of the content.

4.3.2 Reliability Results

The reliability of the data collection instrument was assessed using the Cronbach alpha test.

Table 4.2: Reliability Results

Variable	Number of Items	Cronbach's Alpha
Security Measures	63	.732
Information Sharing	63	.855
Technological Advancements	63	.901
International Collaborations	63	.877

Source: Research Data (2025)

According to the findings in table 4.2, all the Cronbach alpha coefficients are higher than 0.7. This suggests that the tools used for the analysis, interpretation, and presentation of the findings were trustworthy and consistent.

4.4 Descriptive Results

The effects of security measures, information sharing, technological advancements and global collaborations on aircraft safety in Kenya was tested by using descriptive analysis to reveal the degree to which independent variables influence the study's dependent variables.

Table 4.3: Descriptive Results

Variable	N	Mean	Std.dev
Security Measures	63	3.8175	1.230
Information Sharing	63	3.8647	0.980
Technological Advancements	63	3.0900	1.231
International Collaborations	63	3.1500	0.879
Aircraft Safety	63	3.6420	1.032

Source: Research Data (2025)

As shown in table 4.3 above; security measures had a mean of 3.8175. It implies that it affects aircraft safety in Kenya. Implementing security measures entails thorough passenger screening processes, the introduction of metal detectors, X-ray scanners, and the enactment of strict baggage screening procedures. Moreover, air marshals, armed personnel trained to handle in-flight security threats, have become an essential factor of security. The study's participants mostly agreed that information sharing is crucial, as indicated by the study's mean of 3.8647. Participants in the study proposed that when it comes to information sharing, the aircraft industry identifies the importance of appropriate and accurate information exchange among various stakeholders, including airlines, intelligence agencies, law enforcement, and international organizations.

The study’s participants agreed that technological advancements, as evidenced by the study's mean score which was 3.0900. Participants in the study concluded that in technological advancements, progressive scanning technologies, such as full-body scanners and explosive detection devices, have been installed to identify likely threats more effectively, reducing the likelihood of hijackers successfully smuggling weapons or explosives onboard.

The study participants agreed that international collaborations were also significant as seen by the mean response of 3.1500. In Kenya's aircraft sector, one crucial part of these collaborations is the sharing of intelligence and information related to potential threats. Timely and accurate material exchange enables countries to stay informed about individuals, groups, or activities that may pose a risk to aircraft security.

Finally, aircraft safety was 3.6420, signifying that one major area of improvement has been the enhancement of airport security measures, which includes the installation of advanced screening technologies, the training of security personnel, and the establishment of stringent access control protocols. These measures have reduced the likelihood of security breaches and have added to a safer aircraft environment in Kenya.

4.5 Diagnostic Tests Results

These are a critical component of data analysis, particularly when evaluating the vigor, reliability, and validity of statistical models. Diagnostic tests help identify potential matters in the data or model, such as multicollinearity, autocorrelation, heteroskedasticity, and model design errors.

4.5.1 Normality Test Results

The distribution of the data sets was checked using a normality test. For a distribution to be deemed normal, it must have a bell-shaped curve, a mean of 0 (zero), a standard deviation of 1, and a symmetric bell-shaped curve. Findings demonstrate that the presumption was true; the histogram displays a bell-shaped curve suggestive of a normal variate. Constant variance insinuated that the model was devoid of the biases present in models that do not satisfy the normalcy criterion. The results are presented below;

Figure 4.4: Normality Test Results

Source: Research Data (2025)

The results in figure 4.5 show that the assumption was met; the histogram has bell shaped curve typical of a normal variate. Constant variance presented an indication that the model was free from biases inherent in models that do not meet the normality requirement.

4.5.2 Multi-Collinearity Test Results

This was tested by establishing the inter-correlations between the independent variables. Multi-collinearity problem occurs when the independent variables are highly correlated to each other. The findings are presented in the table below;

Table 4.4: Multi-Collinearity Results

	Collinearity Statistics	
Variable	**Tolerance**	**VIF**
Security Measures	.324	3.086
Information Sharing	.601	1.664
Technological Advancements	.749	1.524
International Collaborations	.876	1.141
Aircraft Safety	.753	2.033

Source: Research Data (2025)

Multi-collinearity assumption states that there should be no highly correlated IVs. The VIF should be less than 10 comply with the assumption. The results in table 4.4 above shows that the condition is not violated; all the VIF values are all less than 10.

4.5.3 Heteroscedacity Test and Linearity Results

Scatter plot was used to assess the heteroscedacity and linearity of the model based on the plotting of the regression residuals. The findings are presented in the figure below;

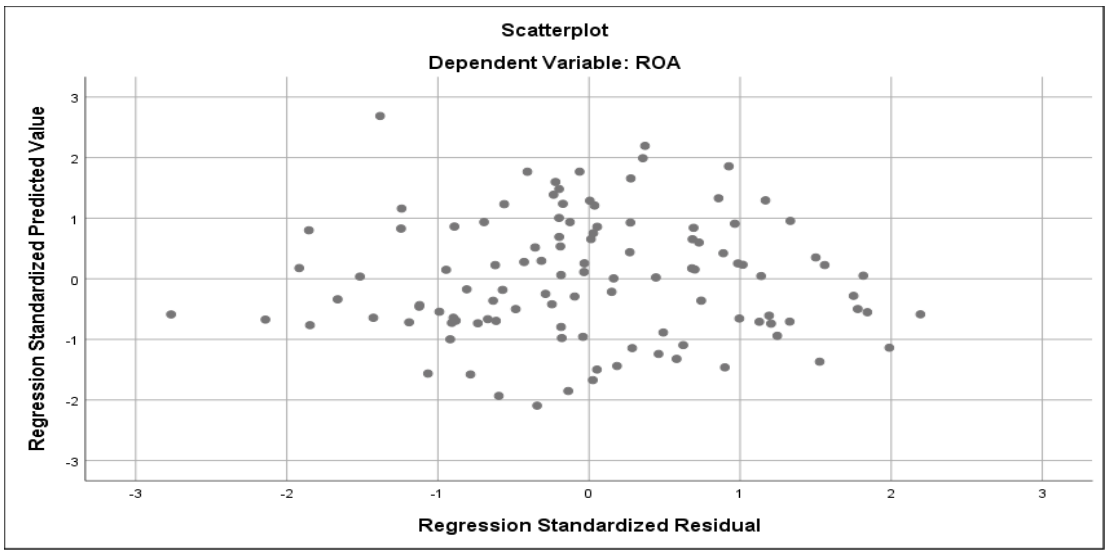

Figure 4.5: Heteroscedasticity Test and Linearity Results

Source: Research Data (2025)

The study made the assumption of heteroscedacity was assessed using the plot of residuals versus fitted values. Lack of an apparent pattern of the plot point is desired scenario to indicate that the assumption was met. Besides, meeting the normality and constant variance assumption indicates the linearity assumption was also gathered. This implies that the effects of national civic aircraft security program on aircraft safety in Kenya has a linear relationship and therefore fits a linear model.

4.6 Correlational Analysis Results

The relationship between the study variables, such as security measures, information sharing, technological sharing and international collaborations was examined using correlational analysis. Because of the analysis, Pearson values of correlation and p-values for all correlations between values. The values for the correlation are shown in table 4.5 below;

Table 4.4: Correlational Analysis Results

Variable		AMO	SP	SR	SA	SP
SM	Pearson Correlation	1				
	Sig. (2-tailed)					
IS	Pearson Correlation	.878**	1			
	Sig. (2-tailed)	.015				
TA	Pearson Correlation	.761**	.898**	1		
	Sig. (2-tailed)	.009	.011			
IC	Pearson Correlation	.692**	.804**	.845**	1	
	Sig. (2-tailed)	.021	.036	.101		
AS	Pearson Correlation	.422**	511**	592**	601**	1
	Sig. (2-tailed)	.019	.041	.033	.042	

Source: Research Data (2025)

Keys:

SM: Security Measures

IS: Information Sharing

TA: Technological Advancements

IC: International Collaborations

AS: Aircraft Safety

Table 4.5 above shows the correlation coefficients on each of the four objectives on aircraft safety in Kenya. The table demonstrates the positive and significant correlations between each of the four objectives on aircraft safety in Kenya. The smallest correlation (r=.422, p=.019) was found to be in aircraft safety. Still, there is a major link (r=.878, p=.015) between information sharing and aircraft safety. Additionally, there is a substantial link between technological advancements and aircraft safety (r=.761, p=.009) and amid international collaborations and aircraft safety (r=.692, p=.021). The favorable correlations substantiate the effects of national civic aircraft security program on aircraft safety in Kenya.

4.7 Regression Analysis Results

The impacts of each independent variable (effects) on the dependent variable were examined using a multiple regression analysis model. The goal of regression is to describe and assess the affiliation between a given variable and one or more other variables. The sections below present the findings;

4.7.1 Model Summary

To evaluate the regression model's suitability for studying the relationships between the variables, a model summary was used in this study.

Table 4.5: Model Summary

Model	R	R-Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.809[a]	.655	.614	.372	1.807

a. Predictors : (Constant), SM, IS, TA, IC

b. Dependent Variable: AS

The model summary finding demonstrates that the four training indicators collectively explain 65.5 percent of the variance on aircraft safety in Kenya. The model elucidates 61.4 percent of aircraft safety in Kenya after accounting for the sum of predictors. An indicator that states that information sharing plays a significant role in determining aircraft safety in Kenya.

4.7.2 Analysis of Variance

Results from the ANOVA test validates the validity of the entire linear multiple models with four predictors of national civic aircraft security program on aircraft safety in Kenya.

Table 4.6: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	**Regression**	18.896	8	2.362	3.016	.017[b]
	Residual	40.693	52	.783		
	Total	59.589	60			

a. **Dependent Variable:** Aircraft Safety: (Constant), SM, IS, TA, IC

Source: Research Data (2025)

The ANOVA findings demonstrate the validity of the entire linear multiple models including the four objectives on national civic aircraft security program on aircraft safety in Kenya predictors. The findings show that the F-statistic (F=3.016, p .017) is significant. The resultant F- ratio is significant (p .017) and shows that the linear regression model fits the data well.

4.7.3 Regression Co-Efficient

In this study, regression coefficients were utilized to examine the type and importance of the link between the study variables. The outcomes are displayed in the table 4.7 below;

Table 4.7: Regression Co-Efficient

	Unstandardized Coefficients		Standardized Coefficients		
Model	**B**	**Std. Error**	**Beta**	**t**	**Sig.**
1(Constant)	.711	.421		1.689	.100
Security Measures	.053	.059	.100	.902	.003
Information Sharing	.233	.107	.282	2.183	.036
Technological Advancements	.140	.041	.220	3.583	.001
International Collaborations	.491	.111	.517	4.422	.019

Source: Research Data (2025)

Dependent Variable: Aircraft Safety

Independent Variables: Security Measures, Information Sharing, Technological Advancements and International Collaborations.

According to the findings in table 4.7 above, each of the four predictors have a valuable regression coefficient, indicating a favorable effects of national civic aircraft security program on aircraft safety in Kenya. Specifically, technological advancements had a flimsy but positive significant influence (=.140, p=.001), international collaborations had a strong positive significant influence (=.491, p=.019), information sharing had a moderate but positive significant influence (=.233, p=.036), and security measures had a weak but positive major influence (=.053, p.003) on aircraft safety in Kenya. The study's regression model is as follows:

AS = .711+.053 SM +.233 IS + .140 TA + .491 IC + e

Key:

AS: Aircraft Safety

SM: Security Measures

IS: Information Sharing

TA: Technological Advancements

IC: International Collaborations

4.8 Discussion of Study Findings

The study set out to examine the effects of security measures, information sharing, technological advancements, and international collaborations on aircraft safety in Kenya. The findings confirm that these four elements of the national civic aircraft

security program play a significant role in shaping the safety and reliability of airline operations.

The results revealed that security measures had a positive but weak effect on aircraft safety. With a mean score of 3.8175 and a significant regression coefficient ($p = .003$), the findings suggest that enhanced security measures, including baggage screening, deployment of air marshals, and strict access control protocols, contribute to safer aircraft environments. This aligns with global aviation safety literature, which emphasizes the critical role of layered security systems in minimizing risks of hijacking, smuggling, and other threats.

Information sharing emerged as an important determinant of aircraft safety. With the highest mean score (3.8647) and a statistically significant regression result ($p = .036$), the findings indicate that effective communication and intelligence exchange between airlines, security agencies, and global organizations enhance preparedness against potential threats. This supports International Civil Aviation Organization (ICAO) guidelines, which stress the need for real-time information flow to mitigate risks.

Overall, the regression model demonstrated that the four factors collectively explained 65.5% of the variance in aircraft safety. This indicates that while security measures, information sharing, technological advancements, and collaborations are significant, other contextual factors such as staff training, organizational culture, and regulatory compliance may also contribute to aviation safety. The study findings, therefore, reinforce the importance of a holistic approach that integrates both national and international strategies in enhancing the safety of aircraft operations in Kenya.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter covered the study summaries, conclusions, recommendations, and suggestions for further studies.

5.2 Summary of Findings

The high response rate of 79.7% that was achieved in this survey made it possible to generalize the findings of the study to the entire population that was the focus of the study. The reliability and validity of the research methods resulted in the collection of data that was appropriate for the presenting of factual information. In addition, the majority of respondents are male, between the ages of 30 and 35, and have a bachelor's degree or above, according to the findings of demographic research.

5.2.1 Effects of Security Measures on Aircraft Safety

The basic purpose of the study was to investigate the effects of security measures on aircraft safety in Kenya. It was suggested that security measures are crucial in enhancing aircraft safety within Kenyan airlines. The findings highlighted that robust security protocols, with passenger screening, baggage inspection, and surveillance systems, have significantly reduced potential threats such as terrorism and smuggling. The study noted that Kenyan airlines have capitalized in advanced technology, such as biometric screening and integrated surveillance systems, which contribute to deterring criminal activities and enhancing passenger safety. The study further indicated that staff training plays a vital role in aircraft safety. Well-trained security personnel can quickly identify and respond to security threats, ensuring swift actions to mitigate risks. However, the research also identified gaps in consistent implementation of security

measures across different airlines, mainly due to resource constraints, which can affect overall safety.

5.2.2 Effects of Information Sharing on Aircraft Safety

In the second objective, the researcher wanted to determine how information sharing affected aircraft safety in Kenya. It was suggested that that robust information-sharing mechanisms are critical in averting accidents and ensuring compliance with international safety standards. Kenyan airlines that have implemented structured information-sharing platforms report fewer safety cases compared to those with fragmented or inefficient communication channels. One of the key findings was that collaboration between airlines, regulatory bodies, and other stakeholders enhances safety monitoring and response systems. Information sharing helps identify safety threats early, allowing for proactive measures to be taken. This practice also advocates for a culture of transparency and liability among aircraft personnel, fostering an environment where potential hazards are promptly reported and addressed.

5.2.3 Effects of Technological Advancements on Aircraft Safety

The third objective was to conduct an investigation into the effects of technological advancements on aircraft safety in Kenya. It was suggested that technological advancements on aircraft safety in Kenyan airlines indicate significant advances in overall safety standards due to the adoption of modern technologies. One of the foremost findings is the enhancement of aircraft navigation and communication systems, which have greatly reduced human errors and improved actual decision-making capabilities. Advanced avionics systems and satellite-based technologies have allowed for more precise tracking and monitoring of aircraft, leading to a reduction in incidents related to poor visibility, adverse weather conditions, and air traffic control miscommunication.

5.2.4 Effects of International Collaborations on Aircraft Safety

The fourth objective of the study was to investigate the effects of international collaborations on aircraft safety in Kenya. It was expected that the partnerships with global aircraft organizations, such as the International Civil Aircraft Organization (ICAO) and International Air Transport Association (IATA), significantly enhance safety standards through the adoption of best practices. Kenyan airlines involved in these collaborations benefit from access to advanced technologies, improved training programs, and standardized safety protocols, which influence better operational safety outcomes. The study also revealed that international collaborations have a positive impact on regulatory compliance. Kenyan airlines working with global partners prove higher adherence to international safety regulations, reducing the risk of accidents and incidents.

5.3 Conclusions

While conducting the research, the researcher arrived at the conclusion that security measures play a critical role in maintaining aircraft safety in Kenyan airlines. Rigorous passenger screening, thorough baggage checks, and improved surveillance systems were identified as key contributors to reducing security breaches and potential threats. These measures, when effectively realized, significantly reduce the risk of incidents such as terrorism, smuggling, and other forms of unlawful interference. This was the conclusion reached by the researcher.

The study also came to the conclusion that information sharing on aircraft safety notably improves the reporting and analyzing of safety incidences. When communication channels are properly structured and accessible, pilots, crew members, maintenance listings, and regulatory bodies can promptly exchange safety-related

communication. This proactive reporting helps identify potential hazards early, leading to timely interventions.

The research also revealed that the use of technological advancements had a marginally significant but favorable effect in enhancing safety protocols and reducing the risk of accidents in the aircraft industry. Modern aircraft are equipped with advanced systems such as automated flight controls, collision avoidance systems, and predictive maintenance tools, which have improved operational safety. The integration of these technologies has streamlined the monitoring and management of in-flight and ground operations, minimized human errors and ensured more precise navigation and communication.

After giving it a lot of thought, the scholar came to the conclusion that international collaborations had a significant impact on aircraft safety in Kenyan airlines. International collaborations have proven crucial in enhancing aircraft safety within Kenyan airlines. By partnering with global regulatory bodies, safety organizations, and international airlines, Kenyan carriers have notably improved their operational standards. These collaborations enable the adoption of globally known safety practices and the implementation of advanced safety management systems.

5.4 Recommendations

5.4.1 Effects of Security Measures on Aircraft Safety

The government and aviation authorities should strengthen the enforcement of aviation security measures by guaranteeing that all airports and airstrips adopt standardized screening procedures, advanced surveillance systems, and well-trained security personnel. Regular audits, drills, and compliance checks should be conducted to test readiness against potential threats. Additionally, investment in human resource training

and capacity-building for aviation security staff should be prioritized to minimize human error and enhance vigilance.

5.4.2 Effects of Information Sharing on Aircraft Safety

A centralized communication and reporting system should be established to facilitate real-time sharing of security-related information between airlines, airport authorities, law enforcement agencies, and international partners. Kenya Civil Aviation Authority (KCAA) should develop clear protocols for intelligence exchange to detect and prevent potential threats before they escalate. Encouraging a culture of transparency and collaboration among stakeholders will ensure timely dissemination of critical information that enhances aircraft safety.

5.4.3 Effects of Technological Advancements on Aircraft Safety

Kenya should invest in modern aviation technologies, including biometric passenger verification, advanced baggage screening systems, and artificial intelligence–based threat detection tools. Adoption of unmanned aerial surveillance and cybersecurity frameworks should be prioritized to protect both physical and digital aviation infrastructure. Continuous upgrading of aviation systems in line with international standards will strengthen resilience against emerging threats and improve overall aircraft safety.

5.4.4 Effects of International Collaborations on Aircraft Safety

Kenya should strengthen partnerships with international aviation organizations such as ICAO, IATA, and regional bodies to adopt best practices and harmonized safety standards. Participation in joint training programs, safety audits, and cross-border security initiatives will enhance the capacity of Kenyan aviation stakeholders. Bilateral and multilateral agreements should be pushed to foster intelligence sharing, coordinated threat response, and improved compliance with global aviation security frameworks.

5.5 Suggestions for Further Studies

i. In order to shed light on the liaison that exists between the four aircraft safety objectives, the research study applied a regression model. This meant that the link could be better understood.

ii. While this study focuses on the effects of the National Civil Aircraft Security Program on aircraft safety in Kenyan airlines, more research could explore how these security measures impact other stakeholders in the aircraft industry, such as airport operations, passenger experience, and ground handling services.

iii. Expanding the focus beyond aircraft safety could provide an all-inclusive grasp of the overall effectiveness of the program.

iv. Further studies can also conduct comparative analyses between Kenya's civil aircraft security measures and those of other countries within East Africa or beyond. This would help identify best practices and focus on areas where Kenyan airlines could improve.

v. Such studies could also explore how regional collaborations influence security outcomes and determine the role of international aircraft standards in shaping national programs.

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APPENDICES

APPENDIX 1: LETTER OF INTRODUCTION

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SCHOOL OF BUSINESS AND ECONOMICS
POSTGRADUATE OFFICE

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P.O. Box 3900-30100
Eldoret Annex Campus
ELDORET, Kenya

MU/SBE/ML/PG/33

30th July, 2024

TO WHOM IT MAY CONCERN

Dear Sir/Madam

RE: ROBERT OYOO ONDENYO - EASA/EMBA/0251/23

The above-named is a student of Moi University, School of Business and Economics. He is undertaking Executive Master of Business Administration (Aviation Option).

Mr. Oyoo has successfully completed his coursework, defended his proposal, and is proceeding to the field to collect his research titled **"*Effects of National Civil Aviation Security Program on Aircraft Safety in Kenya*"**

Any assistance accorded to him will be highly appreciated.

Yours faithfully,

SCHOOL OF BUSINESS & ECONOMICS
MOI UNIVERSITY
P O Box 3900 ELDORET 30100

DR. RONALD BONUKE
POSTGRADUATE CHAIR, SBE

cj/RB

APPENDIX II: RESEARCH QUESTIONNAIRE

Instructions: Kindly answer the questions below by ticking the appropriate answer or writing your answer in the space provided.

Section A: Background Information

1. Age of respondent:

   18-25 years [ ]

   25-30 years [ ]

   30-35 years [ ]

   Over 35 years [ ]

2. Gender of respondent:

   Male [ ]

   Female [ ]

3. Name of the airline company you are based at:

   Kenya Airways [ ]

   Jambo Jet Airline [ ]

   Safari Link Airline [ ]

   Skyward Express [ ]

   Jetways Airlines [ ]

4. Level of education of the respondent:

KCPE [ ]

KCSE [ ]

Certificate [ ]

Diploma [ ]

Degree [ ]

Postgraduate Degree [ ]

Section B: Security Measures

This section seeks your view on the effects of security measures on aircraft safety in Kenya. Kindly indicate your level of agreement or disagreement with the statements using the following 5-point Likert scale where; 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1= Strongly Disagree.

	Security Measures	**5**	**4**	**3**	**2**	**1**
a.	Stakeholders who value passenger and staff safety would generally support increased security.					
b.	Strong security measures can possibly discourage hijackers, according to certain stakeholders.					
c.	Passengers appreciate the increased security, feeling more confident and secure during their flights.					
d.	Aggressive security methods, especially modern screening technologies, may violate tourists' privacy.					
e.	Airline and passenger concerns exist concerning the cost of increased security.					

Section C: Information Sharing

This section seeks your view on the effects of information sharing on aircraft safety in Kenya. Kindly indicate your level of agreement or disagreement with the statements using the following 5-point Likert scale where; 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1= Strongly Disagree.

	Information Sharing	**5**	**4**	**3**	**2**	**1**
a.	Media coverage of aircraft safety influence public opinion by explaining security procedures.					
b.	Media exaggeration can contribute to misinformation regarding aircraft safety.					
c.	Countries and relevant authorities can share statistics to identify threats and adversaries before they act.					
d.	Advanced data analytics on shared data can reveal hijacking or security issues.					
e.	Sharing real-time security threats helps aeronautics authorities improve airport and plane screening.					

Section D: Technological Advancements

This section seeks your view on the effects of technological advancements on aircraft safety in Kenya. Kindly indicate your level of agreement or disagreement with the statements using the following 5-point Likert scale where; 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1= Strongly Disagree.

	Technological Advancements	**5**	**4**	**3**	**2**	**1**
a.	Airports use full-body scanners to identify firearms, explosives, and other forbidden objects.					
b.	Biometric technology like fingerprints and facial recognition improve identity verification in airports.					
c.	Commercial jets have strengthened cockpit doors to prevent unwanted entry and control.					
d.	Security and access control systems restrict access to essential aircraft regions to authorized people.					
e.	Authorities can follow aircraft better with improved reconnaissance, improving airspace security.					

Section E: International Collaborations

This section seeks your view on the effects of international collaborations on aircraft safety in Kenya. Kindly indicate your level of agreement or disagreement with the statements using the following 5-point Likert scale where; 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1= Strongly Disagree.

	International Collaborations	**5**	**4**	**3**	**2**	**1**
a.	Sharing intelligence can help countries spot aircraft security issues and dubious conduct.					
b.	International collaborations frequently advance and execute cross-border security protocols.					
c.	Aircraft security professionals, law enforcement, and appropriate authorities from allied nations can train together.					
d.	Treaties can also establish frameworks for cooperation in probing and prosecuting aircraft-related crimes.					
e.	To prevent terrorism and aircraft hijacking, nations can form multinational task forces.					

Section F: Aircraft Safety

This section seeks your opinion on aircraft safety in Kenya. Kindly indicate your level of agreement or disagreement with the statements using the following 5-point Likert scale where; 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1= Strongly Disagree.

	Aircraft safety	**5**	**4**	**3**	**2**	**1**
a.	Advancements in technology can pointedly enhance aircraft security and reduce the risk of hijackings.					
b.	Specific technological measures like avionics systems should be implemented to improve aircraft security.					
c.	There should be international agreements on how to handle hijackers and coordinate responses.					
d.	The current government have measures in place to prevent and respond to aircraft safety.					
e.	Governments should allocate more resources and funds to prevent aircraft safety.					
f.	Aircraft safety are a major threat to the general aircraft security.					

Thank you for your Cooperation