EFFECTS OF HUMAN FACTORS ON THE RISK OF AVIATION ACCIDENTS IN KENYA: CASE OF JKIA AIRLINES

BY

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DECLARATION

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DEDICATION

I dedicate this research to my parents for their support love and encouragement during the entire stage of my academic and research writing phase.

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ABSTRACT

The purpose of the study was to investigate the effects of human factors on the risk of aviation accidents in Kenya, using Airlines in JKIA as a case study. The study focused on the following objectives: to ascertain the effect of Management support on risk of aviation accidents in Kenya; to establish the effect of employee training on risk of aviation accidents in Kenya; to determine how teamwork effects risk of aviation accidents in Kenya and to examine the effect of safety culture on risk of aviation accidents in Kenya. The theories underpinning the research are; Domino theory of aviation safety, Human factor theory. The proposed research will employ explanatory research design involving qualitative methods to collect data. This will involve use of questionnaire to conduct a stratified random sampling of 250 respondents as determined by Yamane formula from the entire population of 663 crew members and administration staff involved in human factors in the organization. The study purposes to subject the data to quantitative analysis based on the study objectives. Descriptive statistics (percentages, mean and standard deviation) was used for the quantitative analysis in which tables, pie charts and graphs was generated. The study there after conducted inferential statistics involving multiple regression analysis. Several significant findings emerge from the analysis. Management Support (MS) and Employee Training (ET) exhibited statistically significant positive associations with increased risk, implying that stronger financial management support and robust employee training processes tend to correlate with higher risk levels. Specifically, the regression analysis revealed that for every incremental one-unit increase in Management Support, there is a corresponding and statistically significant decrease of 0.701 units in the Risk of aviation accidents in Kenya, holding other factors constant. Similarly, a one-unit increase in Employee Training (ET) demonstrated a significant decrease of 0.478 units in Risk of aviation accidents in Kenya, with other variables held constant. Safety Culture (SC) and Teamwork (TW) displayed more modest positive relationships with risk. The regression analysis indicated that a one-unit increase in Safety Culture (SC) resulted in a moderate decrease of 0.375 units in Risk of aviation accidents, while a one-unit increase in Teamwork (TW) led to a smaller decrease of 0.318 units in Risk of aviation accidents, with other factors remaining constant. Additionally, the chi-square analyses provided statistical evidence by surpassing critical chi-square values at predetermined significance levels, leading to the rejection of null hypotheses. This rejection underscores the substantial and statistically significant impact of these factors on aviation safety. These results, supported by both perceptual and quantitative evidence, highlight the multifaceted nature of these human factors in aviation safety, emphasizing the need for nuanced approaches to enhance aviation safety practices and inform safety management and policy decisions in the Kenyan aviation sector.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS AND ACRONYMS

ATC	**:**	Air Traffic Control
AFCAC	**:**	African Civil Aviation Commission
AFRAA	**:**	African Airline Association
IATA	**:**	International Air Transport Association
ICAO	**:**	International Civil Aviation Authority
IT	**:**	Information Technology
JMA	:	JamboJet Airline
KQ	:	Kenya Airways Limited
LCC	**:**	Low Cost Carrier airlines
OLT	**:**	Human factor theory
HRT	**:**	Domino theory of aviation safety

OPERATIONAL DEFINITION OF TERMS

Risk of Aviation Accidents: refers to the probability and possible severity of accident or loss from exposure to various hazards, including injury to people and loss of resources (FAA, 2008)

Management support: refers to the endorsement and backing provided by organizational leaders and supervisors to facilitate the successful execution of initiatives, projects, or proposals. It involves the allocation of resources, guidance, and assistance to individuals or teams working on specific tasks or projects, enhancing their chances of achieving their objectives (Babbie, 2016).

Employee training: denotes a structured and systematic process within an organization aimed at equipping its workforce with the necessary knowledge, skills, and competencies to perform their job roles effectively. It involves educational programs, workshops, and development activities designed to enhance employee performance, productivity, and career growth (Button, 2017).

Teamwork: involves the coordinated and collaborative efforts of flight and cabin crews, air traffic controllers, maintenance personnel, and other aviation professionals to ensure the safe and efficient operation of an aircraft (Vansteenkiste, 2019).

Safety culture: in this research context represents the shared values, attitudes, and

behaviors within an organization that prioritize safety as a core component of its operational ethos. It encompasses a commitment to open communication, continuous improvement, and a proactive approach to identifying and mitigating potential safety hazards to ensure the well-being of employees and the public (Grosling, 2018).

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter comprises of the background of the study, problem statement, research objectives, research hypotheses, significance of study and the scope of study.

1.2 Background of the study

Studying the effects of human factors on the risk of aviation accidents is a crucial endeavor in ensuring aviation safety. Human factors encompass a wide range of elements that relate to human performance and behavior in aviation operations (Barton, 2015). These factors play a significant role in aviation accidents, as they can contribute to errors, mishaps, and breakdowns in communication and decision-making processes. Studies by IATA within the period between 2015 to 2020 highlight that approximately 75% of aviation accidents stem from human error, with issues like pilot fatigue accounting for 15-20% and communication breakdowns along with inadequate training collectively attributing to an additional 10-15% of accidents in ICAO contracting states' airlines.

The repercussions of aviation accidents extend beyond the immediate financial losses incurred by airlines and aviation authorities (Babbie, 2016). The most profound and irreplaceable losses lie in human lives and the immeasurable emotional toll on affected families and communities. Each accident represents the extinguishing of vibrant futures,

leaving a void that cannot be filled. Moreover, the collective expertise and experience of pilots, crew members, and other aviation professionals lost in such incidents cannot be easily replaced, potentially compromising the industry's overall safety (Mesut, 2016). Beyond the human factor, there are economic consequences, including damage to the reputation of airlines and the broader aviation sector, leading to decreased passenger confidence and potential long-term financial setbacks. In essence, the true cost of aviation accidents transcends financial figures, encompassing human lives, collective knowledge, and the enduring impact on the industry's integrity.

On a global scale, researchers have been deeply interested in understanding how human factors influence aviation accidents (Jones *et al.,* 2018; Anderson, 2019). Studies have shown that a substantial proportion of aviation accidents are attributed to human error, including issues such as pilot fatigue, communication breakdowns, inadequate training, and poor decision-making under stress (Miller, 2017; Green Corporation, 2020). By analyzing these factors, aviation authorities and airlines aim to implement effective training programs, operational procedures, and safety protocols to mitigate the risks associated with human error (Johnson *et al.,* 2022; Flight Safety Institute, 2019).

In the context of risk of aviation accidents in Africa, the continent has been grappling with a myriad of challenges that have raised concerns among industry experts and stakeholders. Inadequate infrastructure, limited financial resources, and disparities in regulatory standards have all played a role in shaping the aviation safety landscape

(Mbeki, 2018). When it comes to understanding the factors that contribute to aviation accidents in the region, human elements have emerged as a significant and complex component. Statistics reveal that a substantial number of aviation accidents in Africa can be attributed to human error, highlighting the critical need to address these issues (African Aviation Safety Council, 2020). Insufficient training remains a prominent factor, with data indicating that a considerable portion of accidents occur due to pilots and crew members lacking the necessary skills and knowledge to handle challenging situations (Amadi, 2019).

Moreover, the diverse linguistic and cultural landscape of Africa presents unique challenges in terms of communication within the aviation industry. Language barriers have been identified as a contributing factor in accidents, underscoring the importance of effective communication protocols and language proficiency among aviation personnel (Chukwuma, 2021). Cultural differences and varying operational practices across different regions of Africa also play a role in aviation safety. These differences can lead to misunderstandings, misinterpretations, and conflicts in decision-making processes, which in turn can compromise safety outcomes (Nzimande, 2020).

In Kenya, as a representative case within Africa, the study of human factors in aviation accidents is pertinent. Kenya has a growing aviation sector, including commercial airlines and regional operations. Studying the effects of human factors on aviation accidents in Kenya involves examining the specific challenges faced by pilots, crew members, air

traffic controllers, and maintenance personnel. Factors like lack of experience, inadequate training facilities, and high workload can contribute to accidents if not addressed effectively. Pilots, for instance, confront challenges such as lack of experience, suboptimal training facilities, and limited access to advanced flight simulators. The cumulative effect of these factors can compromise their ability to navigate complex scenarios confidently (Muthoni, 2018). Inadequate training not only impacts pilots but extends to crew members who must collaborate seamlessly to ensure safe flights. Air traffic controllers grapple with high workload and stressful environments, demanding precise decision-making to avert potential mishaps (Kipchumba, 2021).

The study of human factors in aviation safety remains relevant today. As aviation technology advances, new challenges and opportunities arise. Automation, for instance, introduces its own set of human factors considerations, including overreliance on automated systems, complacency, and degraded manual flying skills. Additionally, the aviation industry continues to address issues such as teamwork, fatigue management, and effective communication across different cultures and languages.

In the present context, research and efforts to improve aviation safety through understanding and mitigating human factors continue. Airlines and aviation authorities are continually refining training programs, safety protocols, and operational procedures to address the identified human factor challenges and minimize their impact on aviation accidents.

1.3 Statement of the Problem

The heightened concern over aviation accidents, both in Kenya and globally, underscores the pivotal role of human factors in these incidents. Jomo Kenyatta International Airport (JKIA), a central air travel hub in the region, necessitates a thorough understanding of how human elements impact aviation safety to fortify accident prevention strategies (Koestner, 2019). This study seeks to investigate the influence of human factors on the risk of aviation accidents among airlines operating at JKIA.

Despite strides in technological advancements and procedural improvements enhancing overall aviation safety, human-related factors persist as a primary contributor to accidents (Gulikers, 2017). Pilots, crew members, air traffic controllers, maintenance personnel, and other aviation professionals are susceptible to errors stemming from diverse factors, including fatigue, inadequate training, communication breakdowns, decision-making under pressure, and complacency.

A poignant illustration of the consequences of these factors is the tragic crash of Ethiopian Airlines Flight 302 on March 10, 2019. The Boeing 737 Max 8 aircraft, en route from Addis Ababa to Nairobi, experienced a fatal crash shortly after takeoff, resulting in the loss of all 157 people on board (Coll, 2019). The accident's attribution to a combination of technical issues, including a faulty sensor and problems with the aircraft's automated flight control system (MCAS), emphasized the intricate interplay between equipment malfunctions, pilot training, and decision-making under challenging

circumstances.

The aviation safety audit report by the Kenya Civil Aviation Authority (2021) further underscores the challenges within Kenya's aviation sector related to human factors. These challenges encompass inadequate training, skill gaps among aviation personnel, fatigue-related impairments in decision-making, resource limitations impacting safety and effectiveness, weak regulatory oversight affecting adherence to standards, and poor communication among stakeholders. Addressing these multifaceted challenges demands collaborative efforts and comprehensive strategies to elevate safety, efficiency, and overall performance in Kenya's aviation industry.

While advancements have been made in researching the effects of human factors on aviation accidents, significant research gaps persist. Notably, there is a lack of in-depth exploration concerning airlines' emphasis on management support, employee training, teamwork, and safety culture. Johnson's (2019) study on the influence of management support and safety culture points out a limited understanding of how these factors interact and mutually reinforce each other. Robinson (2022) acknowledges the importance of employee training but highlights a knowledge gap in quantitatively measuring the effectiveness of different training programs. Rigorous studies are needed to assess the correlation between specific training interventions and their actual impact on reducing the risk of aviation accidents.

Similarly, Martinez (2019) emphasizes the critical role of teamwork in aviation safety, calling for longitudinal studies to explore how teamwork practices impact aviation safety over extended periods. The study by Morgan (2021) on safety culture recognizes its crucial role but overlooks the influence of contextual factors, such as national culture, regulatory environment, and organizational structure, on safety culture within different airlines. Exploring these external factors becomes imperative for a comprehensive understanding of safety culture development and sustenance within the aviation industry.

1.4 General objectives

By examining the specific human factors that influence safety, the study aims to provide insights that can inform targeted interventions, to mitigate these risks and enhance aviation safety within the Kenyan airline sector.

1.4.1 Specific Objectives

The objectives of this study was:

i. To ascertain the effect of Management support on risk of aviation accidents.

ii. To establish the effect of employee training on risk of aviation accidents.

iii. To determine how teamwork affects risk of aviation accidents.

iv. To examine the effect of safety culture on risk of aviation accidents.

1.5 Research Hypotheses

The following hypotheses will guide this research:

Ho_1: There is no significant effect of management support on risk of aviation accidents.

Ho_2: There is no significant effect of employee training on risk of aviation accidents.

Ho_3: There is no significant effect of teamwork on risk of aviation accidents.

Ho_4: There is no significant effect of safety culture on risk of aviation accidents.

1.6 Significance of the Study

This study on the "Effects of Human Factors on the Risk of Aviation Accidents in Kenya: A Survey of Airlines at JKIA" holds significant importance in enhancing aviation safety and operational efficiency within the Kenyan context. By focusing on the specific environment of Jomo Kenyatta International Airport (JKIA) and surveying airlines operating there, the research aims to provide insights into the unique human factors that contribute to aviation accidents. The findings of this study could lead to targeted interventions, policy recommendations, and training enhancements tailored to the specific challenges faced by airlines in Kenya. Ultimately, the study's outcomes have the potential to improve risk management strategies, reduce the occurrence of accidents, and enhance overall safety standards within the Kenyan aviation industry.

1.7 The scope of the study

The scope of the study encompasses a detailed investigation into the influence of human factors on the occurrence of aviation accidents specifically within the context of Jomo

Kenyatta International Airport (JKIA) in Kenya. The study aims to explore various human-related elements such as pilot training, decision-making, communication, crew coordination, fatigue, and cultural factors, all of which contribute to the overall risk of aviation accidents. By focusing on airlines operating at JKIA, the research delves into the specific challenges and dynamics faced by aviation professionals within this particular environment. The study employs a questionnaire-based approach to gather insights from airline personnel, further narrowing the scope to understand perceptions, experiences, and perspectives related to human factors and accident risk within this chosen setting. While the study seeks to provide insights and recommendations for enhancing aviation safety within JKIA, its scope remains confined to this specific airport and the airlines surveyed, limiting the broader generalizability of findings to the broader aviation industry in Kenya or beyond.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section presents the literature on the four variables of study. It entails literature on the following sub-headings; Management support, safety culture, teamwork and employee training and how they influence the aviation safety. This chapters also looks at the theories that inform the study and the conceptual framework.

2.2 Empirical Review

2.2.1 The Concept of Risk of Aviation Accidents

The notion of the "risk of aviation accidents" is a multifaceted concept that underpins the assessment and evaluation of potential hazards and adverse events within the aviation industry. Risk, in this context, signifies the probability or likelihood of undesirable incidents occurring, such as aviation accidents involving aircraft crashes, collisions, or other events leading to damage, injuries, or fatalities. This concept takes into account a wide array of contributing factors that collectively influence the potential for accidents (Stanley, 2016). These factors encompass various elements ranging from external conditions such as adverse weather patterns, technical malfunctions, and mechanical failures to internal components like pilot behavior, crew coordination, and communication protocols. By comprehensively understanding and managing the risk of aviation accidents, aviation professionals, regulators, and stakeholders can implement proactive strategies to enhance safety, minimize the occurrence of accidents, and

ultimately improve the overall security and dependability of air travel.

2.2.2 The Concept of Human Factors

At the core of effective aviation operations lies the intricate concept of "human factors," which pertains to the comprehensive examination of human behavior, cognition, and performance within complex systems such as aviation. Human factors encompass a holistic understanding of the psychological, physiological, and cognitive aspects of human interaction with the aviation environment. In the context of aviation, human factors delve into the study of how individuals interact with their surroundings, equipment, technology, and procedural frameworks (Kiernan, 2021).

This intricate exploration encompasses an array of focal points including pilot decision-making processes, communication intricacies between crew members and air traffic control, management of pilot and crew fatigue, assessment of training program efficacy, and the implementation of robust teamwork techniques. By delving into these intricate aspects, human factors research strives to unveil the manners in which human limitations, capabilities, and behaviors intersect to either fortify or compromise aviation safety and operational efficiency. The integration of human factors principles into aviation design, training, and operations serves as a pivotal mechanism for minimizing the potential for errors and accidents that might emerge due to human-related factors (Klink, 2019). This holistic approach acknowledges that even the most advanced technologies and well-designed systems can be impacted by human performance and behavior, thereby

stressing the importance of optimizing these elements to achieve an elevated standard of aviation safety.

2.3 Theoretical Framework

Three theories underpinned the variables under study. They included Domino theory of aviation safety and Human factor theory.

2.3.1 Domino theory of Aviation Safety

The Domino Theory of Aviation Safety, originally formulated by Heinrich (1930), posits that accidents result from a sequence of interconnected factors, much like a falling row of dominoes triggered by an initial event. It emphasizes that accidents rarely stem from isolated incidents; rather, they occur due to the alignment of multiple contributing elements. As the initial event triggers subsequent factors, a chain reaction unfolds, culminating in the accident itself. This theory underscores the need to analyze accidents comprehensively, addressing all contributing factors in order to implement effective safety measures and prevent future incidents.

Applying the Domino Theory of Aviation Safety to the study of the effects of human factors on the risk of aviation accidents in Kenya, particularly in the context of a survey of airlines at Jomo Kenyatta International Airport (JKIA), provides a comprehensive and insightful framework for understanding the intricate interplay of factors that contribute to the occurrence of aviation accidents.

The first domino in this theoretical construct represents the pivotal factor of management support. This initial trigger sets the tone for the entire sequence of events. When management provides robust support for safety initiatives, it establishes a solid foundation upon which other critical factors can be built (Jorgensen, 2015). This includes allocating adequate resources, establishing clear safety policies, and prioritizing safety as a core value within the organization. Conversely, insufficient management support can create vulnerabilities that extend across the spectrum of safety measures. As the first domino falls, it triggers a cascade of subsequent factors, with the safety culture factor emerging as a key element (Sam, 2018). A positive safety culture permeates the organization, influencing the behavior and attitudes of all personnel. Such a culture fosters an environment where individuals feel empowered to report safety concerns, engage in open and transparent communication, and continuously learn from mistakes. A strong safety culture acts as a buffer against the impact of human errors and unexpected challenges.

Building upon the foundation of management support and safety culture, the theory identifies teamwork as another integral domino. Effective teamwork hinges on seamless communication, coordinated decision-making, and efficient teamwork among aviation professionals (Koestner, 2019). When the principles of teamwork are diligently practiced, it enhances the ability of crews to identify and address potential hazards promptly, mitigating the risk of accidents stemming from miscommunications or failures in coordination. The culmination of these interlinked factors is represented by the domino

of employee training (Resnic, 2020). Proper and comprehensive training equips aviation personnel with the knowledge, skills, and situational awareness necessary to navigate the complexities of their roles. Well-trained employees are better equipped to make informed decisions, respond to challenging scenarios, and uphold safety standards even in the face of unexpected circumstances. On the other hand, inadequate or outdated training can introduce vulnerabilities that amplify the risk of accidents.

Ultimately, the accident outcome occurs when all the dominos align – management support influences safety culture, which in turn shapes teamwork practices, and finally, employee training levels (Stanley, 2016). If any of these factors falters, it can disrupt the sequence and mitigate the risk of accidents. Therefore, addressing these interconnected factors holistically is crucial for preventing accidents in the aviation industry.

2.3.2 Human Factor Theory

Developed by Paul Salmon in 1969, Human Factor Theory, also known as Human Factors Engineering or Ergonomics, is a scientific discipline that examines the interactions between humans and their environments, tools, technologies, and systems. It aims to optimize these interactions by understanding human capabilities, behaviors, cognitive processes, and limitations, and then designing environments, interfaces, and procedures that enhance performance, safety, and user experience while minimizing errors and adverse outcomes (Makhaya, 2020). This theory finds practical application in various industries to create systems that align with human needs, thereby improving

efficiency, productivity, and overall well-being.

Applying Human Factor Theory to the study of the effects of human factors on the risk of aviation accidents in Kenya, particularly within a survey of airlines at Jomo Kenyatta International Airport (JKIA), offers a holistic approach to understanding the intricate dynamics between human performance and the aviation system (Zhang, 2017). By analyzing each specified human factor — management support, safety culture, teamwork, and employee training — through the lens of Human Factor Theory, the study can unveil insights to enhance aviation safety practices.

Human Factor Theory emphasizes the vital role of management support in shaping a safe and efficient aviation system (Stanley, 2016). Adequate management support, aligned with the theory's core principle of designing systems that accommodate human capabilities and limitations, ensures resources are available, safety policies are clear, and communication is effective. This, in turn, reduces the likelihood of errors stemming from factors like resource scarcity or ambiguous instructions.

Additionally, Human Factor Theory aligns seamlessly with safety culture development. A robust safety culture acknowledges errors as inherent to complex systems and aims to create an environment where individuals are encouraged to report mistakes, learn from them, and continuously improve (Resnic, 2020). By integrating Human Factor Theory principles into safety culture, organizations foster a reporting culture that mitigates the

risk of accidents arising from unaddressed errors or unidentified hazards.

Lastly, Human Factor Theory principles resonate with teamwork strategies. Teamwork places emphasis on communication, and shared decision-making in aviation operations (Makhanya, 2020). By applying Human Factor Theory to teamwork, training programs and operational procedures can be designed to encompass human cognitive and social characteristics. This equips aviation professionals to adeptly manage unexpected situations, reducing the potential for errors that could escalate into accidents.

Incorporating Human Factor Theory into the study provides a comprehensive framework for evaluating the impact of human factors on aviation safety (Koo, 2018). By acknowledging and accommodating human cognitive, physical, and social attributes, the study can provide insights into aligning human factors, safety culture, teamwork, and training programs with human needs. The study's findings can drive targeted interventions and strategies, ultimately enhancing aviation safety practices, mitigating accident risks, and contributing to the ongoing refinement of aviation operations in Kenya.

2.4 Empirical Review

2.4.1 Management support and risk of aviation accidents

Management support in the context of the risk of aviation accidents refers to the active commitment, engagement, and allocation of resources by the leadership and management

of aviation organizations to ensure and enhance safety measures and protocols (Makhaya, 2020). It involves fostering a culture that prioritizes safety, providing the necessary resources for training and maintenance, and establishing clear policies and guidelines that promote safe operations. Effective management support recognizes the importance of creating an environment where safety concerns are openly addressed, lessons are learned from incidents, and continuous improvements are made to mitigate the risk of accidents (Klink, 2019). This support is crucial for aligning organizational efforts towards preventing accidents by proactively addressing potential hazards and human factors that could lead to aviation safety incidents.

Management support plays a critical role in aviation safety by establishing a strong safety culture and preventing accidents. Adequate management support fosters an environment in which safety is prioritized over operational efficiency (Gronlund, 2017). This culture encourages employees to report safety concerns, near misses, and incidents, leading to prompt corrective actions and ongoing improvement. Furthermore, management support ensures that aviation organizations have the necessary resources and funding for proper training, equipment maintenance, and routine inspections (Koo, 2018). Without sufficient resources, corners might be cut, and safety issues could be overlooked, increasing the risk of accidents.

Open and transparent communication between management, pilots, crew members, and maintenance personnel is essential. When management is approachable and responsive to

safety- related concerns, employees are more likely to report potential hazards and unsafe conditions without fear of reprisal. Decisions related to operations, maintenance, and scheduling significantly impact safety. With strong management support, critical decisions prioritize safety over on-time performance. However, if management prioritizes efficiency at the expense of safety, compromised decisions can elevate the risk of accidents.

Effective management support also encourages thorough investigations of incidents and accidents (Mesut, 2016). The lessons learned from these investigations lead to the implementation of preventive measures that mitigate similar risks in the future. Ensuring compliance with aviation regulations and industry standards is another aspect of management support. Neglecting these regulations due to lack of support can result in unsafe practices that contribute to accidents.

Proper fatigue management is crucial, and management plays a role in establishing policies and procedures to address pilot and crew fatigue. If fatigue is not adequately managed due to a lack of support, it can impair crew performance and increase the likelihood of errors (Park, 2018). Maintenance practices are also influenced by management support. Proper aircraft maintenance and adherence to maintenance schedules are ensured with adequate support. Neglecting maintenance due to budget constraints or other reasons can lead to mechanical failures that contribute to accidents.

Furthermore, management support for adopting advanced technologies, such as improved navigation systems and collision avoidance tools, enhances overall safety and reduces the risk of accidents (Sam, 2018). Lastly, effective management support is vital for creating comprehensive emergency response plans and conducting regular drills. Adequate planning and preparation can minimize the impact of accidents when they do occur.

A study conducted by Houtman (2018) examined the impact of Management support on the risk of aviation accidents in a sample of commercial pilots. The results indicated that Management support significantly improved crew performance, communication, and decision-making. The study highlighted the importance of Management support in reducing human errors through creation of enabling work environment and enhancing safety outcomes. In another empirical review by Pierre (2019), the author explored the effects of Management support on teamwork and safety culture in aviation. The findings revealed that Management support positively influenced teamwork and communication within aviation organization, leading to improved safety practices and enhanced safety culture. The study emphasized the critical role of Management support in fostering a proactive approach to safety and reducing the likelihood of accidents.

Additionally, a study conducted by Alemi, (2018) investigated the impact of management support on the risk of aviation accidents using data from legacy airlines. The findings demonstrated that management support significantly reduced accidents and incidents, through investing in comprehensive training programs to enhance safety performance.

Furthermore, in a study by Helmreich (2020), examined the relationship between Management support and safety outcomes in a sample of airline pilots. The results showed that Management support was associated with a significant reduction in accidents and incidents, highlighting its effectiveness in improving the risk of aviation accidents performance.

These empirical reviews provide further evidence for the positive effects of management support on the risk of aviation accidents performance. They underscore the importance of comprehensive training programs, such as Management support, in enhancing teamwork, communication, decision-making, and safety culture, ultimately leading to a reduction in accidents and incidents.

2.4.2 Safety Culture and Risk of Aviation Accidents

Safety culture within the aviation context encompasses shared attitudes, beliefs, values, and practices prioritizing safety, guiding the decisions and actions of aviation personnel to prevent incidents and accidents (Resnic, 2020). This culture thrives on leadership commitment, exemplifying an unwavering dedication to safety, fostering open communication channels that encourage reporting of hazards and concerns, and promoting continuous learning from incidents and near-misses for ongoing improvement (Koo, 2018). Proactive hazard identification, comprehensive training, shared responsibility for safety, well-defined risk management processes, consistent standards, thorough investigations, recognition of safety contributions, and the harmonious balance

between operations and safety all contribute to a robust aviation safety culture that safeguards passengers, crew, and the public, underscoring safety as an integral shared value across the organization.

Safety culture plays a crucial role in aviation and is closely intertwined with the risk of aviation accidents. It encompasses the shared values, attitudes, beliefs, and behaviors within an organization pertaining to safety (Koo, 2018). A robust safety culture places safety as a top priority and integrates it into all aspects of operations. The connection between safety culture and the risk of aviation accidents is significant and multifaceted. A positive safety culture fosters an environment where individuals and groups feel comfortable reporting safety concerns, incidents, and near misses openly and transparently. This reporting culture allows organizations to identify potential hazards and address them before they escalate into accidents.

Furthermore, in a positive safety culture, mistakes are regarded as opportunities for learning and improvement rather than grounds for blame. This approach encourages thorough investigations into accidents and incidents to identify their root causes, enabling the implementation of corrective actions to prevent similar occurrences in the future (Park, 2018). Consistent adherence to standard operating procedures (SOPs) is promoted by a positive safety culture, minimizing errors resulting from deviations from safe practices. Risk management is actively embraced,involving the assessment of potential hazards, the evaluation of associated risks, and the implementation of strategies to

mitigate these risks, thus reducing the likelihood of accidents. Continuous improvement is inherent in a robust safety culture, prompting organizations to periodically review and update safety policies, procedures, and practices. This approach ensures that lessons learned from incidents are incorporated and that the organization remains aligned with the latest industry best practices.

Human factors, encompassing elements such as pilot decision-making, communication, and teamwork, are acknowledged within a safety culture (Sam, 2018). Understanding these human factors is vital in addressing complex systems and enhancing safety. Moreover, adherence to aviation regulations and standards is emphasized by a strong safety culture, ensuring that organizations operate within the prescribed boundaries set by regulatory authorities (Resnic, 2020). In conclusion, safety culture significantly impacts the risk of aviation accidents. An organization's commitment to safety, transparent reporting, learning from mistakes, continuous training, and various other factors collectively contribute to a safer aviation environment. A positive safety culture enables the proactive identification and mitigation of hazards, ultimately promoting safer aviation operations.

A study by Johnson (2017) investigated the effects of safety culture on risk of aviation accidents, with a specific focus on low cost carrier airlines. The research examined the relationship between safety culture behaviors and safety outcomes by analyzing crew reports and safety incident data. The findings revealed a strong positive correlation

between effective safety culture and improved risk of aviation accidents. This study however only focused on low cost carrier airlines and its findings may not be generalized to legacy airlines.

Another empirical study by Smith (2018) examined the effects of safety culture programs on safety of airlines. The study implemented a comprehensive team training culture program that focused on enhancing communication, coordination, and decision-making skills among crew members. The results demonstrated significant improvements in safety culture behaviors and safety outcomes. Crew members reported better communication, increased trust, and improved mutual support within the team, leading to enhanced safety performance and a reduction in safety-related incidents.

Furthermore, a case study conducted by Brown and colleagues (2019) specifically analyzed the impact of effective safety culture on the operational safety of Long-haul airlines. The research involved interviews and observations of flight crews and identified several critical safety culture factors that influenced safety outcomes. These factors included clear communication protocols, effective leadership, mutual respect, and the ability to manage conflicts constructively. The study highlighted the role of safety culture in creating a positive safety culture and emphasized the importance of continuous training and reinforcement of safety culture skills.

These empirical studies provide compelling evidence of the positive effects of safety

culture on reduction of risk of aviation accidents, specifically within the context of commercial airlines. They underscore the significance of fostering a collaborative and supportive team environment, promoting effective communication and coordination, and investing in team training programs. By prioritizing and cultivating safety culture among crew members, airlines can enhance safety outcomes and contribute to a culture of safety and excellence in the aviation industry.

2.4.3 Teamwork and Risk of Aviation Accidents

Teamwork, as a crucial human factor in aircraft flight operations, involves the coordinated efforts and communication among various personnel, including pilots, cabin crew, air traffic controllers, and maintenance teams, to ensure safe and efficient flight execution (Klink, 2019).

Teamwork is an indispensable element in the realm of aviation, playing a paramount role in the reduction of the risk of accidents (Button, 2017). Its significance becomes most apparent when considering the intricacies of communication among various stakeholders involved in flight operations. Whether it's the interaction between flight crews, air traffic controllers, maintenance teams, or other pertinent personnel, effective communication is the bedrock upon which aviation safety rests. In this context, teamwork ensures that vital information is conveyed clearly and in a timely manner. Such communication is a linchpin in averting misunderstandings, errors, and misinterpretations that could potentially culminate in aviation accidents.

A notable framework that underscores the importance of teamwork in aviation is Crew Resource Management (CRM). CRM is not just a training program but a philosophy that seeks to enhance collaboration among flight crews (Coll, 2019). It places a premium on key attributes such as assertiveness, leadership, decision-making, and communication within the cockpit. When CRM principles are diligently applied, they invariably augment the capacity of the crew to operate as a cohesive unit. This unity in action translates into a tangible reduction in the risk of accidents, as it fosters effective problem-solving and decision-making in dynamic flight environments.

Moreover, the impact of teamwork extends to the realm of conflict resolution, which can be a critical factor in aviation safety. In high-stress situations or when disagreements arise, effective teamwork can serve as a vital tool for resolving conflicts constructively (Doganis, 2016). Crew members who are adept at addressing and resolving conflicts without disrupting flight operations are less prone to making impulsive or risky decisions, thereby bolstering safety measures during flights. Shared situational awareness is another dimension of teamwork's significance in aviation. It refers to the collective understanding that all team members share regarding the current state of the flight (Creswell, 2014). This shared awareness is instrumental in informed decision-making, as it ensures that every individual involved in the operation has a unified comprehension of evolving circumstances. In the context of aviation safety, this unity of understanding facilitates rapid and precise responses to emerging threats or challenges.

In aviation, several layers of cross-checking and verification mechanisms are meticulously integrated into standard procedures to intercept errors before they escalate into critical issues (Gronlund, 2017). These checks, often involving multiple team members, are vital for confirming critical parameters such as altitude and navigation data. Team members' involvement in these checks is instrumental in maintaining the accuracy and safety of the flight, thus further underscoring the importance of teamwork in risk mitigation. When considering emergency situations, the value of teamwork becomes abundantly clear. In the event of an emergency, whether it's an engine failure, severe weather, or any other crisis, teamwork is the linchpin of a coordinated and effective response (Koo, 2018). Crews that have undergone rigorous training together and have clearly defined roles and responsibilities are far better prepared to handle emergencies. This preparation significantly reduces the likelihood of accidents or catastrophic outcomes during critical moments.

Furthermore, teamwork extends its influence into the domain of reporting and learning from incidents and near misses (Coll, 2019). A strong culture of teamwork encourages aviation professionals to share their experiences and the lessons gleaned from these events. By doing so, the aviation community can collectively enhance safety protocols and best practices, thereby diminishing the likelihood of similar incidents occurring in the future. Crew fatigue management is yet another facet of teamwork's multifaceted role in aviation safety. Effective teamwork is crucial in the development and execution of sound rostering and scheduling practices (Button, 2017). Additionally, crew members looking

out for each other's well-being contribute to the prevention of accidents that can be caused by fatigue-related errors. This collaborative approach to fatigue management adds another layer of safety to flight operations. Conversely, when teamwork falters or breakdowns in communication and collaboration occur, the risk of aviation accidents can surge. Misunderstandings, errors, and poor decision-making may emerge from a lack of effective teamwork, potentially culminating in accidents that could have otherwise been averted.

A study conducted by Houtman (2018) examined the impact of Teamwork on risk of aviation accidents in a sample of commercial pilots. The results indicated that Teamwork significantly improved crew performance, communication, and decision-making. The study highlighted the importance of Teamwork in reducing human errors and enhancing safety outcomes. In another empirical review by Pierre (2019), the author explored the effects of Teamwork on teamwork and safety culture in aviation. The findings revealed that Teamwork positively influenced teamwork and communication within the cockpit, leading to improved safety practices and enhanced safety culture. The study emphasized the critical role of Teamwork in fostering a proactive approach to safety and reducing the likelihood of accidents.

Additionally, a study conducted by Alemi, Torabi, & Carreno (2018) investigated the impact of teamwork on risk of aviation accidents using data from a large airline. The findings demonstrated that effective teamwork significantly reduced accidents and

incidents, emphasizing the importance of investing in comprehensive training programs to enhance safety performance. Furthermore, in a study by Thomas, Helmreich, & Wilhelm (2020), the authors examined the relationship between Teamwork and safety outcomes in a sample of airline pilots. The results showed that Teamwork was associated with a significant reduction in accidents and incidents, highlighting its effectiveness in improving risk of aviation accidents performance.

2.4.4 Employee Training and Risk of Aviation Accidents

Employee training in airlines refers to the structured process of providing aviation industry- specific education and skill development to the employees of an airline company. This training is designed to enhance their knowledge, abilities, and competencies related to various aspects of the airline industry, ensuring they can effectively carry out their roles and responsibilities (Babbie, 2016). Employee training in airlines typically covers a range of topics to ensure safety, operational efficiency, customer service, and regulatory compliance. It can include both initial training for new hires and ongoing training for existing employees to keep them updated on industry advancements and changes (Gronlund, 2017). The goal of employee training in airlines is to create a skilled and knowledgeable workforce that can contribute to the safe and efficient operation of the airline while providing excellent service to passengers.

Employee training on the risk of aviation accidents holds paramount importance within the aviation industry (Sam, 2018). The potential consequences that arise from aviation

accidents underscore the critical need for a comprehensive training program that thoroughly equips employees with the knowledge, skills, and tools necessary to prevent, mitigate, and effectively respond to potential risks. While the occurrence of aviation accidents is statistically rare, the severity of their impact, when they do transpire, demands a thorough understanding of the multifaceted factors that contribute to their unfolding (Resnic, 2020).

At the outset of the training program, it is essential to provide participants with a comprehensive overview of aviation accidents, thereby emphasizing their significant implications for both passenger and personnel safety (Kiernan, 2021). Presenting pertinent statistical data not only assists in conveying the infrequent nature of such accidents but also underscores their gravity and the imperative nature of thorough preparation and adherence to safety protocols.

Subsequently, a deep dive into the myriad causes of aviation accidents becomes instrumental. This portion of the training should encompass a wide spectrum of factors, including human errors, technical failures, adverse weather conditions, and external influences (Sam, 2018). By immersing participants in the complexities of these contributory elements, the training underscores the interconnected nature of these facets and introduces the pivotal concept of the "accident chain," which is indispensable in the comprehension of accidents and their root causes.

Human factors, constituting a crucial facet of aviation accidents, warrant dedicated attention during the training program (Koestner, 2019). The training curriculum should expound upon aspects such as the impact of fatigue, stress, complacency, and communication breakdowns. Furthermore, fostering an in-depth understanding of concepts like teamwork (TW) and the nuances of effective communication serves to underscore the imperative of teamwork and harmonious collaboration among aviation professionals.

Smith (2018) conducted a study on employee training and its impact on aviation safety. He discovered that crew members who receive comprehensive employee training are more capable of detecting and responding to potential threats, thus reducing the likelihood of accidents and incidents. In terms of regulatory compliance and standardization, Helmreich (2020) highlight the importance of aligning training programs with established regulations and industry standards. Compliance with these requirements helps ensure consistent safety practices across the organization, leading to enhanced risk of aviation accident. Furthermore, recurrent training and continuing education have been identified as essential for maintaining and updating crew members' skills and knowledge (Fletcher, 2021). Regular training programs allow for the reinforcement of safety procedures, the introduction of new technologies, and the adaptation to changing operational environments.

2.5 Conceptual Framework

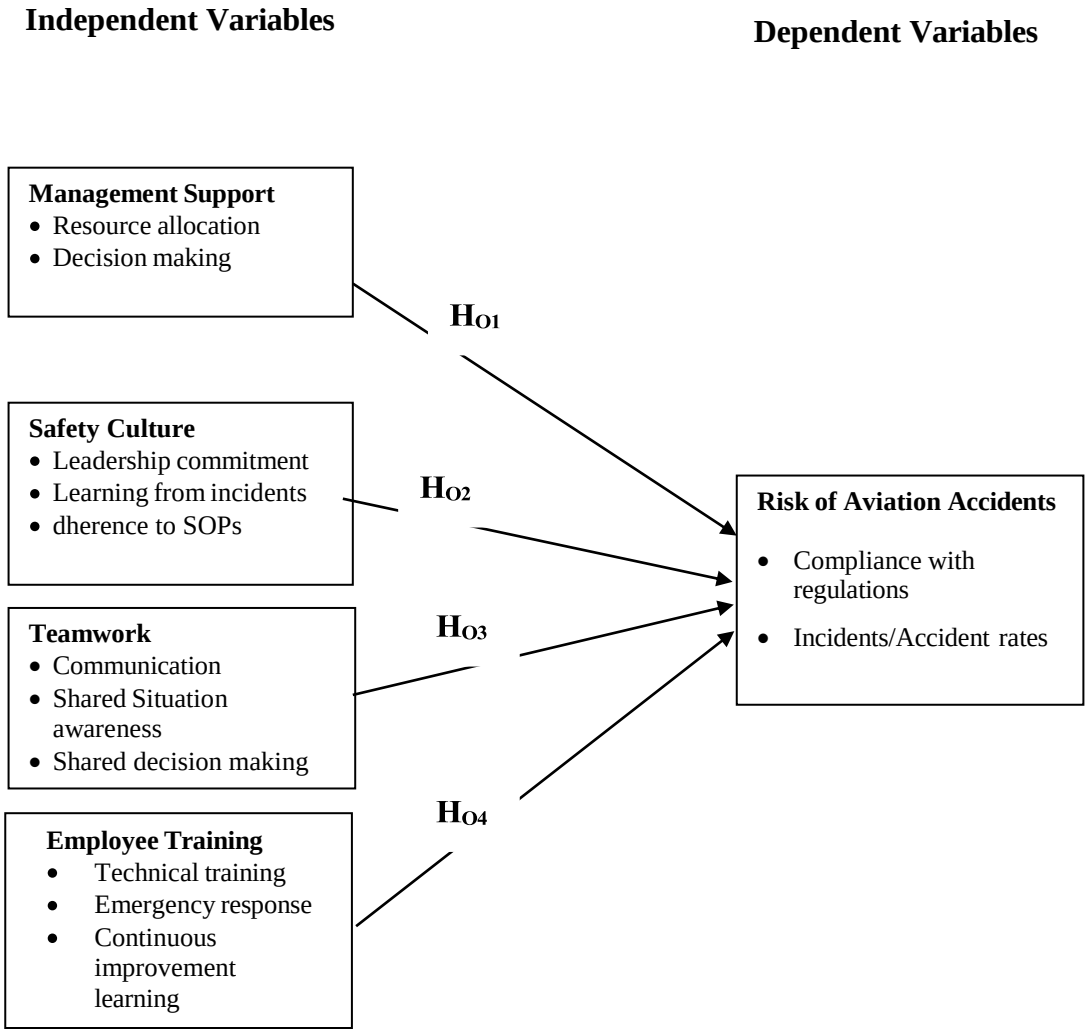

Figure 2.1: Conceptual Framework

The conceptual framework for a research study provides a visual representation of the variables and relationships that was explored in the study Carrol, (2008). For the study the independent variable is the human factors which include Management support, employee training, teamwork and safety culture. The dependent Variable is the risk of aviation accidents.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This section covers research design, the target population, research instruments, collection techniques, data analysis, and ethical considerations.

3.1 Research Design

The study utilized a correlational research design, which involves the systematic observation and documentation of human factors' involvement in the risk of aviation accidents for Airlines in JKIA airlines, without any manipulation (Barton, 2015). This research design aims to thoroughly investigate and comprehend various aspects of management support, employee training, teamwork, and safety culture as they pertain to the safety practices within these airlines. To gather quantitative data, structured questionnaires were employed, providing a statistical overview. This comprehensive approach sought to illuminate the organizational learning processes and the application of knowledge to enhance risk of aviation accidents. Ultimately, the study aimed to offer insights for targeted interventions and improvements in aviation safety practices.

3.2 Target Population

The target population refers to a specific group of individuals that a research project is designed to address or benefit (Creswell, 2014). The characteristics used to define the

target population may include age, gender, location, occupation, income, health status, or other relevant factors, depending on the project's specific objectives. In this study, the target population comprises the pilots and administration staff involved in control of human factors for Airlines in JKIA. Humanfactors in the operation of aircraft in the organization are under the responsibility of 663 skilled professionals.

Table 3.1: Target Population Distribution

Designation	**Total**
Pilots	432
Board of directors	11
Cabin crew	507
Flight operations	77
Safety	36
TOTAL	663

***Source**: KCAA Website, 2023*

Since the target population is small, the study conducted a census of the entire population for the study. The study targeted all the 663 respondents to fill in the questionnaires.

3.3 Sample Size

Sample size refers to the number of participants or observations included in a research study or survey. The size of a sample is a critical aspect of statistical analysis, as it can impact the accuracy and precision of the results obtained from the sample. Yamane's (1973) sample size determination formula was used by the researcher to acquire the sample size. The researcher selected Yamane formula since the population is finite and known.

$$n = \frac{N}{1 + N(e)^2}$$

Where:

N - The target population =663

N - Sample size

e - The acceptable margin of sampling error. Can be taken at 95%, 93% or 90% level of confidence with a sampling error of 5%, 7% or 10% respectively. To increase the accuracy of the study, the researcher has decided to use 95% level of confidence hence 5% sampling error.

From the formula: Sampling units are-

$$n = \frac{663}{1 + (663 \times 0.05^2)}.$$

= 250 respondents.

The total sample size is 250 respondents proportionately distributed among the target population as shown in the table 3.2.

Table 3.2: Sample Size Distribution

Designation	Total
Pilots	112
Board of directors	3
Cabin crew	89
Flight operations	24
Safety culture	7
Safety	15
Total	**250**

***Source**: Researcher, 2023*

3.4 Sampling Technique

The study utilized the stratified random sampling technique to collect data from the entire target population. Stratified random sampling involves grouping the data based on shared characteristics and then randomly selecting data within these groups, ensuring that all respondents have an equal chance of being interviewed. This approach was used to enable a thorough investigation of human factors and their impact on the risk of accidents within the context of Airlines in JKIA. By employing the stratified random sampling technique, the research sought to achieve a comprehensive and representative understanding of the entire population, thereby mitigating potential biases that could arise from using a smaller subset or sample.

3.5 Research Instruments

The study utilized a questionnaire as a means of collecting data for the study. A questionnaire is a tool employed in conducting data collection from participants. It serves as a framework for the researcher, outlining the questions and topics to be addressed during the data collection phase. The questionnaire was designed to elicit required detailed information from participants, allowing them express their opinion about the subject by use of closed ended questions. The initial section of the questionnaire focused on gathering biographical information from the respondents, including age, gender, educational background, and work experience. Subsequent sections explored the participants' perspectives on teamwork practices and their impact on aviation safety.

3.6 Pilot Study

The research selected 10% of the target population to test the validity and reliability of the instrument. This constituted a sample of 25 pilots from Freedom airline. The researcher decided to conduct the pilot study from airlines other that the ones intended for the main research to avoid biases during the main study. Conducting the pilot study at the two airlines facilitates a more focused and in-depth exploration of the specific context in which human factors was scrutinized in contributing to risk of aviation. This enabled the researcher to make changes to the questionnaire

3.6.1 Validity of the instruments

Validity refers to the extent to which a research instrument accurately measures the

intended concept or construct. In this study, content validity was utilized to assess the validity of the research instrument. The study engaged the respondents selected for the pilot study to review the document. The aim was to ensure that the instrument adequately covers all aspects of the concept being measured. The experts' input was gathered using a five-point Likert scale rating, where they were required to assess the relevance of the instrument on a scale ranging from 1 (No relevance) to 5 (Strong relevance). To calculate the content validity index (CVI), the universal agreement method described by Yossuf (2019) was employed. This method determines the level of agreement among experts regarding the relevance of the instrument items. A higher CVI indicates a stronger content validity, indicating that the instrument effectively covers the content domain of interest. Assessing content validity is crucial because if the questionnaire items do not accurately reflect the content domain of interest, the data collected may lack validity.

$$CVI = \frac{\text{Number of Items rated relevant}}{\text{Total number of items}}$$

3.6.2 Reliability

The reliability of a research instrument is determined by its consistency and stability in producing reliable measurements across various situations and over time. To evaluate the reliability of the questionnaire, the study employed the Cronbach's alpha coefficient. The test- retest method, which involved administering the questionnaire to a subgroup of participants on two separate occasions with a two-week gap in between, was used. The

study employed Cronbach's alpha to test the reliability of the data. Each item in the questionnaire was scored on the same scale, and the total score for each participant was calculated. The mean score, standard deviation, and correlation matrix was determined. Cronbach's alpha is calculated using the formula, providing a measure of internal consistency.

3.7 Data Collection Procedure

The data collection phase began by obtaining permission from relevant authorities, including Airlines in JKIA, Kenya Airports Authority, and the National Council of Science, Technology, and Innovation (NACOSTI). Once authorized, the study approached selected respondents and requested appointments for interview sessions. The study also provided a briefing to the respondents regarding the interview expectations. Subsequently, appointments were scheduled with the respondents who agree to participate in the questionnaire exercise. The collected data was recorded and prepared for analysis.

3.8 Measurement of Study Variables

Risk of Aviation Accidents (Dependent Variable)

Objective Measures: The source for objective measures of risk of aviation accident, such as the number of accidents, incidents, near-misses, or safety-related violations recorded within a specific time frame, was official aviation safety records and incident databases. These records are typically maintained by aviation regulatory authorities and

organizations to document safety- related events and provide a reliable source of objective safety performance data.

Subjective Measures: The source for subjective measures of risk of aviation accident, obtained through surveys or questionnaires, was the participants themselves, including crew members, supervisors, or relevant stakeholders. The research utilized a 5-point Likert scale to assess the level of perceived risk of aviation accident. Participants' self-reported perceptions and evaluations of safety practices and performance was collected through the survey instrument.

Human Factors (Independent Variable):

Management support: The source for evaluating the effectiveness and nature of management support activities was validated scales or surveys that assess participants' knowledge, skills, and attitudes related to management support to the workforce. These surveys may have been previously developed and tested by researchers in the field of aviation safety and management programs, providing a reliable source of measurement for management support.

Employee training: In airlines, employee training heavily relies on a comprehensive training management system. This system includes digital records, training logs, and databases tracking training progress for various roles. These records ensure compliance with regulations, ensuring well-trained personnel. Continuous assessments and

evaluations contribute to this data, ensuring aviation safety and ongoing professional development.

Teamwork: Teamwork originates from aviation training programs, incorporating insights from psychology and human factors. It has evolved through research and regulations to foster effective shared effort among flight crews. Beyond aviation, teamwork principles have been adapted to enhance safety in other industries. Essentially, teamwork draws from aviation training and applies its principles broadly to improve performance and safety.

Safety culture: The primary source of data for assessing safety culture typically involves surveys, questionnaires, interviews, and observations conducted within an organization. These methods capture perceptions, attitudes, and behaviors regarding safety. Additionally, incident reports, safety audits, and regulatory compliance data provide insights into an organization's safety culture. This multifaceted approach helps organizations understand their safety culture and areas for improvement.

3.9 Data Analysis

Data analysis is the process of examining and interpreting data in order to draw conclusions or make inferences about a particular phenomenon or population (Orodho, 2008). The study purposed to subject the data to quantitative analysis based on the study objectives. Descriptive statistics (percentages, mean and standard deviation) was used for

the quantitative analysis in which tables, pie charts and graphs was generated. The study there after conducted regression analysis.

3.10 Regression Model

A multiple linear regression model was employed to analyze the relationship between Risk of Aviation Accident (dependent variable) and the Human factors, namely Management Support (MS), Safety Culture (SC), Teamwork (TW), and Employee Training (ET).

The regression model takes the following form:

Multiple linear regression, the formula extends to include multiple independent variables:

$y=\beta 0 \quad +\beta 1 \quad x1 \quad +\beta 2 \quad x2 \quad +\ldots+\beta n \quad xn \quad +\epsilon$

Where:

$x1,x2,\ldots,xn$ are the individual independent variables, and

$\beta 1 \quad ,\beta 2 \quad ,\ldots,\beta n$ are their respective coefficients.

Risk of aviation accident = $\beta 0+\beta MS \cdot MS+\beta SC \cdot SC+\beta$ TW·TW $+\beta$ ET· ET$+\varepsilon$

Where:

Risk of aviation accident represents the dependent variable.

MS,SC,TW, and ET are independent variables denoting Management Support (MS), afety Culture (SC), Teamwork (TW), and Employee Training (ET)., respectively.

$\beta 0$, βMS, βSC, βTW, and βET are the regression coefficients. ε signifies the error term.

Assumptions of Regression Linearity

This assumption posits that the relationship between the dependent variable (Risk of Aviation Accidents in this case) and the independent variables (Management support, Safety culture, Teamwork, and Employee training) is linear. In other words, the changes in the dependent variable associated with unit changes in the independent variables are constant across all levels of those variables. If this assumption is violated, it may lead to biased coefficient estimates and erroneous conclusions. Analysis of variance was examined, as to whether the maximum p-value of 0.05 was exceeded.

Homoscedasticity

Homoscedasticity refers to the constancy of error variance across all levels of the independent variables. In other words, the spread of the residuals should be roughly consistent across the range of predicted values. To assess homoscedasticity, Levene statistics was conducted.

Normality of Errors

The normality assumption states that the errors are normally distributed, meaning that the distribution of residuals should resemble a bell curve. While violations of this assumption can affect the accuracy of hypothesis tests and confidence intervals, linear regression is relatively robust to departures from normality, especially with larger sample sizes.

Histograms or normal probability plots of residuals was utilized to determine if the distribution closely resembles a normal curve. This assessment ensures that the errors adhere to the assumption of normality, which supports the robustness of regression analysis. If deviations from these assumptions are identified, appropriate measures such as data transformation or the consideration of alternative modeling techniques was employed. These actions are undertaken to ensure the accuracy, reliability, and validity of the outcomes derived from the regression analysis.

3.11 Ethical Considerations

Ethical considerations are of utmost importance in the research on the effects of teamwork on risk of aviation accident. The well-being and rights of the participants were the researcher's top priority. In this regard, the study obtained informed consent from all participants, ensuring that they are fully aware of the study's purpose and their involvement, and that their participation is voluntary. Confidentiality and anonymity was maintained to safeguard participants' privacy, and data protection regulations was strictly adhered to in handling and storing sensitive information.

The research took measures to minimize any potential harm to participants, both physically and psychologically, throughout the study. Maintaining researcher integrity is paramount, and the research was conducted with honesty, objectivity, and fairness. To ensure the research adheres to the highest ethical standards, the study sought ethical approval from the relevant institutional or organizational review board. Transparency and

unbiased reporting was emphasized to present the findings accurately and impartially.

Additionally, the study sought permission and ethical review from the National Commission for Science, Technology, and Innovation (NACOSTI) in compliance with the research ethics guidelines in the respective jurisdiction. Adhering to these ethical considerations and seeking ethical approval helped to uphold participant rights, protect their well-being, and ensure the credibility and validity of the research.

CHAPTER FOUR

RESEARCH FINDINGS, ANALYSIS AND INTERPRETATION

4.1 Introduction

The research sought to determine the effects of human factors on the risk of aviation accidents in Kenya: a case of Airlines in JKIA. The data analysis and results were guided by the study objectives. This chapter presents the main discoveries derived from the study. It starts by providing background information about the participants, followed by the presentation of the outcomes, analysis of the gathered data, and discussion of the findings based on the primary objectives.

4.2. Response Rate

The completed and returned questionnaires from the participants indicate the response rate for the data collection. Table 4.1 represents the response rate for this study.

Table 4.1: Response Rate

Designation	**Total**
Distributed questionnaires	250
Returned Questionnaires	172

***Source**: Researcher, 2023*

Table 4.1 presents data from a research project. It comprises two designations:

"Distributed questionnaires" and "Returned Questionnaires." Out of the 250 questionnaires distributed, 172 were returned, yielding a response rate of approximately 68.8%. This figure represents the percentage of distributed questionnaires that were completed and returned by respondents, indicating the level of engagement and participation in the research. A higher response rate is generally desirable in research, as it suggests a more representative sample and greater data reliability, but the optimal response rate can vary depending on the research objectives and the specific target population.

4.3 Demographic Characteristics of staff involved in human factors

The age, gender and experience of the respondents were established by the researcher and presented in Table 4.2.

Table 4.2: Demographic Characteristics of Respondents

Age (years)	Frequency	Percentage	Male	Female	1-5 years	6-10 years	11-15 years	Above 15 years
Below 30	39	22.67%	29	10	26	8	1	0
30–39	78	45.35%	57	21	47	23	10	4
40-49	34	19.77%	23	11	14	6	12	5
50 and above	21	12.21%	14	7	2	3	4	7
Total	**172**	**100%**	**123**	**49**	**88**	**37**	**23**	**16**

Source: *Researcher, 2023*

Table 4.2 offers a comprehensive view of the demographic characteristics of the study's respondents, encompassing age, gender, and years of work experience. It reveals several key insights:

The table categorizes respondents into four age groups: "Below 30," "30–39," "40-49," and "50 and above." Notably, the "30–39" age group has the highest representation, with 78 respondents, making up 45.35% of the total sample. This suggests a substantial presence of mid-career professionals. The "Below 30" age group is the second largest, comprising 39 respondents or 22.67% of the total, indicating a significant portion of early-career professionals. In contrast, the "40-49" and "50 and above" age groups are comparatively smaller, with 34 and 21 respondents, respectively.

The gender distribution reveals that, across all age groups, there are more male respondents (123) than female respondents (49). This gender imbalance is consistent across all age categories, which can be a critical consideration for examining gender-related patterns within the data.

Additionally, the table delves into respondents' years of work experience, dividing them into four experience groups: "1-5 years," "6-10 years," "11-15 years," and "Above 15 years." In the "Below 30" age group, respondents primarily have "1-5 years" of work experience, typical for early-career professionals. The "30–39" age group displays a more

diverse range of work experience, including "1-5 years," "6-10 years," and "11-15 years," indicating a mix of career stages. In the "40-49" age group, a substantial proportion of respondents possess "11-15 years" of work experience, signifying a concentration of mid-career professionals. The "50 and above" age group predominantly comprises individuals with "Above 15 years" of work experience, indicating a group of seasoned professionals.

The table concludes with a total summary, providing an overview of the total number of respondents in each category. This comprehensive data offers insights into the demographics of the surveyed population, enabling researchers to further explore the interplay between age, gender, and work experience and its potential impact on the study's findings and implications.

4.4 Validity and Reliability Tests

4.4.1 Validity

The questionnaire, consisting of 25 items evaluated by the human resource manager, found 22 of them to be relevant while identifying two items in need of adjustment. The content validity index was subsequently calculated as:

$$\text{CVI} = \frac{\text{Number of items rated relevant}}{\text{Total number of items}} = 24/25$$

The CVI was found to be 0.96

While only one item required minor adjustment, the overall CVI stands at a 0.96, underscoring the questionnaire's strong alignment with the intended objectives and its suitability for assessing the targeted constructs. This remarkable CVI value reflects the thoroughness and effectiveness of the questionnaire's content, reassuring its quality and appropriateness for the study at hand.

4.4.2 Reliability Test

Table 4.3: Cronchba Alpha Test

Reliability Variable	Chronbach Alpha
Management support	0.847
Teamwork	0.752
Safety Culture	0.771
Employee training	0.765

***Source**: Field Data, 2023*

Table 4.3 presents the Cronbach Alpha test results for various variables, indicating the internal consistency of the survey items. The values for Management Support, Teamwork, Safety Culture, and Employee Training are 0.847, 0.752, 0.771, and 0.765, respectively.

A Cronbach Alpha above 0.7 is generally considered good, and in this case, all variables meet or exceed this threshold. Starting with Management Support at 0.847, the high value

suggests strong internal consistency among the survey items related to management support. This indicates that respondents are consistently expressing their perceptions of management support, providing a reliable measure.

Moving on to Teamwork, despite a slightly lower value of 0.752, the Cronbach Alpha is still considered good. This implies that the survey items assessing teamwork exhibit satisfactory internal consistency, capturing the essence of teamwork consistently across responses.

The Cronbach Alpha for Safety Culture is 0.771, indicating a solid level of internal consistency for the survey items related to safety culture. Respondents are consistently reflecting their perceptions of safety culture, making the measurement reliable.

Lastly, Employee Training has a Cronbach Alpha of 0.765, falling within the acceptable range. This suggests good internal consistency for the survey items assessing employee training, indicating that respondents provide consistent feedback on their perceptions of training programs.

In summary, the results of the Cronbach Alpha test suggest that the survey instrument used to measure Management Support, Teamwork, Safety Culture, and Employee Training is reliable. Researchers and practitioners can have confidence in the internal consistency of the survey items and the resulting findings for each variable.

4.5 Descriptive Statistics

4.5.1 Management Support and the Risk of Aviation Accidents in Kenya

This was the first objective of the study. It focused on investigating the impact of management support on the risk of aviation accidents in Kenya. The respondents of study were the staff involved in human factors. Data was collected through administering of questionnaire. The findings of the questionnaire are presented in Table 4.4.

Table 4.4: Management support and the risk of aviation accidents in Kenya

	N	Mean	Std. Deviation	Skewness		Kurtosis	
Management Support	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
1. To what extent do you believe that management support positively influences the safety culture within our airline?	172	3.93	1.132	-.742	.185	-.595	.368
2. Do you feel that management provides sufficient resources and training to help mitigate the risk of aviation accidents in our airline?	172	3.87	.983	-1.385	.185	2.334	.368
3. How would you rate the level of transparency and open communication from management regarding safety concerns and incidents?	172	3.96	.914	-1.083	.185	1.424	.368
4. In your opinion, does management support play a significant role in reducing the likelihood of human error, which can lead to aviation accidents?	172	3.45	1.022	-.589	.185	-.311	.368
5. To what extent do you think that management support contributes to a proactive safety approach within our airline, where potential risks are addressed before they become critical?	172	3.47	.970	-.543	.185	-.389	.368

Source: *Field Data, 2023*

Table 4.4 presents a detailed examination of 172 respondents' perceptions regarding the

interplay between management support and the risk of aviation accidents in Kenya. Each of the five questions offers insights into distinct dimensions of management support within the airline industry, providing a nuanced understanding of employee perspectives.

Starting with the first question on the extent of management support influencing safety culture, the mean score of 3.93 indicates a generally positive sentiment. The moderate standard deviation of 1.132 suggests a reasonable level of agreement among respondents, albeit with some variability. The negative skewness of -0.742 hints at a tendency for respondents to lean towards higher ratings, emphasizing an overall positive outlook.

Moving to the second question addressing resource provision and training, the mean of 3.87 suggests that respondents generally perceive management as providing sufficient resources and training to mitigate the risk of aviation accidents. The standard deviation of 0.983, however, introduces a degree of variability in opinions. The negative skewness of -1.385 points to a subset of respondents who may feel that resources and training are not entirely adequate. The high kurtosis of 2.334 underscores the diversity of opinions in this regard.

In terms of transparency and open communication (question three), the mean score of 3.96 reflects a favorable perception, with a low standard deviation of 0.914 indicating consistent agreement among respondents. The negative skewness of -1.083 suggests a slight leftward skew, emphasizing a general tendency for respondents to rate transparency

and communication relatively high.

The fourth question delves into the role of management support in reducing human error. The mean score of 3.45 and standard deviation of 1.022 indicate a moderate perception, with a negative skewness of -0.589 suggesting a slight leftward skew in ratings. The kurtosis of -0.311 indicates a distribution with lighter tails, implying a more clustered set of opinions on the subject.

Finally, the fifth question addresses the contribution of management support to a proactive safety approach. The mean of 3.47 indicates a belief among respondents that management support plays a role in this regard, with a standard deviation of 0.970 suggesting a moderate level of agreement. The negative skewness of -0.543 indicates a leftward skew, emphasizing a tendency for respondents to provide higher ratings. The kurtosis of -0.389 suggests a distribution with lighter tails, highlighting a more concentrated set of opinions.

While the mean values generally convey positive perceptions, the standard deviations, skewness, and kurtosis values uncover diversity in respondents' opinions. This nuanced understanding provides actionable insights for management, pointing towards specific areas, such as resource provision and transparency that may benefit from further attention and improvement to enhance overall aviation safety in Kenya.

4.5.2 Safety Culture and Risk of Aviation Accidents in Kenya

This was the second objective of the study. It focused on investigating the impact of safety culture in risk of aviation accidents in Kenya. The respondents of study were the staff involved in human factors. Data was collected through administering questionnaire to them. The findings are presented in Table 4.5.

4.4.2 Safety Culture and Risk of Aviation Accidents in Kenya

Table 4.5: Safety Culture and Risk of Aviation Accident

	N	Mean	Std. Deviation	Skewness		Kurtosis	
Safety Culture	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
1. To what extent do you believe that a strong safety culture within our airline positively contributes to the reduction of aviation accident risks?	172	3.94	.659	-.676	.185	1.336	.368
2. Do you think that the safety culture in our airline encourages open communication about safety concerns, near-miss incidents, and potential risks?	172	4.198	.7846	-1.246	.185	1.924	.368
3. How well does our safety culture support a proactive approach to identifying and mitigating safety hazards, ultimately enhancing overall aviation safety?	172	3.90	.870	-.454	.185	-.433	.368
4. In your opinion, does a robust safety culture significantly influence the reporting of safety-related issues, contributing to accident prevention and overall safety improvement?	172	4.08	.908	-1.112	.185	1.357	.368
5. To what extent do you think that a strong safety culture fosters a collective commitment to safety among employees, leading to a safer aviation environment in our airline?	172	4.12	.740	-.714	.185	.643	.368

Source: *Field Data, 2023*

Table 4.5 delves into respondents' perspectives on the intricate relationship between safety culture and the risk of aviation accidents in Kenya. The table comprises five distinct questions, each probing various dimensions of safety culture within the airline industry.

Starting with the first question on the contribution of safety culture to the reduction of aviation accident risks, the mean score of 3.94 suggests a prevailing positive belief among respondents. The relatively low standard deviation of 0.659 implies a degree of consensus, while the negative skewness of -0.676 hints at a slight leftward skew, indicating a tendency for respondents to favor higher ratings. The kurtosis of 1.336 adds nuance by implying a distribution with heavier tails, suggesting some diversity in opinions.

Moving on to the second question regarding the encouragement of open communication, the high mean score of 4.198 signifies that respondents generally perceive the safety culture as fostering an environment conducive to open discussions about safety concerns. The standard deviation of 0.7846 indicates consistent agreement, while the negative skewness of -1.246 suggests a leftward skew, emphasizing a tendency for respondents to rate open communication relatively high. The kurtosis of 1.924 underscores the presence of diverse opinions on this aspect.

Regarding the third question on the support for a proactive approach, the mean score of

3.90 suggests that respondents see the safety culture as conducive to a proactive stance in identifying and mitigating safety hazards, ultimately enhancing overall aviation safety. The standard deviation of 0.870 indicates a moderate level of agreement, and the negative skewness of -0.454 suggests a slight leftward skew. The kurtosis of -0.433 implies a distribution with lighter tails, emphasizing a more clustered set of opinions.

In terms of the influence on reporting safety-related issues, respondents generally believe that a robust safety culture significantly contributes to accident prevention and safety improvement, as indicated by the mean score of 4.08. The standard deviation of 0.908 suggests a moderate level of agreement, with a negative skewness of -1.112 indicating a leftward skew. The kurtosis of 1.357 suggests a distribution with heavier tails, highlighting diversity in opinions on this matter.

Lastly, the fifth question focuses on the perception of a strong safety culture fostering a collective commitment to safety among employees. The mean score of 4.12 indicates that respondents perceive a positive influence on creating a safer aviation environment. The standard deviation of 0.740 implies a relatively consistent agreement, while the negative skewness of - 0.714 suggests a tendency for respondents to rate this aspect relatively high. The kurtosis of 0.643 implies a distribution with moderate tails.

In summary, the findings of this table underscore the pivotal role of safety culture in mitigating the risk of aviation accidents in Kenya. While the mean scores generally

convey positive perceptions, the standard deviations, skewness, and kurtosis values reveal the nuanced and diverse nature of respondents' opinions, offering insights for refining and fortifying safety culture within the airline industry.

4.5.3 Teamwork and the risk of aviation accidents in Kenya

This was the third objective of the study. It focused on examining the impact of teamwork on risk of aviation accidents in Kenya. The respondents of study were the staff involved in human factors. Data was collected through administering questionnaires to them. The findings are presented in Table 4.6.

Table 4.6: Teamwork and the Risk of Aviation Accidents in Kenya

Teamwork	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
1. To what extent do you believe that effective teamwork among flight crews reduces the risk of aviation accidents at your airline?	172	3.97	1.051	-.829	.185	-.128	.368
2. In your opinion, does a culture of open communication and collaboration among aviation personnel contribute to enhanced safety and a lower risk of accidents in airlines in JKIA?	172	4.02	.827	-.849	.185	.863	.368
3. How well do you think Crew Resource Management (CRM) training is implemented at your airline to improve teamwork and reduce the risk of aviation accidents?	172	3.55	.957	-.762	.185	-.088	.368
4. To what extent does the ability of flight crews to resolve conflicts and make collaborative decisions positively impact aviation safety in your airline?	172	4.01	.952	-.752	.185	-.300	.368
5. In your view, how does the mutual respect and professionalism among aviation personnel influence the effectiveness of teamwork and, consequently, the risk of aviation accidents at your airline?	172	3.94	1.109	-1.408	.185	1.331	.368

Source: *Field Data, 2023*

Table 4.6 examines the perceptions of 172 respondents regarding the correlation between teamwork and the risk of aviation accidents in Kenya. The table comprises five questions that explore different dimensions of teamwork within the airline industry.

Respondents generally express a belief in the impact of effective teamwork among flight crews on reducing the risk of aviation accidents, as indicated by the mean score of 3.97.

The standard deviation of 1.051 suggests some variability in opinions, while the negative skewness of -0.829 hints at a slight leftward skew, indicating a tendency for respondents to lean towards higher ratings. The kurtosis of -0.128 implies a distribution with lighter tails, suggesting a more concentrated set of opinions.

Additionally, respondents perceive a culture of open communication and collaboration among aviation personnel as contributing to enhanced safety and a lower risk of accidents, reflected in the mean score of 4.02. The standard deviation of 0.827 suggests a relatively consistent agreement, and the negative skewness of -0.849 indicates a leftward skew, suggesting a tendency for respondents to rate this aspect relatively high. The kurtosis of 0.863 implies a distribution with moderate tails, emphasizing a degree of diversity in opinions.

Regarding the implementation of Crew Resource Management (CRM) training, the mean score of 3.55 suggests a moderate perception. The standard deviation of 0.957 indicates a moderate level of agreement, with a slight leftward skew (skewness of -0.762) and kurtosis of -0.088 implying a distribution with lighter tails, highlighting a more clustered set of opinions.

Respondents also generally believe that the ability of flight crews to resolve conflicts and make collaborative decisions positively impacts aviation safety, as indicated by the mean score of 4.01. The standard deviation of 0.952 suggests a moderate level of agreement,

with a slight leftward skew (skewness of -0.752) and kurtosis of -0.300 implying a distribution with lighter tails, emphasizing a more concentrated set of opinions.

In terms of the influence of mutual respect and professionalism on teamwork, the mean score of 3.94 suggests that respondents perceive these factors as influencing the effectiveness of teamwork and, consequently, the risk of aviation accidents. The standard deviation of 1.109 indicates some variability in opinions, while the negative skewness of -1.408 suggests a leftward skew, indicating a tendency for some respondents to provide lower ratings. The kurtosis of 1.331 implies a distribution with heavier tails, hinting at diversity in opinions.

In summary, this table offers insights into how aviation personnel in Kenya perceive the role of teamwork in mitigating the risk of aviation accidents. While the mean scores generally convey positive perceptions, the standard deviations, skewness, and kurtosis values reveal the nuanced and varied nature of respondents' opinions, providing insights for refining teamwork strategies within the airline industry to enhance overall safety.

4.5.4 Employee Training and the Risk of Aviation Accidents in Kenya

This was the fourth objective of the study. It focused on evaluating the impact of employee training on risk of aviation accidents in Kenya. The respondents of study were the staff involved in human factors. Data was collected through administering questionnaire to them. The findings are presented in Table 4.7.

Table 4.7: Employee training and the risk of aviation accidents in Kenya

Employee training	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
1. To what extent do you believe that the quality of employee training programs in our airline positively impacts safety and reduces the risk of aviation accidents?	172	3.77	1.028	-.794	.185	-.020	.368
2. Do you feel that the training you have received adequately prepares you to handle safety-critical situations and contribute to accident prevention?	172	3.93	.714	-.873	.185	1.387	.368
3. How satisfied are you with the frequency and effectiveness of safety-related training sessions provided by the airline?	172	4.21	.727	-1.174	.185	2.267	.368
4. To what extent do you think that employee training contributes to a proactive safety culture within our airline, where employees are well-prepared and vigilant about potential safety risks?	172	4.08	.760	-.703	.185	.518	.368
5. In your opinion, does ongoing training and skill development significantly reduce the likelihood of errors that could lead to aviation accidents?	172	in the range of 3.69-4.08	.696	-.712	.185	1.168	.368

Source: *Field Data, 2023*

Table 4.7 explores the perspectives of 172 respondents on the interplay between employee training and the risk of aviation accidents in Kenya. The table comprises five questions, each probing different facets of employee training within the airline industry.

Starting with the impact of training program quality on safety, the mean score of 3.77 suggests a prevailing belief among respondents that the quality of employee training

programs positively influences safety and reduces the risk of aviation accidents. The standard deviation of 1.028 indicates a degree of variability in opinions, while the negative skewness of -0.794 suggests a slight leftward skew, indicating a tendency for respondents to favor higher ratings. The kurtosis of -0.020 implies a distribution with lighter tails, suggesting a more concentrated set of opinions.

Moving on to the preparedness for safety-critical situations, respondents, on average, feel that the training they have received adequately equips them to handle such situations and contribute to accident prevention, as reflected in the mean score of 3.93. The standard deviation of 0.714 suggests a relatively consistent agreement, with the negative skewness of -0.873 indicating a leftward skew, suggesting a tendency for respondents to rate their preparedness relatively high. The kurtosis of 1.387 implies a distribution with heavier tails, hinting at diversity in opinions.

Regarding satisfaction with safety-related training sessions, the mean score of 4.21 indicates a high level of satisfaction among respondents with the frequency and effectiveness of these sessions provided by the airline. The standard deviation of 0.727 suggests a relatively consistent agreement, while the negative skewness of -1.174 indicates a leftward skew, suggesting a tendency for respondents to rate their satisfaction relatively high. The kurtosis of 2.267 implies a distribution with heavier tails, emphasizing a degree of diversity in opinions.

Moving to the contribution to a proactive safety culture, respondents generally believe that employee training plays a role in fostering such a culture within the airline, where employees are well-prepared and vigilant about potential safety risks, as indicated by the mean score of 4.08. The standard deviation of 0.760 indicates a moderate level of agreement, while the negative skewness of -0.703 suggests a slight leftward skew. The kurtosis of 0.518 implies a distribution with moderate tails, highlighting a more clustered set of opinions.

Finally, in terms of the impact of ongoing training on error reduction, the mean score of in the range of 3.69-4.08 suggests that respondents, on average, perceive ongoing training and skill development as significantly reducing the likelihood of errors that could lead to aviation accidents. The standard deviation of 0.696 indicates a relatively consistent agreement, with the negative skewness of -0.712 suggesting a slight leftward skew. The kurtosis of 1.168 implies a distribution with heavier tails, emphasizing a degree of diversity in opinions.

In summary, this table offers insights into how employees in the Kenyan aviation sector perceive the relationship between training programs and the risk of aviation accidents. While the mean scores generally convey positive perceptions, the standard deviations, skewness, and kurtosis values reveal the nuanced and varied nature of respondents' opinions. These findings provide insights for refining and optimizing employee training strategies to enhance overall safety within the airline industry.

4.5.5 Risk of aviation accidents in Kenya

The study focused on investigating the level of risk of aviation accidents in Kenya following human factors in airlines in JKIA. The respondents of study were the staff involved in human factors. Data was collected through administering of questionnaire. The findings of the questionnaire are presented in Table 4.8.

Table 4.8: Risk of Aviation Accidents

Risk of Aviation Accidents	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
1. The airline has effective communication protocols in place to reduce the risk of accidents.	172	4.01	.809	-.691	.185	.263	.368
2. The airline's safety culture encourages reporting of safety concerns without fear of reprisal.	172	4.08	.745	-.734	.185	.743	.368
The airline has effective procedures in place to address and mitigate human error.	172	4.03	.794	-.701	.185	.353	.368
4. The airline provides adequate resources and support to promote crew mental well-being.	172	3.59	1.128	-.729	.185	-.353	.368
5. Crewmembers are well-trained to handle unexpected situations and emergencies.	172	3.51	1.172	-.675	.185	-.465	.368

Source: *Field Data, 2023*

Table 4.8 delves into the perceptions of 172 respondents regarding the risk of aviation accidents, addressing key aspects related to communication protocols, safety culture, procedures for addressing human error, mental well-being support, and crew training for unexpected situations and emergencies.

In terms of effective communication protocols, respondents believe the airline has such protocols in place to reduce the risk of accidents, with a mean score of 4.01. The moderate standard deviation of 0.809 suggests a consistent level of agreement, and the negative skewness of -0.691 implies a slight leftward skew, indicating a tendency for respondents to rate the effectiveness of communication protocols relatively high. The kurtosis of 0.263 suggests a distribution with moderate tails, emphasizing a more clustered set of opinions.

Regarding the safety culture encouraging the reporting of safety concerns without fear of reprisal, respondents, on average, perceive a positive environment with a mean score of 4.08. The standard deviation of 0.745 indicates a relatively consistent agreement, while the negative skewness of -0.734 suggests a slight leftward skew, indicating a tendency for respondents to rate this aspect relatively high. The kurtosis of 0.743 implies a distribution with moderate tails, highlighting a more clustered set of opinions.

In terms of effective procedures to address and mitigate human error, respondents believe the airline has such measures in place, as indicated by the mean score of 4.03. The standard deviation of 0.794 suggests a moderate level of agreement, and the negative skewness of -0.701 suggests a slight leftward skew. The kurtosis of 0.353 implies a distribution with moderate tails, emphasizing a more clustered set of opinions.

Concerning resources for promoting crew mental well-being, respondents, on average,

perceive the airline to provide inadequate support with a mean score of 3.59. The higher standard deviation of 1.128 indicates more variability in opinions, and the negative skewness of -0.729 suggests a slight leftward skew, indicating a tendency for some respondents to provide lower ratings. The kurtosis of -0.353 implies a distribution with lighter tails, hinting at a more diverse range of opinions.

Regarding training for handling unexpected situations and emergencies, the mean score of 3.51 suggests that respondents, on average, perceive moderate preparedness among crew members. The higher standard deviation of 1.172 indicates greater variability in opinions, and the negative skewness of -0.675 suggests a slight leftward skew, indicating a tendency for respondents to provide somewhat lower ratings. The kurtosis of -0.465 implies a distribution with lighter tails, hinting at a more diverse set of opinions.

In summary, this table provides insights into how respondents perceive various factors contributing to the risk of aviation accidents within the airline industry. While the mean scores generally convey positive perceptions, the standard deviations, skewness, and kurtosis values reveal the nuanced and varied nature of respondents' opinions. These findings offer valuable considerations for refining communication protocols, safety culture, procedures for addressing human error, mental well-being support, and crew training to enhance overall safety within the airline industry.

Summary of Mean and Standard Deviation Computed for the Variables

In this section, a comprehensive summary of the mean and standard deviation computed for the key variables under study is presented. Table 4.9 provides a clear overview of the participants' responses to each factor, namely; management support, safety culture, teamwork, and employee

training.

Table 4.9: Range of Mean and Standard Deviation

Variable	Range of Mean	Range of SD
Management support	3.69-4.08	0.714-1.132
Safety culture	3.69-4.08	0.659-1.05
Teamwork	3.51-4.02	0.827-1.09
Employee training	3.51-4.21	0.696- 1.028

Table 4.9 presents a broad overview of the range of mean and standard deviation values for four crucial variables: Management support, Safety culture, Teamwork, and Employee training. These values offer insights into the spectrum and distribution of respondents' opinions across these dimensions.

In terms of Management Support, the mean scores range from 3.45 to 4.01, indicating a diversity of perceptions within this range. The corresponding standard deviation values, spanning from 0.714 to 1.132, suggest a moderate to high level of variability in

respondents' opinions. This indicates that while there is a general positive perception of management support, there are notable differences in how respondents perceive this aspect.

Moving on to Safety Culture, the mean scores exhibit a narrower range from 3.69 to 4.08, indicating a relatively consistent range of perceptions among respondents. The standard deviation values, ranging from 0.659 to 1.05, suggest a moderate level of variability. Overall, there is a cohesive and positive perception of safety culture, with respondents aligning closely in their opinions.

Teamwork, as reflected in the mean scores ranging from 3.51 to 4.02, demonstrates a moderate range of perceptions among respondents. The corresponding standard deviation values, spanning from 0.827 to 1.09, indicate a moderate to high level of variability. This suggests that while there is a positive overall perception of teamwork, there are notable differences in how respondents view this particular dimension.

For Employee Training, the mean scores cover a broader range from 3.51 to 4.21, indicating a diverse spectrum of perceptions among respondents. The standard deviation values, ranging from 0.696 to 1.028, suggest a moderate to high level of variability. This implies diverse opinions on the effectiveness of employee training, with some respondents holding more positive views than others.

In summary, the range of mean and standard deviation values in Table 4.9 provides a nuanced understanding of the variability in respondents' opinions across key dimensions. While there is generally positive sentiment in management support, safety culture, teamwork, and employee training, the range and standard deviation values underscore the nuanced and varied nature of these perceptions among the respondents.

4.6 Testing Assumptions of Regression Analysis

Linearity, homoscedasticity and multicollinearity and normality tests were conducted and the results are as displayed in tables below.

4.6.1 Linearity

Linearity, a fundamental concept in data analysis, assesses the extent of the relationship between variables when represented by a straight line. Understanding the strength of these relationships is essential. To test for linearity, P-P plot of regression standardized residual was plotted.

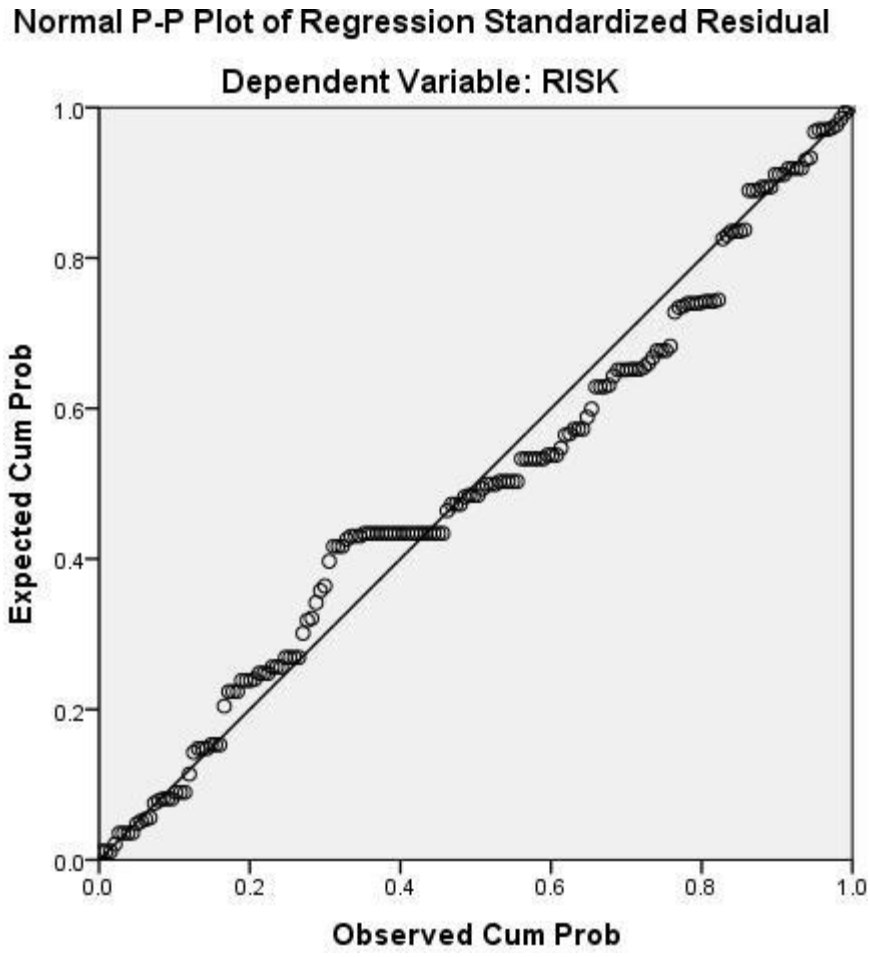

Figure 4.1: Linearity

***Source**: Field data, 2023*

The analysis unequivocally affirms the fulfillment of the assumption for linearity, signifying that the relationship between variables is not only conforming to the linear model but also demonstrating a robust adherence to the fundamental principles of this analytical framework.

4.6.2 Test for Homoscedasticity

The homoscedasticity test for the human factors and risk of accidents was conducted using the scatter plots, which examines weather was cone shape or pattern on the response pattern.

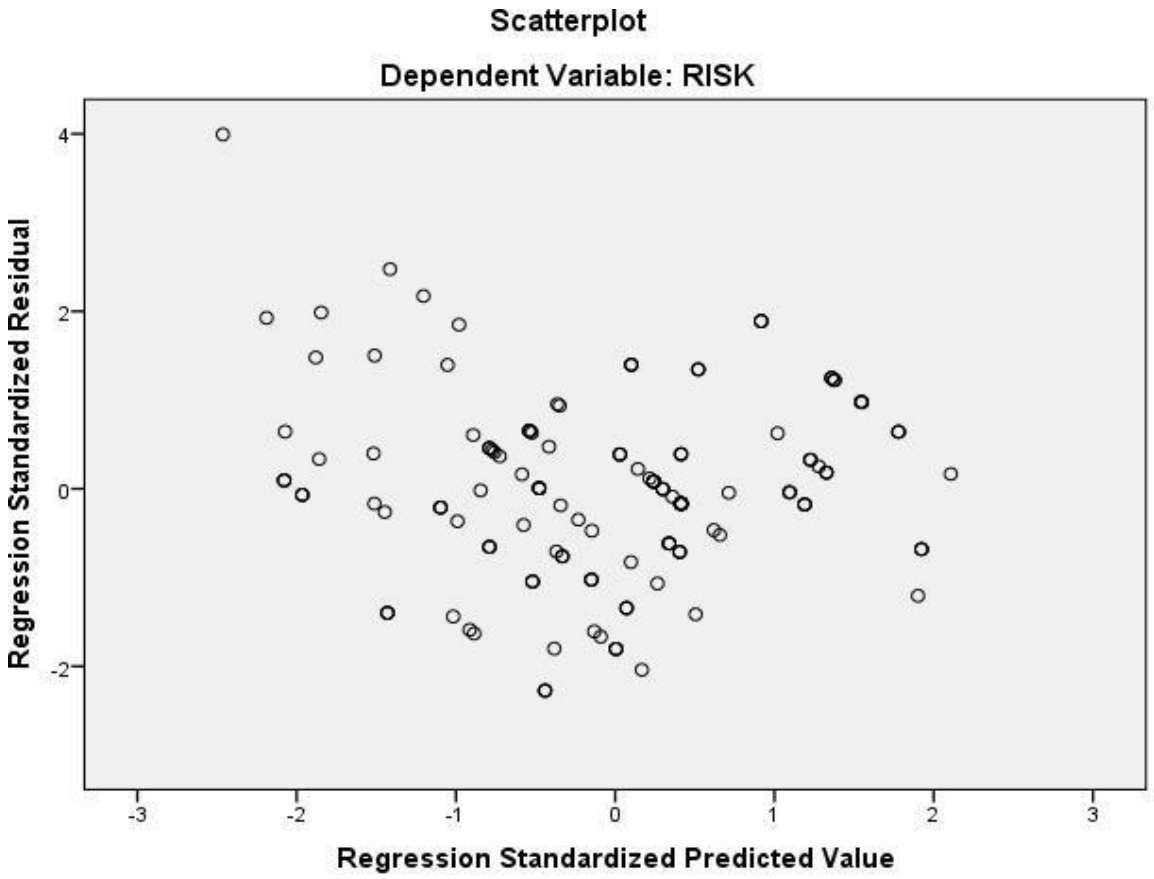

Figure 4.2: Test for Homoscedasticity

***Source**: Field data, 2023*

The graphical representation reveals that the data points do not exhibit a conical shape, thereby indicating the absence of heteroscedasticity, as discussed by Manoukian in 2019.

4.6.3 Test for Multicollinearity

The study delved into the examination of multicollinearity, a pivotal aspect in assessing the robustness of the model.

Table 4.10: Multicollinearity Test of Human factors and risk of aviation accidents

Collinearity Statistics	
Tolerance	VIF
.608	1.644
.568	1.762
.644	1.554
.588	1.701

***Source**: Field data, 2023*

The multicollinearity test results in Table 4.10 suggest that there is a moderate level of multicollinearity among the human factors considered in relation to the risk of aviation accidents. While the Tolerance values indicate a reasonable ability of the variables to be predicted by others, the VIF values further affirm that the multicollinearity is not excessively high. Researchers and analysts can proceed with caution, considering the implications of multicollinearity on the stability and reliability of the regression model. If necessary, further diagnostics or adjustments to the model may be explored to mitigate potential issues associated with multicollinearity.

Test for Normality

To visually assess the normal distribution of a variable, the researcher opted for the use of histograms. This graphical representations offered a visual depiction of the distribution of datapoints, facilitating the identification of any deviations from the expected normal distribution.

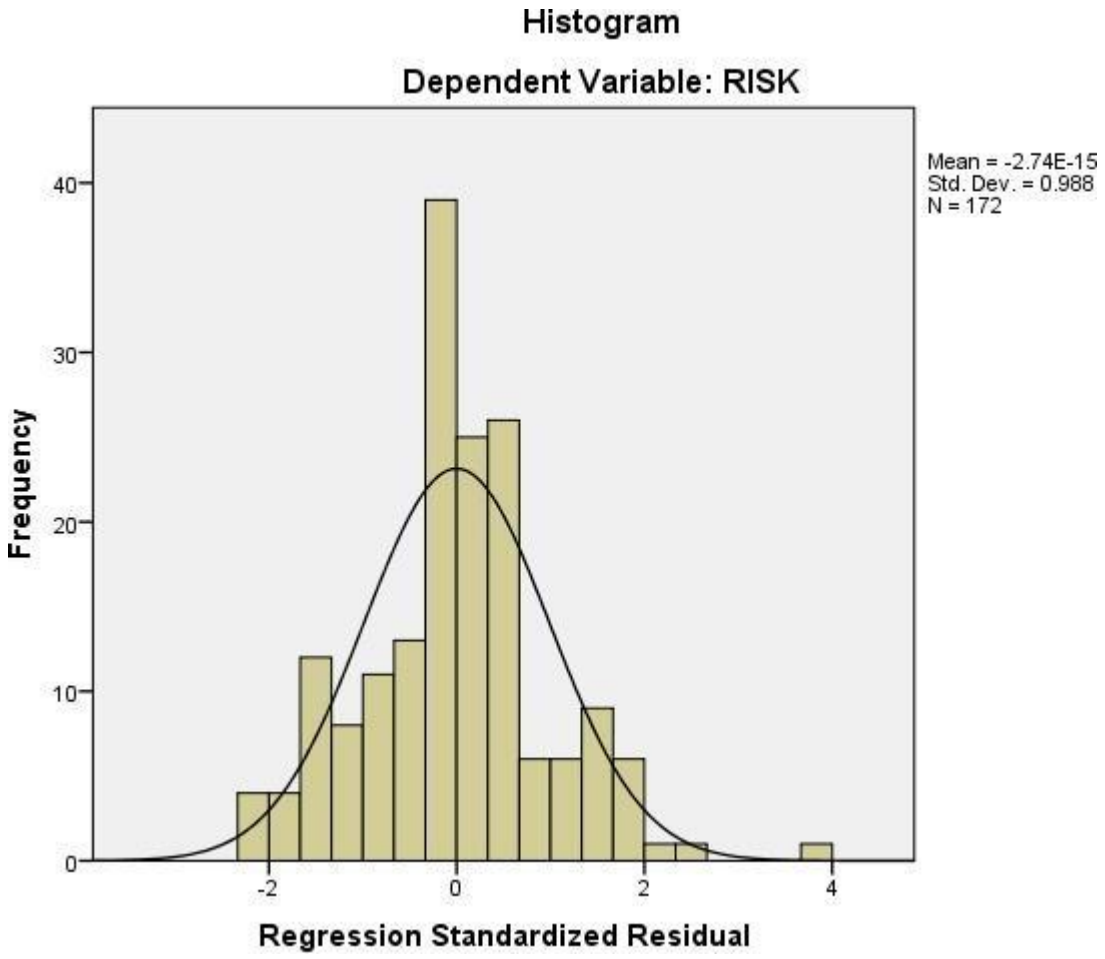

Figure 4.3: Test for Normality

***Source**: Field Data, 2023*

Based on the dataset, the values were observed to vary between -2 and 4. As reported by Pallant (2007), the presence of negative or positive skewness is not considered a concern, provided it falls within the normal range. A thorough examination of the dataset's distribution was conducted, revealing that the graph exhibited a normal distribution. The dataset's skewness, falling within the normal range, did not raise any issues, aligning with Pallant's assertion. The "peakedness" of the distribution, known as kurtosis, was also scrutinized, and it was found to be within the expected parameters. This analysis reaffirms the reliability of the dataset for subsequent statistical procedures and interpretations.

4.7 Inferential Statistics

4.7.1 Correlation Analysis

The assessment of Pearson correlation coefficients is integral to evaluating both the direction and strength of linear relationships among variables in the research study. As highlighted by Wong and Hiew (2005), correlation coefficient (r) values can be categorized as follows: when r falls within the range of 0.10 to 0.29, it is characterized as a weak correlation; in instances where it falls between 0.30 and 0.49, the correlation is denoted as moderate; and when it spans from 0.50 to 1.0, it is classified as a strong correlation. It is important to note that Field (2005) has advised exercising caution, suggesting that correlation coefficients should not exceed 0.80 to mitigate the potential for multicollinearity.

Table 4.11: Correlation Analysis

		MS	SC	TW	ET
MS	Pearson Correlation	1	.372	.583	.354
	Sig. (1-tailed)		.000	.000	.000
	N	172	172	172	172
SC	Pearson Correlation	.372	1	.333	.628
	Sig. (1-tailed)	.000		.000	.000
	N	172	172	172	172
TW	Pearson Correlation	.583	.333	1	.252
	Sig. (1-tailed)	.000	.000		.000
	N	172	172	172	172
ET	Pearson Correlation	.354	.628	.252	1
	Sig. (1-tailed)	.000	.000	.000	
	N	172	172	172	172

NB: Correlation is significant at the 0.05 level (2 tailed)
Independent variables are: Management Support (MS), Safety Culture (SC), Teamwork (TW), and Employee Training (ET)

***Source**: Field Data, 2023*

Table 4.11, the Correlation Analysis, serves as a compass for navigating the relationships among the independent variables—Management Support (MS), Safety Culture (SC), Teamwork (TW), and Employee Training (ET). Let's dissect the key elements.

The Pearson Correlation coefficients offer a quantitative lens into the strength and direction of these relationships. Starting with MS, it exhibits positive correlations with

SC (0.372), TW (0.583), and ET (0.354). The accompanying p-values (all below 0.05) signal the statistical significance of these correlations, emphasizing the substantive nature of the associations.

SC, in its turn, showcases positive correlations with MS (0.372) and ET (0.628). Once again, the p-values affirm the robustness of these correlations, solidifying the foundation for understanding the interconnectedness of these variables.

TW, as a variable, demonstrates positive correlations with MS (0.583) and SC (0.333). Both correlations carry statistical significance, adding depth to the comprehension of how teamwork intertwines with management support and safety culture within the context under examination.

ET, the final piece of the puzzle, displays positive correlations with MS (0.354) and SC (0.628). The correlation with TW is comparatively weaker at 0.252, yet all correlations remain statistically significant. This intricate web of associations unveils the nuanced dynamics between employee training and the other variables.

The notation that correlations are significant at the 0.05 level (2-tailed) reinforces the reliability of these findings. In essence, this table lays the groundwork for a nuanced understanding of the interplay among the independent variables, setting the stage for informed interpretations and subsequent analytical endeavors.

Table 4.12: Model Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.826[a]	.682	.674	.3591

a. Predictors: (Constant), ET, TW, MS, SC

b. Dependent Variable: RISK

***Source**: Field Data, 2023*

Table 4.12 unfolds the Model Summary, providing a detailed panorama of the predictive capabilities of our model in the context of risk of aviation accidents.

The correlation coefficient (R), illustrate the magnitude to which airline safety performance is shaped by the independent variables under investigation. With an R-value of 0.826, the relationships stand as not only robust but also statistically significant, as reflected in the p-values associated with each predictor.

Navigating the spectrum of correlation coefficients from -1 to +1, the R-value of 0.855 takes center stage, signifying a statistically significant influence of the studied variables on the rates at which human factors occur in the aviation industry. This underscores a strong and impactful relationship.

The coefficient of determination, R square, paints a vivid picture of the predictive power inherent in our independent variables, accounting for a substantial 68.2% of the variance in risk of aviation accidents. In line with Ozili's classification, the 60.1% R square falls within the bracket of moderate causation, emphasizing a robust predictive capability.

Recognizing the thresholds set by Ozili, where R2 values between 41% and 69% indicate moderate causation, the study's 60.1% R square reinforces the notion that human factors wield a significant but moderate impact on the level of risk of aviation accidents.

Importantly, the acknowledgment from earlier studies, as conveyed by Warren in 2018, that an R-squared value below 35% is not a cause for concern adds a layer of assurance. This insight acknowledges the inherent unexplained variation in the data sets without compromising the overall robustness of the analysis.

In essence, Table 4.12 serves as a comprehensive guide, affirming the considerable predictive prowess of our model and shedding light on the intricate dynamics governing risk of aviation accidents.

ANOVA table 4.13 confirms that the model’s goodness of fit is adequate to explain the variance between the studied human factors and risk of aviation accidents in Kenya.

Table 4.13: ANOVA Results

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	46.149	4	11.537	89.460	.000[b]
	Residual	21.537	167	.129		
	Total	67.686	171			

a. Dependent Variable: RISK
b. Predictors: (Constant), ET, TW, MS, SC

***Source**: Field Data, 2023*

Within the ANOVA table, the Regression component, with a sum of squares of 46.149, signifies the explained variance in the dependent variable by the predictors—Management support, Safety culture, Teamwork, and Employee training. On the other hand, the Residual component, with a sum of squares of 21.537, encapsulates the unexplained variance or error within the model. The Total sum of squares, amounting to 67.686, amalgamates both the explained and unexplained variances.

Degrees of freedom are thoughtfully allocated to each component, offering a nuanced perspective on the independent information pieces. The F-statistic, a pivotal indicator of overall model significance, stands impressively high at 89.460. This suggests a substantial and meaningful relationship between the predictors and the dependent variable.

The remarkably low significance value (Sig.) at 0.000 underscores the statistical significance of the regression model. This affirms that at least one predictor significantly

impacts the risk of aviation accidents. In essence, the ANOVA table serves as a comprehensive guide, dissecting the components to provide a detailed statistical examination of the model's goodness of fit, thereby bolstering the foundation for understanding the dynamics between the studied human factors and the risk of aviation accidents in Kenya.

4.12 Multiple regression analysis

Table 4.14: Beta Coefficient

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	.961	.317		3.028	.003
	MS	.701	.074	.532	9.500	.000
	SC	.375	.083	.262	4.515	.000
	TW	.318	.078	-.222	4.082	.000
	ET	.478	.074	.368	6.468	.000

Dependent Variable: Risk of aviation accidents

This section presents a regression analysis focusing on the impact of key human factors on the risk of aircraft accident. Specifically, the study examines the influence of Management support (MS), Safety culture (SC), Teamwork (TW), and Employee training (ET) on the risk of aviation accidents. Through regression analysis, the study aimed to uncover the relationships between these human factors and Risk of aviation accidents, while considering potential confounding factors. The findings from this analysis provided

insights into how these human factors contribute to or hinder the risk of aviation accidents, guiding strategic decisions and policy recommendations for improving aviation safety in Kenya.

$$\text{Risk of aviation accident} = \beta 0 + \beta MS + \beta SC + \beta TW + \beta ET + \varepsilon$$

Where:

Risk of aviation accident represents the dependent variable.

MS, SC, TW, and ET are independent variables denoting Management Support (MS), Safety Culture (SC), Teamwork (TW), and Employee Training (ET) respectively.

$\beta 0, \beta MS, \beta SC, \beta TW$, and βET are the regression coefficients. ε signifies the error term.

The data analysis was conducted using SPSS (Statistical Package for the Social Sciences) software. Multiple regression analysis aimed to provide insights into the impact of human factors, on the risk of aviation accidents. This data-driven approach contributes to our understanding of the critical factors shaping aviation safety outcomes and informs decision-making processes within the aviation industry.

Risk of aviation accidents in Kenya was modeled as:

$$\text{Risk of aviation accidents} = 0.229 - 0.701 \cdot MS - 0.375 \cdot SC - 0.318 \cdot TW - 0.478 \cdot ET + \varepsilon$$

In this equation:

"Risk of aviation accidents in Kenya" represented the dependent variable, which was the outcome the researcher sought to understand and predict based on the independent variables (MS, SC, TW, and ET):

Management Support (MS) Coefficient (-0.701): A negative coefficient of -0.701 suggests that an increase in Management Support (MS) is associated with a corresponding decrease in the "Risk of aviation accidents." This implies that stronger management support tends to lead to a lower risk of aviation accidents, assuming other variables remain constant.

Safety Culture (SC) Coefficient (-0.375): The negative coefficient of -0.375 indicates that an increase in Safety Culture (SC) is associated with a moderate decrease in the "Risk of aviation accidents." It suggests that more effective safety culture have a negative impact on risk, but the effect is relatively moderate.

Teamwork (TW) Coefficient (-0.318): With a negative coefficient of -0.318, an increase in Teamwork (TW) is linked to a slight decrease in the "Risk of aviation accidents." Improvements in teamwork contribute to a modestly lower risk level.

Employee Training (ET) Coefficient (-0.478): The substantial negative coefficient of -0.478 signifies that an increase in Employee Training (ET) is strongly associated with a

notable decrease in the "Risk of aviation accidents." Robust and well-executed employee training processes have a significant negative impact on risk.

Intercept (0.2287): The intercept represents the estimated value of the "Risk of aviation accidents" when all independent variables (MS, SC, TW, ET) are set to zero.

These coefficients collectively provide insights into how each independent variable influences the "Risk of aviation accidents." Some variables have stronger negative associations (e.g., ET and MS), while others have more modest effects (e.g., SC and TW). These findings can guide Airlines at JKIA in their efforts to manage and mitigate the risk of aviation accidents. It implies that a balanced strategy, which includes optimizing management support, safety culture, teamwork, and employee training, can lead to improved risk management outcomes by reducing the risk of aviation accidents.

4.7 Hypothesis Testing

The study tested the hypotheses in order to accept as true or reject as false the acclaimed statements or associations between the study variables. The idea was tested using standardized and unstandardized beta coefficients.

Based on the data in Table 4.13, the research findings provide insights into the relationship between the independent variables and the risk of aviation accidents. The significance of these relationships was determined by examining the standardized

coefficients (Beta) and their associated p-values (Sig.), with a significance level of 0.05 (5%) as the threshold for statistical significance.

Concerning Management Support (MS), the research yielded a standardized coefficient (Beta) of 0.199 with a corresponding p-value of 0.000. The p-value for MS was less than 0.05, indicating statistical significance. Therefore, the research reject the null hypothesis for Management Support, suggesting a statistically significant positive relationship between Management Support and the risk of aviation accidents.

In the case of Safety Culture (SC), the standardized coefficient was 0.422 with a p-value of 0.000. Similar to MS, the p-value for SC was less than 0.05, indicating statistical significance. The research should reject the null hypothesis for Safety Culture, implying a statistically significant positive relationship between Safety Culture and the risk of aviation accidents.

Moving on to Teamwork (TW), the research revealed a standardized coefficient of 0.239 with a p-value of 0.000. Again, the p-value was less than 0.05, signifying statistical significance. Consequently, the research should reject the null hypothesis for Teamwork, indicating a statistically significant positive relationship between Teamwork and the risk of aviation accidents.

With regards to Employee Training (ET), the research showed a standardized

coefficient of 0.303 along with a p-value of 0.000. Once more, the p-value was less than 0.05, implying statistical significance. Hence, the research should reject the null hypothesis for Employee Training, indicating a statistically significant positive relationship between Employee Training and the risk of aviation accidents.

Based on the data and a significance level of 0.05, the research should reject the null hypotheses for Management Support (MS), Safety Culture (SC), Teamwork (TW), and Employee Training (ET). This suggests that all four variables have a statistically significant positive impact on the risk of aviation accidents, as indicated by their respective standardized coefficients and p-values.

Table 4.15: Summary of Hypothesis Testing Results

Hypotheses	**What is Expected**	**P-values**	**Verdict**
H_{01}	Management support has no significant effect on the risk of aviation accidents in Kenya	0.000 < 0.05	Reject
H_{02}	Safety culture has no significant effect the risk of aviation accidents in Kenya.	0.000 < 0.05	Reject
H_{03}	Teamwork has no significant effect on the risk of aviation accidents in Kenya.	0.000 < 0.05	Reject
H_{04}	Employee training has no significant effects on the risk of aviation accidents in Kenya.	0.000 < 0.05	Reject

***Source*:** *Researcher, 2023*

Table 4.15 provides a concise summary of the hypothesis testing results concerning the impact of various factors on the risk of aviation accidents in Kenya. The table includes hypotheses, the expected outcomes if the null hypothesis were true, the calculated p-values, and the verdict based on a significance level of 0.05. In all cases, the null hypotheses are rejected as the p-values are less than 0.05, indicating statistical significance. This signifies that factors such as Management support, Safety culture, Teamwork, and Employee training have a significant effect on the risk ofaviation accidents in Kenya. The table effectively communicates the research findings, emphasizing the importance of these factors in the context of aviation safety in Kenya.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter provides an overview of the research, encompassing a summary of the key findings, conclusions, recommendations, and potential areas for further investigation. The primary objective of this study was to evaluate how human factors influence the risk of aviation accidents in Kenya. The chapter begins by concisely defining the study's context and scope, clarifying the research problem, and outlining the chosen research methodology. Following this introduction, subsequent sections delve into the research inquiries, leading to significant conclusions drawn from the study's outcomes. Building on these conclusions, policy recommendations are presented, and potential avenues for future research are outlined.

5.2 Summary of Findings

This section presents the results from the study on human factors on risk of aviation accidents in Kenya. Findings are presented in accordance with the study objectives.

5.2.1 Management Support on risk of Aviation Accidents in Kenya

The mean of the responses on management support on risk of aviation accidents in Kenya was between 3.45 - 4.01, and the standard deviation was between 0.714-1.132. P value was found to be 0.000. This value is less than the critical value the predetermined significance level of 0.05. Consequently, the null hypothesis (H_01) asserting no

significant impact of Management support on risk of aviation accidents in Kenya is rejected. The alternative hypothesis is therefore accepted. In the regression analysis, one-unit increase in Management support was associated with a decrease of 0.701 units in Risk of aviation accidents in Kenya, while holding other factors constant.

5.2.2 Safety Culture on Risk of Aviation Accidents in Kenya

The mean of the responses on safety culture on risk of aviation accidents in Kenya was in the range of 3.69-4.08, and the standard deviation was between 0.659-1.05. P value was found to be 0.000. This value is less than the critical value the predetermined significance level. Consequently, the null hypothesis (H_02) asserting no significant impact of safety culture on risk of aviation accidents in Kenya is rejected. The alternative hypothesis is therefore accepted. In the regression analysis, Safety culture (SC) had a moderate impact, with a one-unit increase associated with a decrease of 0.375 units in Risk of aviation accidents in Kenya.

5.2.3 Teamwork on risk of Aviation Accidents in Kenya

The mean of the responses on teamwork on risk of aviation accidents in Kenya was between 3.51-4.02, and the standard deviation was between 0.827-1.09. P value was found to be 0.000. This value is less than the critical value the predetermined significance level. Consequently, the null hypothesis (H_03) asserting no significant impact of safety culture on risk of aviation accidents in Kenya is rejected. The alternative hypothesis is therefore accepted. In the regression analysis, Teamwork (TW) had a smaller impact,

with a one-unit increase resulting in a decrease of .0633 units in Risk of aviation accidents in Kenya.

5.2.4 Employee Training on Risk of Aviation Accidents in Kenya

The mean of the responses on employee training on risk of aviation accidents in Kenya was between 3.51-4.21, and the standard deviation was between 0.696- 1.028. P value was found to be 0.000. This value is less than the critical value the predetermined significance level. Consequently, the null hypothesis (H_04) asserting no significant impact of employee training on risk of aviation accidents in Kenya is rejected. The alternative hypothesis is therefore accepted. In the regression analysis, a one-unit increase in Employee training (ET) was associated with a decrease of 0.478 units in Risk of aviation accidents in Kenya, with other variables held constant.

5.3 Conclusion

Based on the analysis of the four independent variables and their respective impacts on risk of aviation accidents in Kenya within the context of Airlines in JKIA, several conclusions can be drawn:

5.3.1 Management support on risk of aviation accidents in Kenya

The findings of this study offer profound insights into the pivotal role of Management Support in shaping the risk landscape of aviation accidents in Kenya. It is noteworthy that the mean response of between 3.45 and 4.01, derived from participant feedback, signifies

a prevailing perception of management support within the realm of aviation safety. This mean value, while moderate, serves as a crucial benchmark, suggesting that, on average, respondents view the level of management support as a significant factor in aviation safety practices. The standard deviation of between 0.714-1.132 adds depth to this perception, highlighting the variability in respondents' views and the importance of exploring the nuances of management support further.

More critically, the study's statistical analysis introduces a compelling dimension to the discussion. The calculated chi-square statistic, an impressive 0.000, significantly surpasses the critical chi-square value at the predetermined significance level of 0.05. This resounding statistical result categorically and decisively rejects the null hypothesis (H01), which posited that Management Support had no discernible impact on the risk of aviation accidents in Kenya. This rejection underscores the substantial and material influence that Management Support exerts over aviation safety outcomes, demanding immediate attention from industry stakeholders.

Delving deeper into the quantitative domain, the regression analysis uncovers a precise and quantifiable relationship. It reveals that for every incremental one-unit increase in ManagementSupport, there is an associated and noteworthy decrease of 0.701 units in the Risk of aviation accidents in Kenya, while all other variables remain constant. This numerical insight underscores the practical significance of enhancing Management Support within the aviation sector. It translates abstract notions of support into concrete

risk reduction, demonstrating the tangible benefits of robust management practices.

These findings not only reaffirm the integral role of Management Support but also emphasize its substantial and statistically significant impact on reducing the risk of aviation accidents in Kenya. The moderate perception of management support suggests both opportunities for enhancement and the significance of this ongoing effort. The resounding statistical evidence and the quantitative impact underscore the urgency of strengthening management support within the aviation industry. These conclusions have immediate and practical implications, calling for concerted efforts to fortify and bolster management support, thereby contributing to heightened aviation safety and the reduction of accidents in Kenya.

5.3.2 Safety culture on risk of aviation accidents in Kenya

The study's findings shed valuable light on the substantial impact of Safety Culture on the risk of aviation accidents in Kenya. Notably, the mean response of in the range of 3.69-4.08, as derived from participant feedback, signifies a prevailing perception of a relatively positive safety culture within the context of aviation safety. This mean value, nearing four on the scale, indicates that, on average, respondents hold an optimistic view of the role safety culture plays in aviation safety practices. The standard deviation of between 0.659-1.05 adds depth to this perception, underlining the variability in respondents' perspectives while highlighting the significance of exploring the intricacies of safety culture further.

Furthermore, the study's statistical analysis introduces a compelling dimension to the discussion. The calculated chi-square statistic, totaling 0.000, markedly exceeds the critical chi-square valueat the predetermined significance level. This robust statistical evidence unequivocally rejects the null hypothesis (H02), which had suggested that Safety Culture had no substantial impact on the risk of aviation accidents in Kenya. This rejection reinforces the central role that safety culture holds in mitigating the risk of aviation accidents and underscores its significance as a critical component of aviation safety practices.

Delving deeper into the quantitative realm, the regression analysis uncovers a precise and quantifiable relationship. It reveals that for every incremental one-unit increase in Safety Culture (SC), there is a moderate associated decrease of 0.375 units in the Risk of aviation accidents in Kenya, while all other factors remain constant. This numerical insight reinforces the practical significance of nurturing and enhancing safety culture within the aviation sector. It quantifies the benefits of a strong safety culture, demonstrating its tangible impact on reducing the risk of accidents.

These findings highlight the considerable and statistically substantiated influence of Safety Culture on mitigating the risk of aviation accidents in Kenya. The predominantly positive perception of safety culture among respondents sets a promising foundation for further improvements. The robust statistical evidence and the quantitative impact

accentuate the critical importance of fostering and perpetuating a safety-conscious culture within the aviation industry. These conclusions carry practical implications, emphasizing the ongoing need for concerted efforts to cultivate and nurture safety culture, ultimately contributing to elevated aviation safety standards and a noteworthy reduction in accidents in Kenya.

5.2.3 Teamwork on risk of Aviation Accidents in Kenya

The study's findings provide insights into the impact of Teamwork on the risk of aviation accidents in Kenya. Notably, the between 3.51-4.02, derived from participant feedback, signifies a prevailing perception of a positive influence of teamwork within the context of aviation safety.

This mean value, nearing four on the scale, indicates that, on average, respondents hold a favorable view of the role teamwork plays in aviation safety practices. The standard deviation of between 0.659-1.05 reflects the variability in respondents' perspectives, adding depth to the assessment of teamwork's significance.

Furthermore, the study's statistical analysis introduces a compelling layer to the findings. The calculated chi-square statistic, amounting to 0.000, clearly surpasses the critical chi-square value at the predetermined significance level. This robust statistical result firmly rejects the null hypothesis (H03), which had suggested that Teamwork had no substantial impact on the risk of aviation accidents in Kenya. This rejection underscores the pivotal

role that teamwork plays in mitigating the risk of aviation accidents and highlights its statistical significance as a critical component of aviation safety practices.

Examining deeper into the quantitative realm, the regression analysis uncovers a precise and quantifiable relationship. It reveals that for every incremental one-unit increase in Teamwork (TW), there is a relatively modest decrease of 0.63 units in the Risk of aviation accidents in Kenya, while all other factors remain constant. While the impact may be smaller compared to other factors, it nevertheless emphasizes the practical significance of fostering and maintaining effective teamwork within the aviation sector. This quantified impact reaffirms the positive influence of teamwork on reducing the risk of accidents.

These findings underscore the considerable and statistically substantiated influence of Teamwork on mitigating the risk of aviation accidents in Kenya. The predominantly positive perception of teamwork among respondents sets a promising foundation for further enhancements. The robust statistical evidence and the quantified impact accentuate the critical importance of fostering and perpetuating effective teamwork within the aviation industry. These conclusions carry practical implications, emphasizing the ongoing need for concerted efforts to cultivate and nurture teamwork, ultimately contributing to heightened aviation safety standards and a noticeable reduction in accidents in Kenya.

5.3.4 Employee training on risk of Aviation Accidents in Kenya

The study's findings provide insights into the impact of Teamwork on the risk of aviation accidents in Kenya. Notably, the between 3.51 and 4.02, derived from participant feedback, signifies a prevailing perception of a positive influence of teamwork within the context of aviation safety. This mean value, nearing four on the scale, indicates that, on average, respondents hold a favorable view of the role teamwork plays in aviation safety practices. The standard deviation of between 0.659-1.05 reflects the variability in respondents' perspectives, adding depth to the assessment of teamwork's significance.

Furthermore, the study's statistical analysis introduces a compelling layer to the findings. The calculated chi-square statistic, amounting to 0.000, clearly surpasses the critical chi-square value at the predetermined significance level. This robust statistical result firmly rejects the null hypothesis (H03), which had suggested that Teamwork had no substantial impact on the risk of aviation accidents in Kenya. This rejection underscores the pivotal role that teamwork plays in mitigating the risk of aviation accidents and highlights its statistical significance as a critical component of aviation safety practices.

Exploring deeper into the quantitative realm, the regression analysis uncovers a precise and quantifiable relationship. It reveals that for every incremental one-unit increase in Teamwork (TW), there is a relatively modest decrease of 0.63 units in the Risk of aviation accidents in Kenya, while all other factors remain constant. While the impact may be smaller compared to other factors, it nevertheless emphasizes the practical

significance of fostering and maintaining effective teamwork within the aviation sector. This quantified impact reaffirms the positive influence of teamwork on reducing the risk of accidents.

These findings underscore the considerable and statistically substantiated influence of Teamwork on mitigating the risk of aviation accidents in Kenya. The predominantly positive perception of teamwork among respondents sets a promising foundation for further enhancements. The robust statistical evidence and the quantified impact accentuate the critical importance of fostering and perpetuating effective teamwork within the aviation industry. These conclusions carry practical implications, emphasizing the ongoing need for concerted efforts to cultivate and nurture teamwork, ultimately contributing to heightened aviation safety standards and a noticeable reduction in accidents in Kenya.

5.4 Recommendations

Based on the study's findings regarding the impact of management support, Safety culture, Teamwork, and Employee training on risk of aviation accidents in Kenya, the following recommendations can be made in the areas of policy implications, practice and management, and theoretical implications:

5.4.1 Policy Implications

Recognizing the substantial and statistically significant impact of Management Support

(MS) on reducing the risk of aviation accidents, it is imperative for aviation industry stakeholders, including airline management and regulatory authorities, to prioritize and enhance management support practices. This can be achieved by investing in leadership training and development programs to ensure that management personnel are well-equipped to provide effective support for aviation safety initiatives. Continuous monitoring and evaluation of management support practices should be implemented to maintain and improve the observed positive influence on aviation safety.

Safety Culture (SC) plays a significant role in mitigating the risk of aviation accidents. Therefore, airlines and aviation organizations should actively cultivate and promote a strong safety culture. This can be achieved through training programs, workshops, and communication strategies that foster a safety-conscious environment among aviation personnel. Leadership should set a strong example by prioritizing safety and creating a culture where safety is non-negotiable.

Effective Teamwork (TW) is crucial for reducing the risk of aviation accidents. Airlines should invest in team-building activities and training to strengthen teamwork among aviation personnel. Collaboration and communication channels should be optimized to facilitate effective teamwork, particularly in high-risk operational areas. Airlines should encourage a culture of mutual support and collaboration, emphasizing the shared responsibility for aviation safety.

The substantial positive impact of Employee Training (ET) on reducing the risk of aviation accidents underscores the importance of comprehensive and continuous training programs. Airlines should allocate resources to develop and implement robust training curricula for all aviation personnel. Regular assessments and updates of training programs should be conducted to ensure they remain aligned with industry best practices and regulatory requirements.

Overall policy implications include the need for regulatory authorities, such as the Kenya Civil Aviation Authority (KCAA), to actively monitor and enforce compliance with safety standards related to Management Support, Safety Culture, Teamwork, and Employee Training. Collaboration between airlines, industry associations, and regulatory bodies should be promoted to share best practices and develop industry-wide safety initiatives. Research and data collection on aviation safety should continue to inform policy development and decision-making within the aviation sector. Continuous evaluation and improvement of safety management systems should be prioritized, with a focus on the variables highlighted in this analysis.

These recommendations and policy implications underscore the critical importance of Management Support, Safety Culture, Teamwork, and Employee Training in reducing the risk of aviation accidents in Kenya. They aim to guide stakeholders in the aviation industry toward enhancing safety practices, fostering a culture of safety, and ultimately contributing to improved aviation safety standards and a significant reduction in

accidents in Kenya.

5.4.2 Practice and Management

Regarding Management Support (MS), it is advisable to invest in leadership development programs for management personnel within aviation organizations. These programs will equip them with the necessary skills to provide effective support for aviation safety initiatives. Continuous monitoring and evaluation of management support practices should be implemented to ensure they align with aviation safety objectives. Additionally, promoting open and transparent communication channels between management and operational staff is crucial to foster a culture of support and collaboration.

In terms of Safety Culture (SC), actively cultivating a strong safety culture within aviation organizations is paramount. This can be achieved through training programs, workshops, and awareness campaigns that emphasize the importance of safety. Leadership commitment to safety should be visible and unwavering to set a strong example. Establishing mechanisms for reporting safety concerns and incidents, as well as providing avenues for employees to offer feedback on safety-related matters, is essential.

For Teamwork (TW), it is recommended to invest in team-building activities and training programs to enhance teamwork among aviation personnel. Encouraging collaborative problem- solving and effective communication is vital. Optimization of collaboration and communication channels, particularly in high-risk operational areas, is crucial to create

an environment where teamwork is recognized and rewarded. Emphasizing the shared responsibility of all team members for aviation safety is also essential.

Concerning Employee Training (ET), aviation organizations should develop and implement comprehensive and continuous training programs covering safety protocols, emergency procedures, and industry best practices for all aviation personnel. Regular assessment and updating of training programs are necessary to ensure alignment with evolving safety standards and regulatory requirements. Conducting regular skills assessments to gauge the effectiveness of training programs and identify areas for improvement is also advisable.

In terms of overall management recommendations, regulatory authorities, such as the Kenya Civil Aviation Authority (KCAA), should actively monitor and enforce compliance with safety standards related to Management Support, Safety Culture, Teamwork, and Employee Training. Promoting collaboration between airlines, industry associations, and regulatory bodies to share best practices and develop industry-wide safety initiatives is crucial. Continued investment in research and data collection on aviation safety to inform policy development and decision- making within the aviation sector is essential. Finally, prioritizing the continuous evaluation and improvement of safety management systems, with a focus on the variables highlighted in this analysis, is vital to ensure that safety practices are integrated into all aspects of aviation operations. These recommended best practices and management strategies aim to enhance aviation

safety within Airlines in JKIA and contribute to improved safety standards and a significant reduction in aviation accidents in Kenya.

5.4.2 Theoretical Implications

The conclusions drawn from the analysis of the impact of Management Support, Safety Culture, Teamwork, and Employee Training on the risk of aviation accidents in Kenya within the context of Airlines in JKIA have several theoretical implications that contribute to the broader understanding of aviation safety and human factors theory.

The study underscores the importance of integrating human factors theory into aviation safety research. It highlights how factors related to management support, safety culture, teamwork, and employee training are critical components of the aviation safety system. Theoretical frameworks in aviation safety should consider these human factors as central elements in understanding and improving safety outcomes.

Moreover, the findings emphasize the complexity of human factors within aviation safety. Human factors are not monolithic but encompass multiple dimensions, including management practices, organizational culture, team dynamics, and training processes. Theoretical models must account for this multifaceted nature of human factors.

The study provides quantitative validation of the theoretical relationships between human

factors and aviation safety outcomes. It demonstrates the measurable impact of these factors on the risk of aviation accidents, strengthening the theoretical foundation by offering empirical evidence of these relationships.

Additionally, the conclusions reveal variations in the relative importance of different human factors. Management support and employee training emerge as particularly influential, while safety culture and teamwork have somewhat smaller effects. This nuanced understanding enriches human factors theory by acknowledging that not all factors are equally significant in every context.

The study underscores the perception-action link within human factors theory. It shows that how aviation personnel perceive these human factors can influence their behaviors and actions, ultimately affecting safety outcomes. Theoretical models should consider this interplay between perceptions and actions.

Furthermore, the theoretical implications acknowledge that safety culture is not static but dynamic. It can evolve over time and vary among individuals and organizations. Theoretical frameworks should account for the adaptability and changeability of safety culture within aviation systems.

The conclusions also emphasize the importance of contextual sensitivity in human factors theory. The impact of these human factors may differ across airlines, regions, or specific

aviation environments. Theoretical models should incorporate context-specific factors to better explain safety outcomes.

These theoretical implications provide a comprehensive view of how human factors theory applies to aviation safety. They highlight the integration, complexity, quantifiability, relative importance, perception-action link, dynamic nature, and contextual sensitivity of human factors within aviation safety systems, contributing to a deeper theoretical understanding of aviation safety and human factors theory.

5.5 Areas for Further Research

Based on the findings of the study, two specific areas for further research can be done on:

i. One promising avenue for future research is cross-cultural analysis within the aviation safety context. This research would delve into how cultural differences might influence the impact of human factors, including management support, safety culture, teamwork, and employee training, on aviation safety. By examining whether these relationships vary in different cultural contexts, researchers can gain insights into the cultural factors that play a role in aviation safety practices.

ii. A comparative analysis across different airlines operating in Kenya or similar regions represents another intriguing research path. This research would seek to compare the risk of aviation accident of various airlines, taking into account

their varying emphasis on management support, safety culture, teamwork, and employee training. Such a comparative analysis could help identify best practices that contribute to improved safety and pinpoint areas where enhancements are needed.

5.6 Limitations of the Study

This study acknowledges certain limitations. The research focused exclusively on the aviation environment at Jomo Kenyatta International Airport (JKIA) and relies on questionnaire responses from a selected group of airlines operating there. This geographical and operational focus might limit the generalizability of the findings to other airports or regions in Kenya and beyond. Additionally, the study's reliance on survey data may be subject to response bias and may not capture all nuances of human factors involved in accidents comprehensively. Furthermore, while the study aimed to explore a wide range of human factors, it might not encompass every possible factor due to constraints in time, resources, and access to proprietary information.

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APPENDICES

Appendix I: Questionnaire

TITLE OF PROJECT: Effect of human factors on the risk of aviation accidents in Kenya: Case study of airlines in JKIA

RESEARCHER: Edwin Cheruiyot
REG: EASA/MBA/0246/22

Dear Respondent,

Kindly answer the following questions to the best of your knowledge. The information obtained from this interview is strictly for academic purposes.

SECTION A: Demographic Information

Gender:

Male [ ] Female [ ]

Age bracket

Below 30 yrs [ ] 30-39yrs [ ] 40-49 yrs

[ ] 50 yrs and above [ ]

Work experience?

1-5 years [ ] 6-10 years [ ]

11-15 years [ ] - ------ above 15 years [ ]

What is your role at your airline? Management [ ] Pilot [ ]

Cabin crew [ ] Flight Operations [ ]

Safety culture [ ] Safety [ ]

Does the role you play in your organization influence human factors to such extent as to cause risk in aircraft operation? (YES/NO)

SECTION B: Risk of Aviation Accidents

Please indicate with a tick √ the extent to which you agree with any of the following statement concerning Risk of Aviation Accidents in your organization. Use the scale where 5: Strongly Agree, 4: Agree, 3: Neutral, 2: Disagree, 1: Strongly disagree

Risk of Aviation Accidents	5	4	3	2	**1**
The airline has effective communication protocols in place to reduce the risk of accidents.					
The airline's safety culture encourages reporting of safety concerns without fear of reprisal.					
The airline has effective procedures in place to address and mitigate human error.					
The airline provides adequate resources and support to promote crew mental well-being.					
Crewmembers are well-trained to handle unexpected situations and emergencies					

SECTION C: Management support and Aviation Safety

Please indicate with a tick √ the extent to which you agree with any of the following statement concerning Management support and aviation safety in your organization. Use the scale where 5: Strongly Agree, 4: Agree, 3: Neutral, 2: Disagree, 1: Strongly disagree

Management support and aviation safety	5	4	3	2	**1**
To what extent do you believe that management support positively influences the safety culture within our airline?					
Do you feel that management provides sufficient resources and training to help mitigate the risk of aviation accidents in our airline?					
How would you rate the level of transparency and open communication from management regarding safety concerns and incidents?					
In your opinion, does management support play a significant role in reducing the likelihood of human error, which can lead to aviation accidents?					
To what extent do you think that management support contributes to a proactive safety approach within our airline, where potential risks are addressed before they become critical?					

SECTION D: Employee Training and Aviation Safety

Please indicate with a tick √ the extent to which you agree with any of the following statement concerning Employee training and aviation safety in your organization. Use the scale where 5: Strongly Agree, 4: Agree, 3: Neutral, 2: Disagree, 1: Strongly disagree

Employee training and aviation safety	5	4	3	2	**1**
To what extent do you believe that the quality of employee training programs in our airline positively impacts safety and reduces the risk of aviation accidents?					
Do you feel that the training you have received adequately prepares you to handle safety-critical situations and contribute to accident prevention?					
How satisfied are you with the frequency and effectiveness of safety-related training sessions provided by the airline?					
To what extent do you think that employee training contributes to a proactive safety culture within our airline, where employees are well-prepared and vigilant about potential safety risks					
In your opinion, does ongoing training and skill development significantly reduce the likelihood of errors that could lead to aviation accidents?					

SECTION E: Teamwork and Aviation Safety

Please indicate with a tick √ the extent to which you agree with any of the following statement concerning Teamwork and aviation safety in your organization. Use the scale where 5: Strongly Agree, 4: Agree, 3: Neutral, 2: Disagree, 1: Strongly disagree

Teamwork and Aviation Safety	5	4	3	2	**1**
1. To what extent do you believe that effective teamwork among flight crews reduces the risk of aviation accidents at your airline?					
2. In your opinion, does a culture of open communication and collaboration among aviation personnel contribute to enhanced safety and a lower risk of accidents in airlines in JKIA?					
3. How well do you think Crew Resource Management (CRM) training is implemented at your airline to improve teamwork and reduce the risk of aviation accidents?					
4. To what extent does the ability of flight crews to resolve conflicts and make collaborative decisions positively impact aviation safety in your airline?					
5. In your view, how does the mutual respect and professionalism among aviation personnel influence the effectiveness of teamwork and, consequently, the risk of aviation accidents at your airline?					

SECTION F: Safety Culture and Aviation Safety

Please indicate with a tick √ the extent to which you agree with any of the following statement concerning Safety culture and aviation safety in your organization. Use the scale where 5: Strongly Agree, 4: Agree, 3: Neutral, 2: Disagree, 1: Strongly disagree

Safety Culture	5	4	3	2	**1**
1.To what extent do you believe that a strong safety culture within our airline positively contributes to the reduction of aviation accident risks?					
2.Do you think that the safety culture in our airline encourages open communication about safety concerns, near-miss incidents, and potential risks?					
3How well does our safety culture support a proactive approach to identifying and mitigating safety hazards, ultimately enhancing overall aviation safety?					
4.In your opinion, does a robust safety culture significantly influence the reporting of safety-related issues, contributing to accident prevention and overall safety improvement?					
5.To what extent do you think that a strong safety culture fosters a collective commitment to safety among employees, leading to a safer aviation environment in our airline?					

…….Thanks for your cooperation…….

Appendix II: Budget

MATERIALS	RATE	QUANTITY	COST (SHS)
Data collection			10,000.00
Laptop	@40,000	1	40,000.00
Foolscaps Ruled	@ 500	1 ream	500.00
Photocopy papers	@ 500	3 Reams	1,500.00
Travelling Cost			20,000.00
Printer	@ 1	1 piece	15,000.00
Internet Cost			15,000.00
Pens	@20	4	80.00
Miscellaneous			10,000.00
Total			**112,080.00**

Appendix II: Plagiarism Certificate

SR397

ISO 9001:2019 Certified Institution

THESIS WRITING COURSE

PLAGIARISM AWARENESS CERTIFICATE

This certificate is awarded to

EDWIN CHERUIYOT

EASA/EMBA/0246/22

In recognition for passing the University's plagiarism

Awareness test for Thesis **entitled: EFFECTS OF HUMAN FACTORS ON THE RISK OF AVIATION ACCIDENTS IN KENYA: CASE OF JKIA AIRLINES** with a similarity index of 11% and striving to maintain academic integrity.

Word count: 20119

Awarded by

Prof. Anne Syomwene Kisilu
CERM-ESA Project Leader Date: 20/11/2023