The Decline of Commercial Pilot Training Initiatives in Zambia: Considering the Impending Global Pilot Shortage

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Abstract

This research presents a critical analysis of the commercial pilot training opportunities in Zambia, focusing on the challenges encountered by the sector in looming world pilot shortage. There is concern on how the experience of Approved Training Organizations (ATOs) would be beneficial in meeting the demand for pilots in the civil and commercial aviation sectors. This study investigates the extent of government support for pilot training policy, the essential minimum criteria for pilot training, the qualifications of Approved Training Organization(ATO) holders in managing pilot training, and the existing defects in aviation training management. Over the course of the next decade, the global aviation industry has expectations to witness a notable increase in both passenger numbers and revenue, with a particularly rapid growth already observed in emerging nations. The potential impact of the Middle East on global traffic development necessitates substantial infrastructural enhancements of which major regional airlines have placed orders for almost 1,000 aircraft. According to Greenbank (2022), Boeing's projections state that there is expected to be a sustained need for commercial aircraft pilots and technicians over the next two decades, with the Asia Pacific region anticipated to exhibit the highest need. The European aviation industry now employs a significant number of individuals, with over 95,000 pilots and 101,000 technicians. These figures highlight the demand for skilled professionals in the field of aviation throughout the world. Based on estimations, the need for pilots in Russia is projected to reach 17,000, while the requirement for technicians is anticipated to be 22,000.

This research aims to provide information to enhance the training of Zambian civil aviation pilots by addressing the challenges encountered in the existing flight training schools. The expansion of the global economy (Greenbank ,2022) has led to a rise in travel opportunities, which has projected the need on the procurement of around 38,000 passenger aircraft over the forthcoming two decades. According to Boeing, it is anticipated that a total of 32,600 aircraft would be manufactured by the company by the year 2034. Boeing places emphasis on the expansion of its pilot team and the attrition of its modern aircraft fleet, resulting in an increased demand for skilled pilots.

The Zambia Air Services Training Institute (ZASTI) was established in 1970 with the objective of fulfilling both the domestic pilot training requirements and adhering to international standards. Prior to the establishment of ZASTI program, commercial pilot training was exclusively available abroad. The flying school was initiated by the Zambian government and received sponsorship from Canada. The program, spearheaded by Mr. Valentine Shula Musakanya, aimed to promote the pursuit of aviation studies among Zambian school graduates and University of Zambia students as a means to alleviate the current lack of pilots. Following Zambia's attainment of independence, the government under the United National Independence Party (UNIP) initiated program to provide local training for indigenous aviation pilots. ZASTI secured a substantial government grants that aimed at enhancing educational and technical training initiatives, that encompassed the provision of scholarships specifically tailored for citizens aspiring to be student pilots. To kick start the program, some Canadian donors gave the institution two Cessna 150 aircraft and the researcher noted that at its peak, ZASTI had a fleet of 10 aircraft (7 Cessna 150/152, 1 Cessna 172 and 2 Piper Aztec). Out of a total of 248 student pilots enrolled at Zambia Air Services Training Institute, it is impressive that the flying school successfully taught and produced 136 individuals who obtained Commercial Pilot Licenses within Zambia. The production of this number spanned from 1971 until 1990. The most recent iteration of the Commercial Pilot Training course, known as Course 14, concluded in the year 1990. Since 1990, ZASTI has provided about 12 Private Pilot License(PPL) courses, all of which have not been focused on commercial flying and are not relevant for commercial pilot employment. In 2009, Zamfari Limited provided training to four pilots trained locally.
Nevertheless, it has been 33 years since the Zambia Air Services Training Institute (ZASTI) last provided training for Commercial Pilot License (CPL) certification. Over the course of 14 years, the private sector has demonstrated a lack of success in generating a sufficient number of pilots.
The ZASTI student pilot bursaries system was ended by the MMD administration restricting sponsorship to the flying students who made up the last CPL course 14. Additionally, the existing data on training schools in Zambia was sourced for Lusaka Flight School that operated under Zamfari Ltd, Aero Academy operated by Corporate Aero, Sky Trails Flight School operated by Sky Trails Ltd, and the Zambia Air Force Flying Training School.
Zambian Flying schools both Approved Training Organizations(ATOs) and those not approved have had challenges in providing training for commercial pilots since 1990, in the case of Zambia Air Services Training Institute (ZASTI), and since 2009 for the private sector. The existing circumstances are further aggravated by a dearth of appropriate training aircraft, proficient flying instructors, a lack of flight and Navigation Procedures Training (FNPT) equipment and aircraft simulators, aircraft spare parts, insufficient qualifications in flight training provider management, inconsistencies in syllabi, shortages of ground training instructors, and issues pertaining to pay structures and QFI employment. It is important for managers to do a thorough evaluation of an organization’s strengths and limits. The necessity of revising legislation is vital in order to have a robust strategy and framework for planning. The present study investigates the multifaceted influences on the supply and demand of airline pilots worldwide. This study examines the impact of financial consequences, corporate expansion objectives, retirement patterns and legislative factors.

Key Words:Flight Training;Zambia Approved Training Organizations;Shortage of Pilots;ZASTI last CPL Course 1990;138 Additional Pilots in Zambia by 2041;Qualified Flying Instructors;Training Aircraft;Aircraft Simulators;Civil Aviation Authority;Zambia Air Services Training Institute;External and Internal Factors affecting Flying Training Organizations

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Author’s Personal Reflections

The Aviator’s Academic Paradox

I joined the Zambia Air Force on April 19, 1993, and it has been a privilege to fly military missions when I served in the defense force. Since 2005, I have worked in civil aviation and become familiar with the pre-flight concerns of pilots. The administration of the aviation sector is enhancing safety, health, labour ,environmental and quality regulations. The majority of local aviators assert that aviation policy, management and complications from non-industry aviators or academicians create conflicts for pilots when they are excluded

from setting rules and procedures for the aviation sector. On the international fora, typically, academic and aviation industry experts are involved in a comprehensive aviation operational assessment and a significant omission in Zambian committee of policy formulation and process evaluations is a lack of aviation expertise. In popular culture, Pilots are commonly portrayed as individuals who possess the opportunity to unveil the concealed "Aviation Pandora's Box" whenever granted a platform. In other words, it might be inferred that while the general public should be informed about aviation, they may not necessarily require insights from pilots on the impact of aviation policy on their own industry. Although flying in itself has some degree of being hazardous, people have faith in their pilots when they travel as passengers on a flight, thus the reason why aviation safety must be given its undue requirements whenever it is under review notwithstanding the fact that the pilot must be allowed to represent his own experiences within the aviation industry. Collaborative interaction through safety reviews enables the understanding on reasons why enhancing pilot well-being, remuneration, working conditions, and safety regulations is paramount for the aviation industry. As a result of misunderstanding due to lack of association, it is not uncommon that the academic world considers that modern aviation credentials as lacking academic rigour thus misrepresent facts on consultations that pilots possess "specialized vocational skills."

The Zambian aviation sector and associated business has been challenged with approval predicaments with regards to Commercial Pilot License course. It is also worth noting that some Zambian Approved Training Organizations (ATOs) have experienced challenges in seeking permission to operate uncertified aircraft, such as the South African-built Sling. This proposal has not been authorized by the Civil Aviation Authority (CAA) noting that there is relevance on the Zambian ATOs desire to utilize the Sling for pilot instruction. It is interesting to note that some flying schools in South Africa have demonstrated the cost-effectiveness of the Sling aircraft for pilot training as accepted by the South African Civil Aviation Authority. According to extensive testing conducted by South African aviation institutions, the Sling provides globally accessible and economically viable pilot training. The CAA Zambia has at some instances found itself at cross roads with the Zambian aircraft operators on desired application of foreign but regional recommended practices seen as feasible for the industry. There is continuous debate between the two sides that some recommended practices in other countries that would be equally suited for domestication under such regulation, a consensus among flying training operators is common that the CAA has not been prompt enough to implement Aviation Training Organization solutions that are efficient and cost-effective. It is also true that in recent decades, simulation technology has enhanced aviation training worldwide (Salas, 1998). In several ways, simulation technology has enhanced aviation training in that modern aviation instruction is more realistic, secure, economical, and adaptable. I believe biases and preconceptions within the aviation policy community prevent us aviators from utilizing current scientific advances to enhance aviation training. At the moment, Zambia lacks certified synthetic flight training apparatus for civil aviation.

It is therefore my hope that this research paper assists pundits and critics alike in analyses of the research assumptions to stimulate discussion among behavioural science specialists and relevant Approved Training Organizations. Pilots use aeronautical science to control their intuitive and deliberate responses to various stimuli during routine flight operations. Consequently, these individual pilots typically and unknowingly take part in the circumventing of "Aviator Pandora Box" by evaluation of their work station following safety International standards. Underrepresentation of pilots in aviation policy evaluation committees may surely result in an omission for overall aviation sector requirements.

It is my very strong belief that intellectually gifted individual pilots have a strong comprehension for efficient aviation sector operations.

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Chapter One

Back Ground and Introduction

1.1.1 A Short History of Pilot Training In Zambia

Zambia gained its independence from Great Britain on October 24, 1964. The platform of the United National Independence Party (UNIP) government aimed to empower appropriate technical skills to the citizens of Zambia through a nationwide inclusive policy on education. This commitment led to the establishment of government backed aviation policy for the Republic of Zambia. The UNIP Aviation policy prioritized decision-making following a Top-down model from the government to the public. The new republic implemented broad reaching comprehensive social policies. These policies were designed to improve the standard of living in the newly independent nation that required providing a blanket policy for the transfer of essential knowledge and skills from the colonial administrators to the local population which was critical during the transitional period after independence. The systematic transfer of knowledge, particularly in the realm of government administration, was intended to occur over a designated timeframe, with specific deadlines set for various crucial branches of government. For instance, the administration of the Zambia Air Force, which had been under the control of the Royal Air Force, underwent this transfer process until 1972.

Based on the aforementioned information received (Nyirenda, 2023), the research revealed that the Zambia Air Force recruited a group of six Zambian student pilots who commenced their training in December 1965.Among the six individuals, just two individuals were able to completely complete their program in the year 1967. The individuals in question were Christopher J Kabwe and Desmond C Arneson. Following their completion of the Qualified Flying Instructor (QFI) program, the two pilots proceeded to join the instructors's group for both the Chipmunk and the De-Havilland of Canada DHC-2 Beaver aircraft.

In light of the aforementioned accomplishments of the first Zambian pilots, it is noteworthy to mention that the 1972 appointment of Peter Dingiswayo Zuze as the Air Force Commander served as an important milestone in the indigenous pilot training governance of the Zambia Air Force.

Christopher J Kabwe subsequently converted (Nyirenda, 2023) to fighter flying upon the establishment of No.47 Squadron at Mbala, and the study noted that his colleague chose to separate from the Zambia Air Force at an earlier stage. Major General C.J. Kabwe subsequently assumed the role of the inaugural Commanding Officer (CO) for Mbala from 1971 to 1974, before transitioning to the position of Air Commander of the Zambian Air Force (ZAF) from 1976 to 1980.

In order to get insight into Civil Aviation development, the researcher investigated the area of Pilot training adopted by the UNIP government from 1964 that it was coordinated adequately with the colonial administrators having already set in motion a policy to develop locally produced pilots for the Zambia Air Force. The transformation from colonial air corps into the Zambia Air Force started on 1st March 1964 as witnessed in retrospect that by 1967 two Zambian pilots had qualified from ZAF Livingstone ,Flying Training school.

1.1.2 Pilots for The Civil Aviation Network-National Airline

The UNIP government took important consideration and noted the significance of pilot training accomplishment in the Zambia Air Force considering how the success can be replicated within the context of the Civil Aviation sector. This was particularly relevant when reviewing the collapse of the Central African Airways, a joint venture between Rhodesia and Nyasaland. It was imperative to replace this collaborative effort with an indigenous airline that would be locally established. The Zambian government encountered difficulties in achieving equitable development agenda over the nation as a whole. In the field of aviation, the UNIP government recognized the opportunity to establish a comprehensive air network that effectively served the country's interest both at home and abroad. On a domestic front it was imperative that the government policy delivery could be more efficient with a robust aviation network to the provincial administration centres and other geographically isolated regions of the country. Nevertheless, the establishment of a new airline presented a significant challenge for UNIP due to the scarcity of trained, proficient and indigenous commercial pilots within the country.

1.1.3 The Italian Government and set up of Zambia Airways (In-Liquidation)

Following the dissolution of Central African Airways, (Mulenga, 2018) the UNIP government-initiated negotiations with other developed nations, culminating to the Italian government's involvement in providing technical assistance and aircraft leasing options which Consequently resulted in the 1967 establishment of Zambia Airways (In-Liquidation).The establishment of Zambia Airways (In-Liquidation) was followed by flight operations on January 1, 1968, at a critical time when the nation lacked the necessary resources to train pilots and aircraft engineers domestically. Consequently, the airline initially relied on foreign personnel to fulfil these roles. The airline expeditiously commenced its global operations with the Lusaka to London flights, having layovers at Nairobi that facilitated connectivity between several destinations such as Kenya, Malawi, Tanzania, and Mauritius. Rome served as the European layover and gateway to other destinations as served by partner Alitalia.

Consequently, the researcher noted that immediately after the establishment of the national airline, an inconsistency in the development of commercial aviation growth conflicted against local pilot training delivery. The foregoing is attributed to the fact that Zambia Airways (In-Liquidation) saw a period of fast expansion (Mulenga, 2018), backed by the expedited development of significant facilities built by Italians. The aforementioned initiatives encompassed the progress made in constructing residential structures within the Lusaka's Longacres area, establishing a maintenance base, constructing a headquarters in Longacres, and establishing a cargo processing facility at Lusaka International Airport. The high level of activity in the Longacres district can be traced to the presence of an airline operating from City Airport (Mulenga, 2018) until the latter half of 1968, at which point the newly constructed Lusaka International Airport became fully operational. The researcher acknowledges that the Italian government played a significant role in the start-up of Zambia Airways (In-Liquidation) although despite these significant infrastructure developments, there was a lack of facilitation on commercial flight training institutions in the country.

Nevertheless, the Italians and the Yogoslavs were acknowledged and later on about 1970 assisted the development of the Zambia Air Force, Ground Air support capability, in providing technical assistance instrumental in setting up of the jet aircraft training air base facilities for military pilots. This endeavor proved successful, leading to the establishment of Zambia Air Force Mumbwa Air Base. ZAF Mumbwa base served as the home for the Italian-built light ground attack twin-seater aircraft, the Aermacchi MB326GB and ZAF Mbala base,as the home of Yastrebs and Galeb N60 fighter aircraft.

1.1.4 Scarcity of Local Pilot Training Facilities

Nevertheless, the newly established UNIP administration encountered difficulties pertaining to the modalities of foreign training requirements associated with overseas pilot training. This predicament was also compounded with the scarcity of domestically educated individuals capable of undertaking a comprehensive and rigorous pilot training program. Apart from recreational and private flying training available at the Lusaka flying club situated at City Airport from 1968 onwards, the researcher noted that prior to the establishment of the Zambia Air Services Training Institute (ZASTI), Commercial pilot training courses could only be completed from overseas.

1.1.5 The Birth of Zambia Air Services Training Institute

The year 1970 witnessed the establishment of the Commission of Vocational Training and Technical Education, (Mulenga, 2018) which was initiated by the Zambian government. The entity was situated within the premises of the former Secretariat buildings. The organization's first commissioner was Mr. Valentine Shula Musakanya, with Mr. Mitchel serving as his deputy. The commission was provided with financial assistance from the Canadian government and a donation of two(02) light training aircraft, leading to its future reorganization into the Department of Technical Education and Vocational Training. During that particular time frame, Zambia Airways (In-Liquidation), although being managed by Alitalia, experienced a shortage of Zambian pilots. In response, Mr. Musankanya devised a program with the objective of incentivizing aspiring Zambian school graduates and University of Zambia students to pursue flight training. The primary goal was to facilitate their ability to seek professional occupations as airline pilots subsequent to acquiring their commercial pilot licenses.

During that time, Mr. Musakanya, recognizing the need of an aviation training institution in Zambia and took the initiative to establish an arrangement with the Lusaka Flying Club. This club was located at City Airport, which now currently serves as the headquarters for the Zambian Air Force. Mr. Musakanya, a distinguished club member and owner of a Beechcraft Bonanza aircraft with the registration 9J-ABO, successfully brokered an agreement that enabled the delivery of aviation instruction to both school leavers and university students during weekends or on a part-time schedule. Furthermore, a consensus was reached regarding the allocation of financial responsibility to the government for the costs related to membership and aviation instruction at the Lusaka Flying Club.

In view of the foregoing, according to Mengo, (2018), who stated that unfortunately, there was a restricted cohort of university students who exhibited a proclivity towards this prospect, and some of those who did engage afterwards disengaged. The scheme was solely continued by Alick Sakala who opted to terminate his studies at the university to pursue a professional career as an airline pilot. In January 1971, Zambia Airways (In-Liquidation) offered sponsorship to facilitate Alick Sakala's training in Perth, Scotland. It historically important to note that during the period of Zambia Airways (In-Liquidation) collapse, Captain Alick Sakala occupied the role of Chief Pilot for Standards and Training, notwithstanding the fact that he had assumed the role of chief instructor for the DC10 aircraft.

In view of the foregoing ,the researcher notes that about June 1971, (Mengo, 2018) Zambia Airways (In-Liquidation) sponsored the attendance of four former school graduates, including Captain Maurice Chimbelu, at the Air Service Training in Perth, Scotland. The primary objective of the individuals in question was to get commercial pilot licenses following their prior acquisition of private pilot licenses. This event signified the commencement of pilot training in Zambia. In the following year, the government initiated the establishment of a flying school at the Lusaka Flying Club, whose primary aim was to provide comprehensive instruction that would enable individuals get commercial pilot licenses. Following that, the institution underwent a name change to ZASTI and was then relocated to Lusaka International Airport, currently renamed as Kenneth Kaunda International Airport. During its prime, ZASTI possessed a total of ten aircraft, which included seven Cessna 150s, one Cessna 172, and two twin-engine Piper Aztecs.

1.1.6 Government Bursaries to Zambians (UNIP)

The research observed that within the context of ZASTI activities, the UNIP government, in its capacity as the policy initiator, had a clearly defined mission and mandate to supply domestically educated pilots for the aviation sector. Based on the aforementioned information, it is evident that a substantial proportion of government-funded projects in the field of aviation and technical training were appropriately assigned to the institution widely known as ZASTI. This encompassed the allocation of specific funds and the subsidization of local student pilot expenses via government bursaries. The student pilot bursaries program was finally discontinued by the MMD administration, limiting its scope to the completion of the last course for Commercial pilots. This particular course, was identified as course number 14. The financial flow challenges at ZASTI became apparent subsequent to the completion of the final batch of CPL students for course 14.

1.2 Other Notable Zambia Flight Training Approved Training Organizations

Besides ZASTI a few notable pilot training organizations are acknowledged as follows:-

1.2.1 Zamfari Ltd's Lusaka Flight School operated from 2007 to 2010 (only managed to qualify two (02) Commercial Pilots with Instructor Ratings)

1.2.2 Corporate Aero's Aero Academy opened in 2021 (Still running Private Pilot training ,not yet certified for Commercial Pilot training and yet to produce Commercial Pilots)

1.2.3 Sky Trails's Flight School opened in 2022 (Still running Private Pilot License training programs and not certified for COL programs and yet to produce Commercial Pilots)

1.2.1 Zambia Air Force Flying Training School

Although there has been a significant decrease in commercial pilot training in Zambia, it is well recognized that the military pilot aviation sector has achieved remarkable accomplishments in local pilot training, extending up to the flight instructor level. The Zambia Air Force's track record of accomplishments (Nyirenda, 2023) has had

a notable influence on the Southern Africa Development Community. In addition to providing training for its own pilots, the Zambia Air Force has extended its flight training programs to military pilots from neighbouring nations such as Namibia and Botswana. It has been observed that the Zambia Air Force, although facing capacity challenges, has taken steps to enhance its instructor workforce by partnering with 43 Air School to train some of its instructors. The collaboration with 43 Air school was undertaken with the objective of ensuring adherence to the regulations set out by the Civil Aviation Authority. The Zambia Air Force has primarily served as a significant local resource for civilian commercial pilot instructors at institutions such as ZASTI and other flight schools.

1.3 Statement of The Problem

Since the year 1990, the Zambian Approved Training Organizations have faced a multitude of challenges in their endeavours to support the training of commercial pilots within the country of Zambia. Since 1990, the quantity of Commercial pilots who have effectively acquired certifications from the nation's Approved Training Organizations (ATOs) have consistently remained less than five(5) locally qualified CPL holders from any flight school. Majority of the available pilots are either Ex-ZAF or were trained abroad. This corresponds to an average production of

little less than five(05) Commercial pilots locally trained since 2009. The present circumstances have been intensified by various elements, such as the lack of appropriate training aircraft, a restricted number of Qualified Flying Instructors, the unavailability of Flight Procedures Training equipment and Aircraft Simulators, a scarcity of aircraft spares, inadequate qualification of flight training provider management, inconsistencies in the flying training syllabus, a shortage of ground training instructors, high student enrollment fees or course fees, insufficient pay structures and employment conditions for Qualified Flying Instructors, elevated maintenance costs, compliance fees, cost-prohibitive fixed costs, and costly fluctuating fuel prices.

These concerns necessitate thorough deliberation. The introduction of aviation input has posed considerable difficulties for the budgets and cash plans, thereby affecting the marginal costs of the Approved Training Organization. Therefore, the primary aim of this study was to create a scholarly discussion regarding these challenges in order to improve the existing situation.

1.4 Main Objective

The main objective of this study was to examine the inadequacies in the country's policy on commercial pilot training. The aim of this study was to ascertain the challenges faced by Approved Training Organizations in their endeavours to enhance their capability for generating an adequate number of pilots to fulfil the requirements of pilots in Zambia amidst the looming global shortage civil pilots for Commercial aviation entities.

1.5 Specific Objectives

The specific objectives of the study were as follows:

i. This analysis focuses on the deficiencies within the country's prospective pool of human resources, as well as the current criteria for government support on pilot training policy. It also considers the minimum applicable standards for essential pilot training, ATO holder management qualifications, and the prevailing inadequacies in aviation training management.
ii. Evaluate the identified ATO issues regarding compliance standards for aviation training in Zambia.
iii. The study also aims to examine the influence of current economic inputs on the selected ATO holders and their operations.
iv. The research also examines the manner in which the chosen Approved Training Organizations (ATOs) are effectively handling training expenses, while also assessing the current deficiencies in local aviation training.
v. The objective of this study assess the current state of local aviation technical equipment and infrastructure, and analyze its impact on the costs associated with Approved Training Organization (ATO) operations.

vi. Offer suggestions for all of the aforementioned aspects.

1.6 Research Questions

The researcher utilized research questioning context rules to maintain focus within the issue area and facilitate successful interviews as follows:

i. What are the deficiencies pertaining to the nation's prospective human resource pool, the current parameters for governmental support in aviation training, the minimum relevant Zambian standards (ZCARs) regarding essential qualifications for ATO holder management, and the prevailing state of aviation management?
ii. What are the primary concerns of selected Approved Training Organizations(ATOs) regarding aviation compliance standards in Zambia?
iii. What is the influence of the prevailing economic factors that directly impact the costs of aviation pilot training and operational expenses on Approved Training Organization(ATO) holders?
iv. How do the ATOs effectively handle and control training expenditures?
v. What are the current deficiencies in local aviation training?
vi. What is the impact of the current local aviation training technical support and infrastructure on the expenditures incurred by Approved Training Organizations(ATOs)?

1.7 Significance of the Study

The findings of this study have the potential to provide resolutions to the difficulties encountered in pilot training within the aviation industry and contribute to the effective administration of civil aviation pilot training in Zambia.

1.8 Limitations of the Research

As a result of apprehensions over privacy, a small number of participants exhibited hesitancy in offering relevant information. Nevertheless, participants were reassured that the collected data would be handled with the highest confidentiality, ensuring that only the researcher would have privileged access to the submitted information.

Chapter Two

2.1 Literature Review

The researcher undertook an extensive literature review, examining several books and articles, with the aim of identifying pertinent literature related to the unique pilot training requirements in the context of Zambia. The present study examines the data related to pilot training, doing an analysis of its direct and indirect consequences. This study conducted a comprehensive organization and evaluation of the existing human resource performance standards within Approved Training Organizations, as well as training equipment and other relevant studies related to pilot training. The primary objective of this study is to identify and emphasize specific aspects of pilot training in Zambia that have not received sufficient attention and warrant further exploration within the designated categories. These areas will be thoroughly studied in the ensuing evaluation. The current study aims to investigate the process of defining the crucial role played by an Approved Training Organization (ATO) in the field of aviation pilot training. It also seeks to establish the level of expertise required for effective pilot training, evaluate the performance of pilot training programs, explore the use of simulation in training, and propose strategies for facilitating knowledge transfer in the training process. Furthermore, the objective of this study is to outline the specific operational duties that are required to uphold and enhance proficient aviation abilities inside the nation. This study also examines the global progression of pilot training methodologies throughout history and examines international approaches to enhancing pilot supply in relation to work opportunities. The current research on pilot training is expected to attract attention from government policy makers and corporate experts engaged in the supply of flight training and flight training instructors.

2.1.1 Safety Culture and Literature Dearth on Flying Training Organizations

Notwithstanding the above, according to Gao (2017), who notes that considerable amount of scholarly material exists pertaining to the subject of safety culture and safety climate within commercial aviation enterprises. Nevertheless, there is a scarcity of research explicitly dedicated to Approved Training Organizations. In their research, Freiwald, Lenz-Anderson, and Baker (2013) adopted a mixed methods methodology, incorporating surveys and interviews, to investigate the attitudes and viewpoints of employees in both operational and managerial roles inside a global organization operating across multiple campuses in the aviation industry. The conducted analysis unveiled a lack of a safety culture within the aforementioned firm, which had recently experienced a series of aircraft hull losses. In the study conducted by (Adjekum, 2014), the Collegiate Aviation Program Safety Culture Assessment Survey (CAPSCAS) was utilized to assess the safety culture of a certified Part 141 collegiate aviation program. The primary objective of this study was to investigate the influence of year groups and nation culture on the perception of safety culture within the collegiate aviation program. In a later investigation, Adjekum et al. (2015) utilized an enhanced iteration of the CAPSCAS tool to analyze the influence of safety culture views on safety reporting behaviour among flight students who were enrolled in five college aviation programs in the United States. The study's findings (Gao, 2017) revealed that there was a substantial relationship between the age of the participants and their opinions of the reporting system and safety essentials, which in turn influenced their safety reporting conduct. Based on the literature research previously discussed, it is apparent that the focus of the majority of studies related to safety culture and safety climate has predominantly centred on commercial aviation or flight training businesses in the United States. It is worth noting that there is a limited amount of research available that investigates flying training organizations outside of the United States. Owing to the distinctive regulatory framework, the obstacles encountered in establishing flight training organizations in multiple countries and incorporating equipment from previous studies were substantial, as they necessitated extensive alterations. The study also consulted research that examined the safety climate within an Australian tertiary aviation curriculum (Gao, 2017) who by utilizing a custom-designed survey instrument, assessed the influence of training experience and year groups on students' perceptions of the safety climate. The study according to Gao(2017), aimed to make a valuable contribution to the existing scholarly literature on safety climate by introducing a unique measurement tool and, more importantly, a practical procedure that can be easily adopted by resource-constrained organizations for the purpose of evaluating and comparing safety climates.

2.2 Aviation Strategy-Global Pilot Demand

In a conference paper according to Ahmadian S. and Soran S.(2019), the previous decade, notwithstanding the anticipated risks linked to the global economy, the air transport business has had a steady increase in both passenger volumes and revenue. Moreover, it is worth noting that emerging markets have seen a significantly swifter expansion in this particular industry when juxtaposed with established nations. Between the years 2008 and 2013, the aviation sector in the Middle East experienced a notable increase of 11% in Revenue Passenger Kilometres (RPKs). The growth rate observed during this period exceeded the compound annual growth rate (CAGR) of 4.3% for the total industry, as reported by IATA in 2014. Moreover, it is expected that the Middle East region will emerge as a frontrunner in terms of worldwide expansion in international traffic in the future decades. To capitalize on this growth, several governments and air service providers in developing countries have made significant expenditures to improve their infrastructure. Based on the findings of CAPA (2014), it has been observed that the airlines operating in the Middle Eastern and African regions have made significant acquisitions, with orders exceeding 1,000 aircraft. This figure represents approximately 43% of the total aircraft fleet currently in operation within these geographical areas. Based on the 2011 report published by the Airports Council International (ACI), it is anticipated that airport projects in the Middle East, Africa, and Latin America regions will get a substantial investment of almost US$110 billion. The primary objective of this significant financial commitment is to augment the capabilities of these airports, hence leading to a projected surge of more than 600 million passengers on an annual basis by the year 2020. In 2014, Boeing (BA) published a research projecting a sustained need for commercial aircraft pilots and technicians over the subsequent two decades. The

aforementioned prediction was created with the assumption that there would be a global increase in the number of aircraft by 38,000 across all airlines. Based on forecasts, it is anticipated that the worldwide demand for commercial airline pilots and technicians will reach 558,000 and 609,000 respectively, throughout the period spanning from 2015 to 2034. Based on the existing statistics, it is expected that the Asia Pacific region will exhibit the highest demand for aviation experts, encompassing an estimated necessity of 226,000 pilots and 238,000 technicians. Likewise, it is anticipated that Europe will experience a significant requirement for proficient professionals, including approximately 95,000 pilots and 101,000 technicians. On the contrary, it is anticipated that the demand for aviation experts in Russia will be relatively smaller, encompassing a total of 17,000 pilots and 22,000 technicians. The worldwide economic expansion has contributed to a more equal distribution of money, resulting in increased accessibility to travel opportunities for a larger segment of the global population. Consequently, the number of individuals able to engage in air travel has expanded. Based on Boeing's analysis, it is projected that a substantial demand for travel will necessitate the acquisition of approximately 38,000 passenger aircraft within the next two decades. These aircraft are anticipated to possess a collective value of $5.6 trillion. The statement provided above is in accordance with the latest forecast given by Airbus (EADSF), which predicts the manufacturing of 32,600 new aircraft by the year 2034. As per a spokesperson from Boeing, the utilization of larger aircraft requires the inclusion of expanded pilot teams. Moreover, the increase in pilot attrition rates is coinciding with the growth of modern aircraft fleets, thereby heightening the need for individuals to fill these roles. In 2003, the Ministry of Transportation, Maritime Affairs and Communications implemented a promotional slogan with the objective of encouraging air travel among Turkish people. The slogan emphasized that it was a collective ambition for every individual in Turkey to have the opportunity to partake in the experience of flying at least once during their lifetime. The effects of the "Aviation Liberalization Project" have become apparent within a relatively short period, resulting in rapid progress and growth in Turkey's aviation sector. Turkey has successfully positioned itself as a nation with a comprehensive aviation infrastructure, largely attributable to the diligent endeavours of the Turkish Civil Aviation. The company has established a laudable goal of enabling universal accessibility from Turkey to all destinations worldwide. During a time of crisis and contraction in the aviation industry, Turkey's aviation sector demonstrated consistent growth in several wealthy nations. According to projections, Turkey is expected to experience a substantial growth in the number of aircraft, hitting a total of 700 by the year 2023. Furthermore, it is anticipated that the quantity of pilots will surpass 10,000 within the aforementioned timeframe. Turkish Airlines requires an annual recruitment of approximately 500 newly trained pilots. Flight training organizations, similar to other entities in the aviation industry, conform to regulations at both the national and international levels. These organizations possess structures that are vulnerable to potential harm or interruption. The utilization of strategic management principles in the formulation of a strategy plan can effectively contribute to the progress of educational institutions, with a specific focus on FTOs. This approach empowers these institutions to improve their educational offerings and integrate cutting-edge technical resources. Terrorist organizations utilize strategic management practices in order to adeptly address the dynamic trends and external influences, such as the phenomenon of globalization. A multitude of scholarly inquiries have been undertaken within the realm of strategic management process, spanning the domains of planning and evaluation. However, it has been observed that there is a dearth of extensive scholarly investigation about the strategic review procedure within the Turkish aviation sector. The industry has witnessed substantial expansion, mostly attributed to heightened backing from both governmental and private sectors. The external environment analysis entails the identification and understanding of strategic issues within the external environment. These issues have an impact on a business and eventually determine the outcomes for that firm. The main purpose of external auditing is to identify potential hazards and uncover hidden possibilities within a constantly changing company environment. Like many other industries, the aviation sector is subject to the impact of changes in its external environment. The evaluation of environmental concerns involves a range of elements, such as political, legal, economic, socio-cultural, demographic, technological, international, and marketing considerations. The bulk of aviation sectors are susceptible to variations in external factors. However, the entities operating within the

industry lack direct authority over the constituents. In light of dynamic economic circumstances, enterprises are required to modify their business models, pricing strategies, revenue generation approaches, and cost structures to harmonize with the changing demands of their clientele. Therefore, having a comprehension of current trends and the economic life cycle can aid in the prediction of external opportunities. Moreover, it possesses the capacity to predict potential risk factors linked to investment in the sector.

Organizations exhibit a variety of strengths and limits (Ahmadian S. and Soran S., 2019). The firm's capacity to identify and evaluate its strengths and weaknesses, and subsequently leverage them to derive significant insights and meaningful conclusions, is a vital characteristic. These elements will aid managers in making an accurate assessment. The implementation of a proficient strategy and planning system requires the rectification of existing acts. The evaluation of strengths and weaknesses is subject to the influence of multiple elements, encompassing organizational culture, human resources, organizational structure, physical assets, profit and cash flow, as well as management expertise and knowledge. In the context of the dynamic business environment for FTOs, an analysis has been carried out to examine strategic planning and sector-specific SWOT analysis. This research investigates the correlations between the current conditions and the variables being examined (Ahmadian S. and Soran S., 2019).

2.3 Projections on Pilot Demand for the US

According to Lutte (2014), projections for the aviation sector in the United States anticipates to witness the recruitment of approximately 95,000 pilots over the course of the next twenty years. The forthcoming recruitment procedure was expected to arise as a result of the growth in aircraft operations, the retirement of pilots, and the attrition of pilots from the industry owing to factors unrelated to retirement. Moreover, it is important to acknowledge that government regulations have the ability to generate an increase in the demand for fresh aviators. Given the aforementioned increase in demand, it was crucial to determine if a sufficient quantity of new pilots would be accessible to ensure a continuous and sustainable provision in the future. The primary aim of the research was to examine the intricate interplay between supply and demand factors within the airline pilot sector in the United States. Numerous nascent aspects were anticipated to exert an influence on the forthcoming dynamics of airline pilot supply and demand. Several reasons contributed to the existing situation at the time of the study, including the financial implications of pilot training, expectations of industry expansion, patterns of retirement, regulatory changes, and a decline in the number of military pilots. The study utilized a methodological framework to undertake an empirical investigation of the labour supply among pilots in the United States. A multivariate regression model was developed with the purpose of forecasting demand. To explore the notion of supply, a comprehensive analysis was undertaken by integrating various data sources and administering a survey. The study's findings indicate that there was a projection that a shortage of around 35,000 pilots within the United States airline industry from 2013 to 2031. The study examined the implications of the scarcity on both regional and major airlines. Multiple different options were considered and discussed.

Based on the findings of the Federal Aviation Administration (FAA) in August 2011 (Lutte, 2014), it was estimated that the airline industry in the United States made a substantial contribution of more than $1.3 trillion to the national economy, or around 5.2% of the nation's Gross Domestic Product (GDP). Furthermore, it is worth noting that this particular sector played a crucial role in sustaining around 376,000 employment opportunities within the US domestic labour market. The industry faced various dynamic and well-documented challenges, including high fuel expenses, occasional labour disputes marked by dissatisfaction, and vulnerability to variations in the broader economic conditions. While the aforementioned difficulties having been widely acknowledged, the issue of acquiring adequate staff across different workforce groups had been a topic of inquiry in both historical and contemporary contexts. The emphasis was placed on the accessibility of pilots who had undergone suitable training and possess the requisite qualifications. A question in the research was considered on whether the United States airline industry had a satisfactory quantity of proficient pilots to adequately staff its aircraft? Several recent initiatives in the domain of forecasting have been dedicated to statistically evaluating the anticipated demand for pilots in the next years, as well as the matching capacity for pilot training. After careful examination of several forecasts, it became apparent that there was a continuous

indicator of an increasing global demand for commercial airline pilots. The main aim of the research attempted to investigate a basic question: is there a potential shortage of pilots expected in the United States?

2.4 Role of Vocational Training Institutions

On the roles of Approved Training Organizations(ATOs) the researcher considered a study according to Yiu (2022) which outlined that vocational training is a widely utilized approach employed to nurture the emerging generation of aviation professionals. Yiu et al. (2022) assert that the development of practical skills through on-the-job training plays a vital role in developing a robust knowledge foundation among diverse aviation workers, encompassing pilots, air traffic control officers (ATCOs), and aircraft maintenance professionals. The significance of training in equipping individuals to effectively address future challenges within the business context has been acknowledged by scholars (Hogan et al., 2021; Yiu et al., 2021a). Furthermore, there is a diverse range of specializations and skill sets that individuals can choose to pursue (Anici´c and Buselic, 2021). The aviation business has witnessed an increasing emphasis on a range of novel abilities, as indicated by recent scholarly investigations (Henderson, 2022; Weissbach & Tebbe, 2016). The skills encompassed in this list comprise unmanned aircraft systems (UAS), airline administration and operations management, air logistics and cargo management (e.g., Dangerous Goods Regulations), pilot ground theory, as well as non-technical skills such as customer service management, organizational management, and leadership. Sun et al. (2021) presented three propositions for aviation education in their study. The proposals encompass the enhancement of skills that involve systematic thinking and social responsibility, the adoption of more advanced learning methods through virtual and engaging platforms, and the encouragement of professions that prioritize multiple specializations and lifelong learning. It is expected that institutions of higher education will play a significant role in equipping their students with the aforementioned technical capabilities, in order to fulfil the industry's requirements (Fullingim, 2011). Moreover, it is anticipated that these educational establishments will provide their students with non-technical proficiencies, including but not limited to communication, teamwork, leadership, and management abilities (Miani et al., 2021). The construction of the third runway at Hong Kong International Airport and the recently signed China-Hong Kong-Macau Joint Mainland-Macao Closer Economic Partnership Arrangement (JMMCA) are expected to have significant implications for the aviation employment market. Consequently, it is imperative for students to develop the necessary skill sets to ensure their long-term adaptability in this evolving industry. Hence, institutions of higher education assume a crucial function by providing suitable modifications to the curriculum to aid students in adapting to the ever-changing landscape experienced during the phase commonly referred to as "career shock."

2.5 Quality of Pilot Training

In view of the foregoing according to Valenta, (2018), Air transport is universally acknowledged as a fast and reliable method of transporting both passengers and goods. In spite of a substantial rise in aviation traffic by almost two times throughout the previous decade, there has been an absence of commensurate escalation in the frequency of major accidents.

The paramount concern in the realm of aviation is the assurance of safety. All employees receive extensive training in order to keep a superior safety record. The airline industry acknowledges the importance of training as an essential element of its operations, rather than viewing it exclusively as a financial liability. However, it is still crucial to prioritize the effective utilization of resources.

In general, (Valenta, 2018) it is customary for airlines to refrain from offering financial assistance for the initial training of prospective pilots. The trainees bear the financial responsibility for the costs associated with their initial pilot training. Individuals who are taking training are not actively involved in employment-related activities, as their primary concentration is primarily on their training. Pilots are eligible to pursue employment opportunities only after successfully completing their training program at a flight school. After successfully completing the evaluation process, the recently graduated pilots engage in type rating instruction that is customized to the particular aircraft type to which they have been assigned. The last phase of the training procedure entails an operator conversion course. In this training, newly employed pilots partake in the examination of corporate policies and actively engage in line flying operations with the supervision of a captain-

instructor. The main aim of this stage is to ensure that the pilots acquire a thorough comprehension of corporate protocols and familiarize themselves with the particular operational area. It is expected that the initial instruction would lay a solid groundwork for future training. Valenta's essay investigated the perspective of airlines on introductory training and aimed to evaluate its congruence with their specific needs. The exponential growth of the aviation sector leads to a heightened demand for qualified pilots. In contemporary times, there has been a discernible focus on the topic often known as the global shortage of pilots. The increasing demand for pilots has resulted in new business opportunities for training institutions, while also creating concerns among airlines and regulatory authorities. Many training institutions place a high emphasis on producing pilots but fail to sufficiently assess the graduates' capacity to adapt to the demands of the airline industry. The introduction of cost reduction strategies has led to a deterioration in the working conditions encountered by some pilots. The escalating economic strain linked to the first pilot training, in conjunction with the possibility of restricted financial rewards, could act as a disincentive for prospective individuals contemplating a profession as an airline pilot. The study investigated the effects of recruitment techniques and early compensation on organizational outcomes.

2.6 Capacity of Training Aircraft

Additionally, another research study showed that in Turkey, over the past two decades (Torğul, 2022), there has been an observable increase in the utilization of aeroplanes as a means of transportation. Nevertheless, the observed dearth of flight routes can be attributed to the inadequate quantity of pilots available. Hence, the growth in aircraft use has been constrained. The observed escalation in Turkey suggests a corresponding surge in the establishment of flight academies. Flight academies have become prominent and costly institutions for the purpose of providing flight instruction. In the contemporary global economy, the matter of aircraft selection has emerged as a pivotal concern for Flight Training Departments that are slated to be established within government institutions. The study presented a novel strategy that utilized the fuzzy BWM method for the purpose of selecting training aircraft that are better suited for government institutions. The fuzzy BWM approach was employed to establish the weights of criteria and the ranks of alternative aircraft. Subsequently, a mathematical model was constructed to ascertain the requisite number of aircraft to be procured, taking into account specific constraints. Necmettin Erbakan University sought to establish a comprehensive pilot training program, necessitating the acquisition of suitable training aircraft and skilled instructors capable of delivering effective pilot instruction. The Department of Flight Training at Necmettin Erbakan University did a case study on the selection of training aircraft. Therefore, it was concluded in the study that a fleet of 13 aircraft (Torğul, 2022) would be adequate for the Flight Training department to initiate its educational activities.

2.7 Training Standards Proposal

In following up with the above scenario, according to Kulyk (2014), the significance of training is paramount in allowing the progress and implementation of global Standards and Recommended Practices in the field of aviation activities. After conducting a study of prevailing policies and practices, European experts arrived at a consensus regarding seven fundamental principles that should shape the training strategy across Europe. The aforementioned principles encompass various aspects, such as the facilitation of training, the implementation of competency-driven training methodologies, the cultivation of an aviation-oriented culture, the encouragement of reciprocal acknowledgement, the proactive identification of training requirements, the endorsement of competitive training practices, the guarantee of training excellence, and the formation of collaborations with non-ECAC States. The ICAO Training Institute, situated at the National Aviation University in Kiev, Ukraine, has effectively met the membership criteria specified by the European ECAC Network of Training Organizations and has been formally acknowledged as a member of the network. The main activities encompassed in this initiative include engaging in discussions related to collaboration, improving the quality of services, facilitating the sharing of experiences, coordinating training programs, developing new training programs and materials, and creating a repository of optional training courses.

2.8 Use of Flight Simulators

Nonetheless on training equipment, according to Caro, (1973), Flight simulators are built as realistically as possible, presumably to enhance their training value. Yet, their training value is determined by the way they are used. Traditionally, simulators have been less important for training than have aircraft, but they are currently emerging as primary pilot training vehicles. This new emphasis is an outgrowth of systems engineering of flight training programs, and a characteristic of the resultant training is the employment of techniques developed through applied research in a variety of training settings. These techniques include functional context training, minimizing over-training, effective utilization of personnel, use of incentive awards, peer training, and objective performance measurement. Programs employing these and other techniques, with training equipment ranging from highly realistic simulators to reduced-scale paper mockups, have resulted in impressive transfer of training. The conclusion is drawn that a proper training program is essential to realizing the potential training value of a device, regardless of its realism.

2.9 Covid 19 Effects on Aviation Training

According to Byrnes, (2022), Flying training programs involved significant hazards as instruction is given to aspiring pilots during and on the completion of flying training followed up by licensing procedures. Creating robust safety cultures and climates was crucial for these Pilot training programs in order to foster an optimal level of safety. The COVID-19 pandemic had elicited numerous safety concerns among various businesses, with particular emphasis on the aviation sector. The study aimed to examine the effects of the COVID-19 pandemic on the safety culture and safety climate inside the Approved Training Organization at Embry-Riddle Aeronautical University (ERAU). In order to achieve the intended objective, the study gathered longitudinal data spanning from 2018 to 2021, encompassing the variables of safety culture and safety climate. The findings of the study indicated that multiple safety culture and safety climate factors experienced effects throughout the duration of the COVID-19 epidemic. Based on the findings presented, the management overseeing the flight training programs successfully implemented measures to address safety rules and procedures, resulting in an enhanced safety culture and climate, hence ensuring a sustained record of accident-free operations. Ultimately, the effectiveness of these and additional safety protocols for the secure handling of forthcoming emergencies was deliberated.

2.10 Public Private Partnerships in Aviation Training

According to Asefa (2013),The process of recruiting qualified individuals in the field of Human Resources.
Asefa (2013) reveals that according to Terefe (2011), the Director of Public Relations at Ethiopian, the main goal is to employ folks mostly from the local community. The training sessions provided are specifically designed for those who possess Ethiopian citizenship. The qualifying criteria for applicants in all programs include specific restrictions related to age, height, and weight. The age range that is commonly noticed among applicants is normally between 18 and 25 years of age. In contrast to the aviation training practices observed in the United States, which frequently entail students independently funding their aviation training and education through various programs and institutions, Ethiopian Airlines employs an ab-initio training approach for all recently hired personnel, including pilots, maintenance technicians, and cabin crew. Administrators are also provided with the opportunity to receive leadership training. A significant proportion of recently employed staff members receive training from the Ethiopian Aviation Academy, an institution that maintains a formal association with the airline. The participation of Ethiopia in this undertaking signifies a substantial financial dedication. As a result, firms engage in a deliberate process of recruiting and training personnel in numbers that adequately align with their operational needs. In addition, the business actively participates in international recruitment endeavours to staff a wide range of positions, including those related to flight crew. Approximately 4,000 employees receive training on a yearly basis. The organization's training technology experienced continuous upgrades, as documented in the Tour of Ethiopian in February 2012. Ethiopian Airlines offers regular training programs in various areas, including technical, cabin crew, and commercial operations. During the reporting period of 2010/2011, a notable rise of 27% was noted in the provision of this specific training. Therefore, in order to sustain the retraining initiative, it will be imperative for them to expand their workforce

and infrastructure accordingly. According to an interview performed in April 2011 with Captain Steve Jones, a former Chief Pilot and operation manager of United Airlines, it was found that the average pilot-to-aircraft ratio is 6.5. In relation to Ethiopian Airlines, the aforementioned statistic pertains to the hiring of 280 new pilots only for the recently acquired fleet of aircraft. The relationship between the number of support personnel and fleet size demonstrates a direct proportionality. In the event of doubling the fleet size, there is a concomitant requirement to increase the number of support staff. This is in accordance with the goals set forth in Ethiopia's Vision 2025, which seeks to increase the size of the workforce from 5,600 to 16,900 workers. In order to enhance the expansion of their route network, it would be crucial for them to bolster their global sales crew. Based on the findings of the Jones Interview conducted in 2011, the inclusion of each supplementary destination required the obligatory participation of airline workers. The Ethiopian populace would therefore need to engage in the recruitment of a significant workforce to support the formation of numerous such entities. On June 16, 2010, Ethiopian Airlines initiated its operations to Pointe Noire, the second most populous city in the Republic of Congo. In 2011, Ethiopian Airlines initiated the expansion of its air transportation services to many destinations, hence offering a wider range of travel possibilities. The aforementioned locations encompassed Hangzhou, China; Malakal, Southern Sudan; Milan, Italy; and Muscat, Oman. Ethiopian Airlines has recently initiated daily direct flights to Beijing, employing its long-range Boeing 777-200 aircraft. Regardless of whether Ethiopian Airlines chooses to transfer their current staff from Addis Ababa or hire individuals from the local labour force in each new location, it is crucial for them to anticipate and address the potential challenges related to integrating diverse cultures, languages, authority structures, and work practices in a proactive manner. What are the essential prerequisites for effectively meeting (Asefa, 2013) the increasing needs for training?
Answering the above question (Asefa, 2013),Ethiopian Airlines has recently procured a fleet of five (5) newly acquired training aircraft, namely the Bombardier Q400, a turbo-prop aircraft. In addition, the aviation academy is known for its extensive simulation capability, as documented in the Tour of Ethiopian in February 2012. There is a projected rise in the quantity of educators who will be enrolling in the training institution. According to the 2010/2011 Annual Report of Ethiopians (p. 10), one of the primary goals for the organization during that specific timeframe was to fulfil the human resource requirements of the company in accordance with Vision 2025. In order to accomplish this objective, the corporation placed a high emphasis on fostering collaborative partnerships with educational institutions. The pursuit is bolstered by the support received from the Ministry of Education (MoE) and Ministry of Defense (MoD). Currently, the training facility administered by the Air Force is hosting four cohorts of trainees pursuing a career as Aircraft Maintenance Technicians (AMTs). The excellent effects resulting from the collaboration between our institution and the Ministry of Education (MoE) are evident in the effective development of the curriculum for the Technician, Cabin Crew, and Customer Service disciplines. The aforementioned documents have been appropriately prepared for submission to the Ministry of Education (MoE) with the intention of seeking accreditation. The initiation of the initiative is expected to take place in September 2011, as per the predetermined schedule. The strategic orientation defined in Vision 2025 has identified certain areas of collaboration, which have been expressly stated. To formalize these relationships and assure their continuity, a memorandum of understanding (MoU) has been executed. To enhance the efficiency of the recruitment process for cabin crew, customer service agents, and other relevant positions, an initiative was undertaken to build a data sharing system among a selection of educational institutions in Addis Ababa. Specifically, a total of eleven regional and fourteen preparatory high schools were contacted for this purpose.

2.11The Problems of Vocational Education and Training.

In another development study and with regards to a problematic system, according to Fluitman, F. and Alberts, W. (2000),the World Bank report on Matching Skills to Markets and Budgets, Vocational Education and Training (VET) system in Zambia functions within a complex socioeconomic environment. The entity has numerous limits that can be categorized according to its aims, target audience, administration, and product quality. The primary focus revolves around the importance of training. The scope of the training efforts is constrained, since it encompasses a mere fraction of 3 percent of those who are entering the job market. Despite

its limited scope, the system has continuously exhibited a tendency to target the wrong client demographic for a prolonged duration. Programs largely focus on providing a certain cohort of young individuals with the essential skills required to obtain job in the formal sector, which has unfortunately undergone a substantial drop. When individuals commence their participation in the workforce in Zambia, they frequently encounter a restricted range of opportunities and are driven to engage in self-employment as microentrepreneurs or work as family aides within the informal sector or subsistence farming. This situation commonly poses difficulties as individuals frequently lack the necessary skills and knowledge to effectively fulfil these responsibilities. One of the issues arises due to the lack of a cohesive national training policy. The current efforts in education demonstrate a deficiency in centralization and coordination. The capacity of government personnel to collect and interpret information necessary for policy development or administrative goals remains inadequate. The involvement of non-governmental stakeholders, such as private training providers and representatives from the world of work, in shaping the system is subject to notable limitations, and the precise managerial roles of external contributors are occasionally unclear. Predictably, the standard of training is rather below par. The staff employees exhibit a deficiency in adequate training, and a notable proportion of posts remain vacant. The disbursement of monies allocated for training purposes is occasionally subject to considerable delays in release, and the process of distributing these funds is further impeded by banking regulations that require many signatures to generate a cheque for delivery. The courses are widely regarded as being antiquated. The lack of adequate maintenance has led to the deterioration of equipment, degradation of structures, insufficient library resources, and a shortage of essential writing materials. The regular observation of the absence of paper, seats, or light bulbs is a common occurrence. The current level of staff utilization is not optimal, as shown by an observed student-staff ratio of roughly 6 to 1. Moreover, it is noteworthy that in the year 1997, there was a significant disparity in the ratio of nonteaching professionals to teaching staff, with a percentage of 2 to 1. Proposals for Reform in the Context of the Current Situation Following the inauguration of a new administration in 1991, there was a mounting concern regarding the deplorable state of skills development across the country. As a result, a multitude of policy evaluations and initiatives for reform were conducted in response to this concern. The reforms in vocational education and training (VET) have garnered significant recognition for their innovative approach, encompassing both procedural elements and the proposed modifications they encompass.

2.12Aviation Training Policy versus Education Policy

The existing challenges in the delivery of pilot training and the drastic reduction of locally trained commercial pilots in Zambia, it is imperative to examine reviews of a few authors on the African government's educational policy agenda in this context. The attainment of pilot training necessitates a preexisting population of individuals who have received a formal education, and this condition applies equally to aspiring pilots.

It is imperative to conduct a comprehensive evaluation of the current pilot education policy, taking into account its intricate specifics. Achola (1990) provides a comprehensive analysis of the educational system in Zambia following its independence from Britain in 1964. Similar to other African countries, Zambia's educational system at that time was marked by racial segregation and a notable prejudice against Africans. The author offers a succinct summary of the prevailing conditions during the period of independence, followed by a meticulous examination of the key educational policies implemented post-independence. The examination of these policies was conducted by considering legislative acts, national development plans, and their supporting paperwork. Achola conducted a study that analyzed the accomplishments and limitations in the implementation of a program, as assessed using metrics of both internal and external efficiency. The study observed that the education system has seen substantial expansion, however there is a scarcity of data regarding its internal efficacy. The study additionally demonstrated that there are other factors that have played a role in hindering the successful implementation of educational policies. These factors include an economic downturn, a lack of an adequate number of teachers beyond the primary level, concerns regarding the appropriateness of the curriculum, and a longstanding debate regarding the merits and drawbacks of English language instruction versus instruction in native languages.

Furthermore, Psacharopoulos (1990) posited that the concept of "educational policy" might be seen as the contemporary equivalent of what was previously known as "educational plan rang" twenty years ago. Irrespective of its particular characteristics or diverse manifestations, including the guise of "educational reform," practically every nation worldwide has at some juncture, proclaimed its dedication to making decisions that influence different facets of education within the broader societal context. The term "educational policy" was utilized within the framework of a more expansive setting in his essay. The individual additionally asserted that the proclamation of educational policy or the execution of school reform was carried out with the purpose of achieving a particular objective. The objective may encompass various noble purposes, such as educational, political, economic, or a combination thereof, as defined by the perception of the impersonal entity generally referred to as "the policy maker." What is the historical progression of educational policy development in developing countries? Were the intended reforms effectively executed in the earliest stages, and if so, did they provide the expected results? If not, what are the underlying factors contributing to this phenomenon? This study aimed to offer valuable insights into complex queries by specifically investigating the African continent and analyzing a limited selection of widespread reform initiatives that include the full educational spectrum. Educational policy declarations are prevalent in a wide array of governmental papers in African nations, including:

a)Political statements or manifestos, e.g., Nyerere's most furious Education for Self-Reliance, The Workers Party of Ethiopia Program, or Swaziland's Imbokodvo National Manifesto;

b)Reports of special commissions, e.g., Zambia's "Lockwood Report," or Ethiopia's 1971 Education Sector Review;

c)The country'- educational plan, often embedded in the country’s Development Plan, e.g., Education, in Botswana's National Development Plan 1979-85,1or Uganda's Ten Year Development Plan, 1981-1990;

d)Ministry of Education Acts, Orders or Circulars, 3.g.,Lesotho's "National University Act, 1975.";

e)Reports of international agencies, e.g., UNESCO's 1961 Outline of a Plan for African Educational Development (better known as the" Addis Ababa Conference").

In view of the above, it also becomes imperative that understanding the background of pilot training policy requires evaluation existing aviation training policy for Zambia is reviewed, specifically the relevant policy for Pilot Education or Pilot Training should be considered from either the existing aviation acts and/or TEVETA act of Zambia.

After its establishment in 1971, ZASTI was initially governed under the Department of Technical Education and Vocational Training initially governed under the Technical Education and Vocational Training Act of 1972. The researcher referred to the TEVETA Act No. 13 of 1998 throughout the consultation process. The legislation titled "Technical Education, Vocational and Entrepreneurship Training Authority Act" was passed on the 21st of April 1998. This Act was established to create the Technical Education, Vocational and Entrepreneurship Training Authority and outline its responsibilities. It also aims to establish government institutions that provide technical education, vocational training, and entrepreneurship training. The Act further mandates the formation of management boards for these institutions and specifies their composition. Additionally, it regulates all institutions that offer technical education, vocational training, and entrepreneurship training. The Act repeals the Technical Education and Vocational Training Act of 1972 and addresses matters related to or incidental to the aforementioned provisions. This legislation was enacted by the Parliament of Zambia on the 24th of April 1998.

In light of the aforementioned, the research also sought to examine the objectives of the Civil Aviation Authority Act no 7 of 2012 (referred to as The Civil Aviation Authority Act, 2012) which aims to establish a civil aviation authority and delineate its powers and functions. These include the regulation and promotion of civil aviation, ensuring the safety and security of civil aviation, as well as addressing related matters.

Additionally, the Civil Aviation Act No 5 of 2016 (Civil Aviation Authority, 2016) short title states that it is an Act to provide for the control, regulation and orderly development of civil aviation in Zambia; to provide for the grant of permits for air services and airport services; provide for the implementation of a State Safety

Program in compliance with Annex 19 to the Chicago Convention; to provide for the establishment of an independent Aircraft Accident Investigation Board in compliance with Annex 13 to the Chicago Convention; to provide for security for civil aviation and a National Aviation Security Program in compliance with Annex 17 to the Chicago Convention; to provide for air services, airport services and air navigation services in compliance with Annex 14 to the Chicago Convention; to provide for the transportation of dangerous goods by air in compliance with Annex 18 to the Chicago Convention; to promote the safe, secure and efficient use of civil aviation; to give effect to the International Convention on Civil Aviation signed in Chicago on 7th of December, 1944 and all international agreements on civil aviation to which Zambia has acceded and is a State party; to consolidate the various laws on aviation and repeal the Aviation Act, 1995, Safety of Civil Aviation Act, 1989, Air Services Act, 1964, and Tokyo Convention Act, 1971; provide for the functions of the Zambia Airports Corporation Limited and the renaming of designated airports; and to provide for matters connected with or incidental to the foregoing.

In spite of the aforementioned legislation enacted to support aviation regulation and the establishment of training institutions, the researcher discovered that the current aviation regulations and standards primarily pertain to the minimum criteria for obtaining pilot licenses. The relevant Zambia Civil Aviation Requirements (ZCARs) Part 2, along with its associated Implementing Standards, provide additional details regarding the minimum ground training syllabus for pilots.

The researcher acknowledges that there is a lack of a comprehensive national pilot training policy in Zambia, regardless of whether training is conducted domestically or internationally. This absence is evident in the political party manifestos of UNIP, Movement for Multi-Party Democracy, Patriotic Front, and United Party for National Development. Consequently, there is no specific target set by any of these parties regarding the policy on ensuring Zambians are included in the delivery of minimum number of pilots to be trained in order to meet the demands of the commercial aviation industry. The aviation industry requirements are commonly addressed as advantageous aspects within the tourism policy. However, there is presently an absence of a distinct policy solely dedicated to aviation, which would delineate the different elements of the industry. Consequently, this lack of a well-defined policy hinders the Zambian government's ability to provide explicit guidelines regarding the management of pilot training for Zambian individuals.

2.13Inadequate Aviation Policy

The EU-funded (Ministry of Transport and Logistics, 2022)Technical Assistance to Zambia-Aviation on Sector Support Program II (ASSP II**) Aviation Strategy 2022-2026** is a 19-page document which has a very short statement of aviation training as follows:-

Specific Objective 5.1: To Enhance Human Capital in the Aviation Sector Key initiatives:

a. Transform ZASTI into an aviation training academy that meets national and international standards.

b. Assess the competence requirements of the aviation sector.

c. Establish a national aviation training program focusing on the core competencies required for Zambia's aviation sector stakeholders and adjoining industries.

d. Implement a training of trainer's approach to evolve local Zambian training capacities for regularly demanded competencies requiring ICAO standard certification.

Specific Objective 5.2: To Mainstream Differently Abled, Environment, Gender and Staff Wellness Key initiatives:

a. To mainstream differently abled, environment, gender and staff wellness in the provision of aviation services, facilities and infrastructure development.

The aforementioned concise statement extends beyond Zambia and applies globally, as numerous countries have taken a cautious approach by refraining from complying with regulations pertaining to specific aviation flight training projections and fulfilling the necessary criteria for data analysis. However, the decision has been made allowing deregulation to shape pilot training forecasts, with the exception of the United States and the European Union Aviation Safety Agency (EASA) region. In these regions, regulatory bodies have consistently worked together with universities and aviation experts to conduct research, resulting in publicly available

projections regarding the anticipated changes in training requirements affecting various aviation professionals, including pilots. Zambia's inadequacy in meeting the need for commercial pilots in the aviation industry might be attributed to its limited approach to research collaboration.Considering the specific setting of the study, it is important to acknowledge that the National Aviation Policy outlined in the Aviation Strategy for Zambia can be perceived as a mere "Ministerial Wish List" for the aviation industry. The primary emphasis of the government appears to be directed towards augmenting passenger "traffic" figures through the development of additional airports, while neglecting to address the implications of local commercial aviation expansion on Zambia's GDP. The anticipated distribution of the augmented traffic resulting from the expansion of domestic Air Operator Certificate holders in relation to various aircraft fleet types and sizes is not explicitly outlined. The Aviation Strategy lacks information regarding the anticipated growth in aircraft numbers and its implications for pilot demand within the nation. The entity known as ZASTI, which is responsible for fulfilling the predicted demand for Commercial Pilots as outlined in the National Aviation policy, currently lacks any estimates regarding the expectations on required pilots for the Commercial Aviation sector.

2.14Boeing Projections on African Aviation Growth

Consequently, (Greenbank, 2022), Boeing has underscored the notable resurgence of the African aviation industry in 2022, attributing it to a confluence of factors including pent-up demand and economic progress driven by heightened global commodities prices. Consequently, African airlines have managed to reinstate their flying operations to around 80% of the pre-pandemic levels.

The general director of Commercial Marketing for Middle East and Africa at Boeing asserts that the 777X is a highly suitable option for the replacement of widebody aircraft, primarily due to its capacity to achieve a notable reduction in fuel consumption, estimated to range between 20% and 30%. The graphic presented portrays the emblem of the Boeing Company. During his address at the Aviation Africa summit, Randy Heisey, the Managing Director of Commercial Marketing for Middle East and Africa at Boeing, delivered a presentation on Boeing's commercial market perspective specifically tailored for the African region. The Aviation Africa conference was slated to occur in Kigali, Rwanda from 12-13 September 2022. Heisey emphasized the notable recovery of travel within the African region and the favourable consequences it has had on the continent.

According to Greenbank (2022), Boeing presented data based on their forecasts, that it was expected that the African sector will have a substantial increase in demand for an additional 1,010 aircraft by the year 2040, which predicted to have a value of $176 billion. Heisey argues that African carriers hold a strategically advantageous position that can support the growth of inter-regional traffic and enable them to capture a greater market share. This can be achieved by offering efficient services that successfully connect passengers and assist business activities across the continent.

The study follows that basing on Boeing's forecasts, it was expected that there will be a growth in the average size of aircraft and the number of seats per aircraft for the African fleet. Heisey asserted that there would be a substantial market demand for mid-size, single-aisle aircraft, as exemplified by the Boeing 737 MAX, across the continent.

In the context of the increasing relaxation of restrictions, Heisey underscored the need of analyzing the increase of African traffic. It was noted that the present load factor of 75% has exceeded the pre-pandemic level of 72%. Furthermore, it was highlighted Africa's economic growth rate of 3.1%, which exceeds the global average. The aforementioned factors, namely the increasing rates of urbanization and the expanding middle-class population, indicate that the growing income levels in Africa will ultimately lead to an increased demand for air transportation.

In view of the findings of Boeing's 2022 Africa Commercial Market Outlook, it was anticipated that airlines operating in the African region will have a consistent annual growth rate of 3.5% in terms of fleet expansion through the year 2041. It was anticipated that this particular advancement would provide assistance in accommodating the growth of passenger volume, which is projected to experience a yearly expansion of 5.2%. It is noteworthy to mention that the aforementioned growth rate exceeds the global average growth rate of 3.8%. Furthermore, it was expected that the majority of commercial deliveries will consist of single-aisle jets,

accounting for more than 70% of the total. These deliveries would mostly consist of 740 freshly produced aircraft, which will predominantly serve the local and inter-regional market demands.

Boeing has forecasted a requirement of 250 additional widebody aircraft by African carriers to effectively support the growth of long-haul routes and air-freight operations. In his assertion, Heisey emphasized the 777X as a very suitable option for the replacement of widebody aircraft, citing its fuel efficiency as a key factor. This attribute was expected to yield a significant reduction of 20% to 30% in fuel consumption.

Additionally, basing on above forecasts, it was anticipated that the industry encompassing supply chain, manufacturing, repair, and overhaul (MRO) would see significant expansion. According to Boeing's projections, the commercial services potential within this sector is anticipated to attain a valuation of $80 billion by the year 2041.

2.15 Researcher's own Business plan Presentation extract

In view of Boeing projections according to Greenbank (2022), the researcher whilst studying at the University of Lusaka in December 2022 presented a business plan proposal to a panel of examiners entitled "Business Plan Presentation For The Cessna 172 Training Aircraft Operating Lease". Below are extract of African pilot projections based on the business plan.

2.15.1 African Aviation Forecast

Randy Heisey, Boeing Managing Director of Commercial Marketing for Middle East and Africa told Times Aerospace on September 12, 2022 (Greenbank,2022) that African traffic is rising as COVID restrictions relax, with a 75% load factor surpassing the pre-pandemic 72%. He also observed that Africa's above-average economic growth of 3.1%, rising urbanization rates, and burgeoning middle *class will increase air travel demand. Boeing's 2022 Africa Commercial Market Outlook predicts* African airlines will increase their fleets by 3.5% per year to meet passenger traffic growth of 5.2%, above the global average of 3.8%, until 2041. Single-aisle jets will make up over 70% of commercial deliveries, with 740 new aircraft serving local and interregional demand.

2.15.2 Aircraft fleet growth projections Zambia

Based on Boeing's forecasts, Zambia's formidable and established carriers have just four regional aircraft, thus there is a growth opportunity for single-aisle regional aircraft by 2041.

Extrapolating from the above, Zambian Airlines' fleet size will rise by 3% of the African fleet share by 2041.

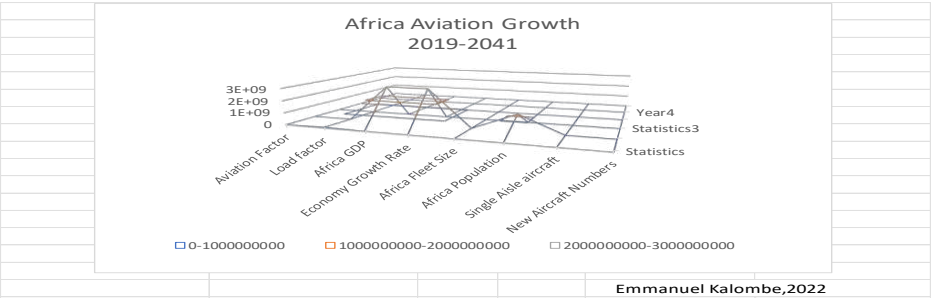
23 aircraft interpret into 1.2 aircraft annually by 2041.

This number of 23 aircraft means 138 more Zambian pilots by 2041. (Not considered a portion of retirements in 18 years from current numbers)

Proflight Zambia added two regional planes to its fleet in 2022, which might mean four to six new pilot employment.

From the above analysis ,it can be assumed that Proflight Zambia on its own may have added about 5 pilots every year.

FIGURE 1:AFRICA AVIATION GROWTH 2019-2041



2.15.3 Africa Pilot Demand

According to Boeing, 740 more aircraft require a minimum of 2 pilots (01 crew) or 2 additional pilots per aircraft, which is unfeasible to operate due to the following:

- Flight and duty time rostering restrictions.
- Off-days
- Leave

It is therefore expected that 740 aircraft require a minimum of 3 crew or 6 pilots, requiring 4,440 extra pilots by 2041.

In as much 44 African nations signed the Yamoussoukro Decision for a Single African Air Transport Market (SAATM) the continent has only about 30 airlines.

Zambia Airways(2014) and Proflight Zambia are the two strong airlines in the country and by 2041, each African airline will add 23 aircraft.

Dividing 4,440 pilots equally across the 30 African airlines yields 148 pilots for each airline or 148 pilots for Proflight Zambia alone, which has acquired 2 aircraft but no pilots.

According to ICAO flight training standards, an ATO must fly 29,600 flight training hours in 17 years, or 1741 hrs per year, or 8.70 new pilots each year.

According to the aforementioned scenario, Zambia requires 8.7 pilots interpolated to 7.6 pilots from the 3% share of 740 aircraft or 1.2 aircraft per year to achieve predicted development, yet all ATOs have failed Commercial Pilot License training since 2009. Thus, Zambian ATOs have produced zero commercial pilots whereas international ATOs graduate two Zambian pilots every year. Zambia must immediately embark on a program to produce 138 pilots in 18 years at 7.6 pilots yearly contribution.

2.15.4 Zambian Pilot development from Feb 2023:

Total Foreign Pilot Production Projected Domestic Pilot Production Annual Growth Rate

02 Pilots trained overseas * 100% = 22.98% and 77.02% trained in Zambia = 106 pilots in 18 years or 21,258hrs in 18 years, which projects to

5.9 or 6 locally trained pilots each year is 600hrs per flight school.

Due to the above, most Zambian student pilots are forced to seek training in the United States, South Africa, or Australia. Other undue factors also come into play such as hotel, food, ground training, and sponsorship fee delays. There are roughly 6 student pilots abroad every three years.

Conclusion

Nevertheless, African airport arrival stood at 19.4 million arrivals for the year 2022 and Zambia recorded 1.7 million arrivals which equates to 8.7% of the market share. Considering all carriers operating in and out of Zambia we can split the arrivals 5.7% due to foreign carriers and 3% due to the domestic airlines. While considering the current carriers in Zambia Airways (2014) and Proflight Zambia, which are the two significant airlines in operation inside the nation, it can be observed that both airlines are projected to expand their fleet by an average of 3% share of aircraft numbers by the year 2041. Zambia will share about 3% of African Commercial fleet which interprets to 23 aircraft from the 740 additional aircraft or 138 additional pilots by 2041

2.15.5 Lower Female Representation in Pilot Recruitment

According to Marintseva (2022), a report on Factors influencing low female representation in pilot training recruitment, Personnel-related expenses, such as those related to training and certification, can constitute a significant proportion of airlines' financial statements (Stalnaker et al., 2018; Valenta, 2018). The aviation industry recognizes that pilots constitute a significant investment in terms of human resources. Hence, there has been significant scholarly and commercial attention directed towards the subjects of employee retention, training, and retraining, as evidenced by a multitude of academic publications (Krikunov, 2013; Elisov and

Gromov, 2014; Lutte et al., 2014; Judy, 2018; Sun, 2021; CAPA, 2018; AIS, 2019). The problem of pilot shortage had been widely acknowledged as a significant obstacle prior to the onset of the COVID-19 pandemic (Merdith, 2019). Based on an estimate provided by the International Civil Aviation Organization (ICAO) in 2011, it is expected that the air transportation sector will require a total of 980,799 pilots by the year 2030. The International Civil Aviation Organization (ICAO) also recognized the problem of inadequate capacity in flight schools, as evidenced by their projection of a shortage of approximately 160,000 pilots (ICAO, 2011). According to a report released by CAPA in 2018, CAE, a well-established provider of flight training services, forecasted a demand for around 255,000 newly trained pilots by the year 2027. Based on the data presented in the figure, it can be deduced that there exists an approximate annual requirement for an additional 25,000 pilots. The projections provided by Boeing and Airbus exhibit notably heightened statistical figures. According to the Boeing pilot outlook report of 2018, a projection was made suggesting a demand for 790,000 fresh pilots over a span of 20 years. According to Boeing (2018), based on this assumption, there is an estimated annual requirement of 39,500 pilots.

In light of the concern of shortages in flight crew, (Marintseva, 2022) numerous initiatives and projects have been devised. As a result, there has been a discernible rise in the allocation of resources towards flight schools, with universities incorporating pilot training into their aviation curriculum as well. In the context of the United Kingdom, a variety of instances of these practices can be observed (refer to Table 1). However, it is crucial to recognize that the need for a degree is solely enforced by a restricted subset of prominent airlines (Phillips, 2019).

Nevertheless, the global environment saw significant and swift transformations due to the widespread pandemic. Extensive discussions have taken place in many media channels (BBC News, 2020; ECA, 2021; Schlappig, 2020; Grimstead, 2021) regarding the topics of shattered aspirations, workforce reductions, and significant financial commitments experienced by both novice and experienced aviators. According to the research conducted by Creedy (2021), there has been a significant decrease in the demand for aviation training services at L3Harris, resulting in a 50% reduction. In addition, Lufthansa Aviation Instruction has implemented a temporary suspension of its ab initio training program and has provided complete reimbursements to its cohort consisting of 850 students.

In light of the substantial consequences (Marintseva, 2022)stemming from the ongoing pandemic, which have had a profound and extensive impact on the aviation and tourism sectors, scholars and professionals persist in engaging in discourse concerning the prospective dearth of pilots from the forthcoming cohort. According to a study conducted by Oliver Wyman, it is projected that there will be a global shortage of 34,000 pilots by the year 2025 (Wolfsteller, 2021). According to Boeing's latest projection, it is expected that the demand for around 763,000 new pilots will arise by the year 2039 (Boeing, 2020). Based on the forecasts provided by CAE, it is estimated that there will be a need for 27,000 new aviators by the end of 2021. Furthermore, it is expected that an additional 260,000 pilots would be in demand during the next decade (CAE, 2020). According to a report published by CAPA (2021), Ryanair has released a statement acknowledging the need to hire an additional 2000 pilots in order to adequately manage the manpower requirements associated with its projected aircraft deliveries by 2024. At present, airlines are compelled to cancel flights as a result of a scarcity of pilots stemming from the protracted retraining period necessitated by prolonged periods of inactivity (Parker, 2021). The necessity of flight training can be further supported by the conclusions of a research conducted by Mordor Intelligence, which indicates that the market value of civil aviation flight training and simulation reached USD 1.15 billion in 2020. Furthermore, it is expected that there will be a compound annual growth rate (CAGR) of 17.85% during the projected period from 2021 to 2026, leading to a projected valuation of USD 3.10 billion by 2026. In the year 2021, a research study conducted by Mordor Intelligence was published, which indicated...

The calculation of the demand for new pilots is contingent upon fluctuating factors, primarily derived from projections regarding the quantity of aircraft in operation and the prevailing demand for air transportation. The aforementioned estimates indicate that there is a projected and persistent need for pilot training and retraining in the upcoming decade to fifteen-year period.

In response to the widespread issue of the scarcity of pilots (Marintseva, 2022), numerous studies have proposed the integration of female students into pilot training programs as a potential solution. This method aims to increase the involvement of individuals in pilot roles, so advancing the goal of gender equality, which is a core objective of the United Nations Sustainable Development Goals (Wolfsteller, 2021; Josephs, 2019; Opengart and Ison, 2016; UN). Aligned with the chosen research methodology, the primary objective of this study is to investigate the many factors that facilitate or impede the recruitment of women in pilot training, surpassing the existing obstacles. The hypothesis posits that the primary barriers to augmenting the representation of female students at flight schools and subsequently in airline pilot roles are the persistent issue of unemployment and the pervasive cultural perception that flying is exclusively a male-dominated occupation.

The following passage provides a thorough overview of excerpts from the section. Section snippets, also known as section extracts or section synopses, are concise summaries or abstracts of longer written works. These snippets are frequently utilized in academic settings.

The present state of affairs indicates a prevailing pattern of women experiencing a lack of proportional representation within the aviation industry. The presence of a gender disparity within the aviation business is apparent and acknowledged by various sources (Gagliardo, 2020; Gagliardo, 2020; ICAO, 2019; European Commission, 2019; Uniting Aviation, 2020). Notwithstanding the extensive research conducted and the various initiatives implemented to promote women's participation as pilots in the commercial aviation industry, empirical evidence consistently indicates minimal advancements in terms of female representation in this profession. According to an analysis conducted by Lutte (2019) on data from the U.S. Bureau of Labour Statistics, the percentage of women in the role of airline captains is a mere 5%. Similarly, the representation of women in the larger category of those employed in the airline industry is a relatively small 5.1%.

2.16 Imminent World Pilot Shortage

According to Caraway (2020), a report by Coast Flight Training in 2018 indicated that Boeing made a projection that the demand for pilots would reach 790,000 by the year 2037. According to Mazareanu (2018), the projected figure represents a substantial growth of 267% compared to the global population of active commercial pilots in 2018, which was at 305,000. According to Kohler's (2019) estimation, the need for new pilots in North America is projected to exceed 200,000 within the next twenty years. However, based on the analysis of student patterns conducted by the Federal Aviation Administration (FAA) in 2019, it has been determined that the estimated figure is approximately 360,000 new pilots. In order to fulfil the anticipated pilot demand, the aviation sector will need to increase the number of student pilots to twice the amount recorded in 2018 and sustain this level for the subsequent 18-year period. Based on data provided by the Federal Aviation Administration (FAA, 2019), the population of student pilots in the year 2018 amounted to 167,804 individuals. This figure represents a notable rise of 18,863 individuals compared to the levels observed in 2017. To address the shortage gap, it is important for the aviation industry to undertake the recruitment of 36,683 new pilots annually from 2018 to 2037. There is an impending shortage of pilots, which necessitates a reevaluation of the existing regulations.

Over the course of the last 106 years, the field of aviation has experienced substantial growth, transitioning from being a recreational luxury to becoming an essential means of transportation for both business and personal purposes. International trade is considered to be the fundamental basis and a crucial facilitator of globalization. The aviation industry has exerted a significant influence on the prevailing business model across several sectors, hence bringing about a transformation in our economic culture. Should the aviation industry fail to address the issue of pilot scarcity, it will not be the sole economic sector to endure the consequences. The world economy as a whole will see negative consequences.

This article aims to examine the necessary business adaptations that airlines must do in order to mitigate the disparity between the supply and demand of pilots. Initially, an examination of the historical context of pertinent rules will be conducted in order to ascertain the underlying purpose of each rule. Subsequently, this study will identify additional significant contributing reasons to the issue, examine the efficacy of each regulation in achieving its intended purpose, and evaluate the impact of these rules on the scarcity of pilots using compiled

data. Finally, potential solutions will be proposed by means of regulatory amendments. In the event that the restrictions are determined to have no influence, this study will examine additional issues that may contribute to the pilot shortage and inadequate performance in future aviation operations, with the aim of identifying potential remedies.

Chapter Three

3.1 Theoretical and Conceptual Framework.

This study recognized the suggestion that a researcher (Imenda, 2014) contends that a deductive method to literature review commonly relies on theories and theoretical frameworks, while an inductive approach often results in the creation of a conceptual framework, potentially in the form of a conceptual model. In an article according to Imenda (2014), he presents an analysis of the potential synonymous nature of 'theoretical' and 'conceptual' frameworks, or alternatively, whether they denote distinct structures. While it is common for literature to use these two phrases interchangeably, implying that they have the same meaning, the researcher contends that they are distinct constructs both in terms of their definition and how they manifest in the study process.

3.2 Theoretical Framework

The conception of the commercial pilot training environment in Zambia entails the convergence of operations carried out by Approved Training Organizations (ATOs), which are explicitly designated as flight training schools that must obtain approval from the Civil Aviation Authority. These activities involve several aspects, including the operations of flying schools, the management of flight and ground school training activities by the Approved Training Organizations (ATOs), the technical requirements and their related management, as well as the administration of the ATOs in compliance with Civil Aviation Regulations and business needs. Moreover, the extent of scrutiny pertaining to these endeavours constitutes a crucial element in comprehending the whole scope and framework of commercial pilot education in Zambia. The focus of this study is to the current aviation flight training facilities within the context of management and Organizational aspects. This pertains to the tactics utilized by Organizations and enterprises to efficiently oversee and allocate their internal resources throughout the execution of aviation training programs. Furthermore, this study investigates the alignment between external factors and the company expectations, as well as the aims aimed at ensuring the development of competent pilots. Hence, the aforementioned statement has substantial importance in enhancing the total value generation within the aviation industry. The theoretical framework comprises three fundamental concepts: the functioning of an Approved Training Organization, the various factors within flying training that impact training programs, equipment, and resources, and the business environment and administrative factors that contribute to the improvement of pilot production in Zambia. These principles delineate the objectives pursued by an Organization and provide direction for its future endeavours. Common motivations include increased consumer engagement, improved brand recognition, and higher market value. The assets possessed by the ATO consist of a harmonious combination of information technology assets and competencies, which need a substantial commitment of time for their creation and a tremendous amount of effort for learning and optimization. Moreover, these entities exhibit dynamic attributes that facilitate their ability to successfully adjust to alterations in their external surroundings through the revitalization and reorganization of their current set of resources. The benefits associated with awareness are contingent upon the degree to which the current resources of the Approved Training Organization (ATO) contribute to the overall achievement of the Organization. The assessment of benefits may be enhanced by taking into account both external and internal elements that influence aviation training companies.

As a result of the aforementioned elucidation, the researcher alludes to the study inquiries delineated in chapter 1.7 above. This investigation is categorized as a case study, and hence, the ensuing inquiry will conform to the requisite criteria and suitable procedures for conducting a comprehensive and effective case research. Considering the information presented, Edwards (1998) raises an inquiry regarding the situations under which

the application of a case study methodology is considered suitable. According to Yin (2003), the application of a case study design is deemed suitable in some situations. These circumstances encompass:

(a) Situations where the research seeks to investigate the mechanisms and reasons behind a phenomenon.
(b) Cases where it is impractical to control or manipulate the behaviour of the individuals under study;
(c) Instances where the researcher aims to include relevant contextual factors related to the phenomenon being examined; or
(d) Scenarios where the boundary between the phenomenon and its surrounding context is unclear.

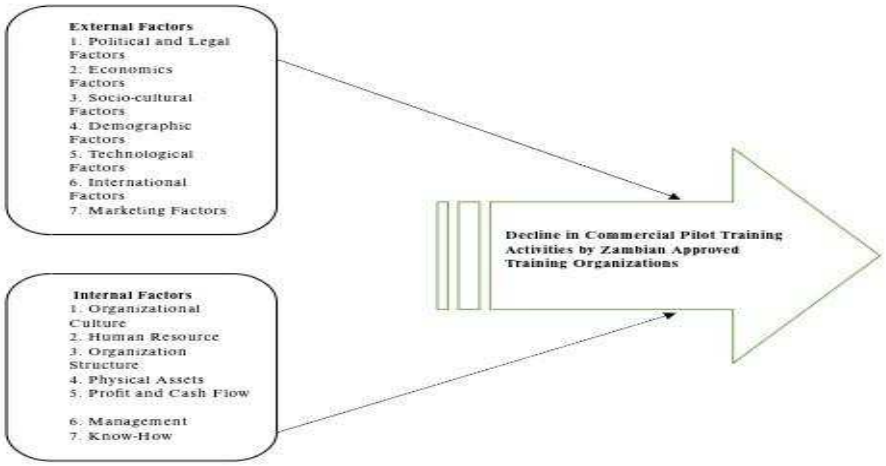
The purpose of this discourse was to analyze the primary obstacles that the entire Zambian civil aviation sector must overcome in pilot recruitment. The researcher used the inductive methodology, which has been specifically designed to align with the study's aims and objectives, in order to conduct an assessment of the obstacles. The researcher investigates new phenomena pertaining to the topic matter by employing a specific research approach in order to increase the probability of achieving the study's objectives. The study employed a research technique that adhered to qualitative research methodology, relying on the analysis of data collected and the examination of relevant literature to inform the findings.

3.3 Conceptual Framework

This study aimed to identify and analyze the key factors that impact Approved Training Organizations (ATO) in Zambia, as required by the Zambian Civil Aviation Regulations (ZCARs). The analysis factors were delineated based on the primary domains of management outlined by Ahmadian and Soran (2019). These domains are essential for ATOs to effectively carry out their business operations in Zambia. Given the aforementioned points, it can be argued that a conceptual framework, as proposed by Jabareen (2009), is a complete and interrelated structure of concepts that aims to clarify a certain reality. The concepts inside a conceptual framework exhibit reciprocal reinforcement, effectively articulate the underlying phenomena, and contribute to the cultivation of a distinct philosophical perspective associated with the framework. In contrast, methodological assumptions encompass the formulation of a conceptual framework and the evaluation of its efficacy in generating meaningful understandings about the fundamental nature of reality. The researcher established particular goals or subjects for the questionnaire based on the Concept, and subsequently analyzed the responses supplied by the participants.

3.4 Conceptual Theorem

FIGURE 2:FACTORS AFFECTING FLIGHT TRAINING ATOS IN ZAMBIA



Author,2023

This study focuses on identifying the characteristics that contribute to the fall of commercial pilot training activities in Zambia. These variables comprise both internal and external factors that impact the aforementioned drop.

3.5 External Factors

Political And Legal Factors: The study recognizes that growth of aviation training in Zambia has been influenced by various types of government from 1964 to 2023,cognizance of political backing and legislative issues playing roles towards overall aviation policy. The government of UNIP, upon independence, pursued a socialist policy that prioritized the aviation industry as a crucial component of the economy. Hence, the pursuit of achieving national aviation autonomy played a pivotal role in facilitating the advancement of technical education. This led to the establishment of ZASTI in 1969, which emerged as a distinct entity from DTEVT, evolving into a comprehensive institution dedicated to the domestic training of pilots for the Zambian Aviation Sector. In the contemporary context of 2023, the prevailing governmental policies reflect a capitalist ideology and prioritize the operation of a free-market economy. Consequently, the responsibility for the development of aviation training is predominantly assigned partially to the private sector. The present governmental policies prioritize Public Private Partnerships as a means to foster economic development in the aviation sector. Consequently, the traditional socialist approach of government-led flying training is seen less essential, given the country's existing financial and budgetary constraints. Insufficient deliberation has been given to the allocation of capital for aviation training, resulting in a challenging predicament for institutions like ZASTI in their efforts to revamp their existing flight training equipment in order to boost commercial pilot training activities in Zambia.

Economics Factors: Zambia's unemployment status, exchange rates, inflation, salaries, supply and demand affect aviation training business's income and efficiency. These factors directly affect flight training organizations/companies predictability of consumer spending that equally affect marketing objectives. Understanding Zambian economic issues can help explain existing flight training organizations' s problematic areas compounded by insufficient number of flying instructors working for ATOs and untapped potential in investment opportunities in ATO business. The prevailing economic variables that affect the overall country's economic growth has to some extent created an uncertainty with potential financiers for Approved Training Organizations. To some extent, the Zambian policy drivers have inadequate understanding of the operations of civil aviation business and fail to generally answer critical aviation technicalities when investors seek answers to the question "What are economic factors that threaten investor financing in set up of approved training organization(ATO) in Zambia?" .Economic issues affect family and business incomes and consumer purchasing power. Buyer power is how much customers spend on goods and services. Supply and demand are affected by economic forces, which affect the free exchange of goods and services. The exchange rate compares a country's currency to another currency or economic zone. In view of the foregoing, exchange rates affect the price of imported aviation training inputs such as technological requirements ,training aircraft and spares. Exchange rates seriously affect the local aviation inputs as a large portion training aircraft, flight synthetic devices, other associated student pilot training aides and maintenance requirements use imported materials or components. An unstable currency exchange rate affects organizations financial gains or losses when exporting and importing aviation training requirements. The existing Zambian economic factor has fewer disposable incomes to stimulate spending by families on flight training activities which are far much costlier when compared to academic training. To compound the issue of national spending is the unavailability of government bursaries to support flight training activities to the less privileged families in the country and all these complications affects aviation training investment, inflation, interest rates, and the employment market. It is also considered that countries with higher exchange rates may have lower unemployment. Import price increases may encourage domestic manufacturing, increasing labour demand and employment.

Socio-cultural Factors: According to the University of Zambia (Research, 2023),the primary objective of the Socio-cultural Research Program is to engage in research activities aimed at generating empirically grounded information that may contribute to the formulation of national development strategies. A population

characterized by a pronounced level of reliance poses notable socio-economic difficulties for both individual households and the wider society. The mitigation of this burden will predominantly depend on the adoption of solutions designed to promote sustainable development that considers socio-cultural factors. According to the Seventh National Development Plan (2017:29), cultural influences are comprised of values, attitudes, and behavioural patterns that are deeply intertwined with many aspects of development. Despite recognizing this fact, there has been a significant dearth of adequate consideration given to socio-cultural factors in the design of aviation policy in support of pilot training activities.

The primary findings (Mwila, 2022) indicate a robust correlation between academic programs that foster entrepreneurship and investment-friendly environments, and the cognitive dispositions of university students. According to a study conducted at the University of Zambia, students pursuing a business degree exhibited higher levels of optimism about entrepreneurial endeavours and investment opportunities compared to their counterparts majoring in education, social science, technology, law, or health. Furthermore, the analysis of variance (ANOVA) test indicated that six out of the eight factors examined, namely inadequate course content on entrepreneurship and investment, insufficient university policies to facilitate student-run businesses on campus, and a dearth of family entrepreneurs, were found to be influential in fostering an unfavourable culture of entrepreneurship and investment among students. The study (Mwila, 2022) suggests prioritizing entrepreneurial education and reallocating resources from conventional business and management courses.

This study however acknowledges that due to the absence of official aviation instruction in elementary and secondary schools, students who aspire to pursue aviation-related degrees are compelled to depend on their own internal drive, as opposed to a compulsory curriculum established by the government. Many students who demonstrate exceptional performance in their academic pursuits and aspire to contribute to policy development may possess some familiarity with the field of aviation but may lack a comprehensive understanding of the necessary components for an effective aviation training policy in Zambia. The absence of predicted large-scale drive in Pilot training can be attributed to the significant lack of knowledge.

Demographic Factors : The population of Zambia has had a constant rising trajectory, reaching a reported estimate of 15.4 million inhabitants in the year 2015. According to projections by the University of Zambia (Research, 2023), it is anticipated that the population would reach a total of 17.9 million individuals by the year 2020. This estimation is derived on an average annual growth rate of 2.8 percent. Based on the prevailing rate of expansion, it is anticipated that the population would attain a cumulative figure of 23.6 million inhabitants by the year 2030. Based on data provided by the Central Statistics Office (CSO, 2013:10), it is evident that a considerable segment of the population, namely 46.0%, belongs to the age group below 15 years. This particular demographic cohort exhibits a notable degree of reliance that can be tapped into for target student pilots.

Technological Factors : The topography of Zambia predominantly consists of elevated plateaus, interspersed with some hills and mountains. The Zambezi river is situated at an elevation of 329 m (1,079 ft) above sea level, representing the lowest point. Conversely, the highest point is located inside the Mafinga Hills, at an elevation of 2,339 m (7,674 ft) above sea level. Zambia is a landlocked nation that shares borders with many countries. It is situated adjacent to Zimbabwe in the south, with Victoria Falls acting as a natural split. To the north, it is bordered by the Democratic Republic of Congo, while Tanzania is to the northeast. Additionally, Zambia shares its eastern border with Malawi and its southeastern border with Mozambique. The nation's overall topography is distinguished by elevated planation surfaces. The overall topography of the country exhibits a gradual increase in height from the Kalahari Basin in the west to the eastern regions. The topography gradually descends from the upper Congo region towards the Zambezi depression in the southern part, resulting in the formation of a plateau. Zambia is situated inside the hydrological divide between the drainage basins of the Democratic Republic of Congo and the Zambezi River. With the exception of two provinces, the remaining provinces are situated inside the country's border that is created by the continental split, dividing the Atlantic Ocean and the Indian Ocean. This barrier extends from the Democratic Republic of Congo to the southern region of Tanzania. The topography is well suited for flight training activities as the plateau characteristics of the land act as a safety net for flight training misfortunes such as forced landing incidences,

International Factors: The phenomenon of globalization has effect on prompting Zambian flying training organizations to strive for a global reach as a means of achieving success. This would enable organizations to venture into untapped areas and establish connections with international consumers, resulting in heightened sales and financial gains. Prior to the establishment of a multinational clientele for the Zambian ATOs, it is necessary that affected Zambian stakeholders take into account and acknowledge that international business recognition was successful and achieved by ZASTI after establishment and throughout the 1970's and early 1980s.It is imperative that the study acknowledges that the global business environment may be categorized into two distinct components: micro-environment and macro-economic. The micro-environment encompasses several elements present inside a certain nation or area that exert an influence on an organization. These aspects include cultural distinctions, political and legal limitations, market insights, and technological advancements. Remaining well-informed on these alterations and integrating them into the organization's strategic framework is of paramount significance. In contrast, the macro-economic encompasses global patterns, encompassing economic indicators such as national debt, income levels, inflation rates, currency valuations, recession and interest rates. Additionally, this encompasses global phenomena such as information technology, consumerism, and the environment. In the contemporary globalized landscape, discerning the activities of one nation from those of another is a formidable challenge. For Zambian ATO embarking upon a journey to attract students from foreign nations, it is of utmost importance to carefully evaluate and take into account the prevailing political landscape. The classification of a government system, namely dictatorship, democracy, or constitutional monarchy, may exert a substantial influence on the operational and structural aspects of businesses. In the context of authoritarian regimes, it is observed that the state exercises complete ownership over all firms, while individuals are prohibited from possessing assets or engaging in international travel. In democratic nations such as Zambia, corporations have a greater degree of adaptability, but within the confines of governmental regulations. The International economic context of Zambia also has significant importance in determining the efficacy of global expansion efforts. In order to assess the compatibility between an Approved Training Organization's business plan and its operating environment, it is crucial to consider many factors such annual growth rates, per-capita income, business infrastructure, and remuneration structure. Moreover, it is crucial to take into account **PESTEL** factors which are Political. Environmental, Social, Technological, Environmental and Legal aspects country and intended nation of external clientele and associated aviation training inputs. With the foregoing it is plausible that initiating a business venture in a place lacking demand might result in unfavourable outcomes. It is imperative for Approved Training Organizations with aspirations of worldwide success to carefully analyze a multitude of international business concerns. The aforementioned factors encompass the advantages of engaging in foreign business, the micro- and macro-environments, as well as the political, economic, technical, and cultural contexts of the host nation. Through a meticulous assessment of these variables, Zambian Approved Training Organizations may enhance their likelihood of achieving success in the provision of pilots for international aviation community.

Marketing Factors: According to Abu-Dalbouh, (2020), the study examined the correlation between digital strategies and their impact on the Jordanian aviation sector, highlighting its significance and use. Scholars posited that the integration of digital technology facilitated the enhancement of management strategies and educational processes, hence enabling them to function as regional training centres. Research revealed that the use of digital tools, such as content production, web pages, social networks, advertisements, videos, and other marketing tools, within organizational management practices had been shown to enhance the efficiency of the management process and facilitated knowledge acquisition. It was suggested that the educational and training methods employed for managers were contingent upon the utilization of digital technologies inside the firm, as well as the specific nature and sector of the business. The training program implemented in the Jordanian aviation sector, developed by specialists in design and management, serves as evidence of the sector's accessibility and underscores the necessity for a regional training facility. Research has demonstrated that the establishment of a training centre at the regional level in the Jordanian air industry would result in several positive outcomes, including employee advancement, support from the government, enhanced organizational

reputation, and increased loyalty. These benefits will contribute to the heightened awareness of managers operating at both local and regional levels. In order to establish the significance and pertinence of the subject matter, a statistical one-way analysis of variance was conducted to examine the impact of various elements on training within the flying industry of Jordan. The primary findings of the statistical one-way analysis of variance highlight the significance of this study in the Zambian context and underscore the necessity for enhancing the digital strategy and its implementation in marketing endeavours that target digital platforms. Several distinct and practical recommendations proposed include centering on customer-centric approaches and three specific digital strategies: client engagement, product training, and utilization of digital technologies. These strategies are expected to facilitate the flying training organization's achievement of its strategic pilot training output objectives and enhance ATOs financial performance.

3.6 Internal Factors

Organizational Culture : The international aviation industry is seeing rapid growth, necessitating an increased demand for personnel inside airlines. Flight schools and universities that receive government financing are now providing instruction to an increased number of aspiring pilots in order to meet the growing demand in the aviation industry. The increasing number of student pilots presents a range of difficulties pertaining to the preservation of flight training quality and safety. Within this particular context, flight schools are required to evaluate various factors that have the potential to hinder the performance of student pilots and implement appropriate actions accordingly. There is a lack of empirical investigation about the leadership role of instructors in the context of student pilots. In this study, we acknowledge the influence of different leadership styles on the performance of student pilots, both in terms of positive and negative effects. The performance of contemporary companies is significantly impacted by cultural factors. Research has demonstrated that the presence of a strong organizational culture has a positive impact on both the overall performance of an organization and the individual performance of its members. The study investigated the impact of teacher pilot leadership styles and organizational culture on student pilot success. Our research encompasses the domains of performance, leadership, and organizational culture. Leaders who effectively manage groups comprising individuals with diverse cultural orientations are perceived to be more successful in their roles. Cultural norms give rise to variations among individuals, which can be referred to as outcomes of leadership. The evaluation of flight crew leadership necessitates the consideration of culture, since both individual and environmental factors have an influence on behaviour. Furthermore, an evaluation was conducted to analyze the effectiveness of crew resource management, with a specific focus on the cultural attitudes of both the crew members and their leader.

Human Resource: According to de Andreis, (2022), statistical data, a significant proportion of aviation incidents and accidents may be attributed to human error, namely resulting from human interactions with technological systems. In order to fully leverage its capabilities, technology requires the backing of a suitable organizational framework. Both technology and intangibles, namely human capital and intellectual capital, play crucial roles in organizational success. While technology may be cheaply obtained from the market, intangibles require careful preparation, training, and alignment with aviation training goals. Contextualizing on aviation incidents, the study notes that in the past, student pilot and all pilot accidents were predominantly attributed to technical malfunctions. However, in contemporary times, human factors have emerged as the primary contributors to aviation mishaps. Nonetheless, it is important to acknowledge that humans are an invaluable asset in the realm of air transportation, as they possess the potential to effectively enhance safety via improved interaction with technological systems. The present analysis, (de Andreis, 2022) formulated within the framework of a research endeavour conducted by the Giustino Fortunato University, seeks to examine the correlation between training in human resources and the utilization of technological tools.

This study aspires to provide a stance that valuable contribution to the existing body of Zambian aviation training to include a focus in the domain of Human Resources that include safety and appropriate aviation training.

Organization Structure : The study considers Luxhøj,(2001) in the field of study pertaining to the identification, categorization, and amelioration of organizational aspects within the aviation industry as being

in its nascent phase. The cryptic nature of organizational aspects has been well acknowledged. However, new studies in systems theory indicate that organizational impacts on system safety are prevalent. The field of aviation encompasses a range of intricate challenges that want more study and discourse. This is crucial in order to transform vague notions into tangible instruments for evaluating and intervening in organizations, as well as establishing a link between organizational characteristics and tangible enhancements in safety. This study proposes a methodology that combines the Prof James Reason model of accident causation with Nagel's Information-Decision-Action model, use Bayesian Belief Networks to examine the interconnectedness of these causal components, with particular attention to organizational aspects. The present study introduces a proposed taxonomy of organizational factors. The suggested approach involves utilizing the Organizational Development (OD) cube to map various organizational characteristics to strategies aimed at mitigating aviation training risks.

Physical Assets : Approved Training Organization physical asset refers training aircraft, flight synthetic training devices, buildings and other associated physical installations, training aids etc. In Business Physical assets according to Amadi-Echendu(2004), an entity that possesses the ability to generate, maintain, or diminish value during its entire lifespan. Physical asset management is the process of ensuring that the value profile of an asset is improved in a sustainable manner throughout its lifespan, as determined by all relevant stakeholders. This entails the harmonious integration of various fields of study and procedures that encompass the entire life cycle of developing, establishing, utilizing, and disposing of a tangible asset in a well-rounded manner to meet the array of limitations imposed by business strategy, economy, ergonomics, technical and operational soundness, and regulatory adherence. It is crucial to employ innovative methodologies that effectively manage the trade-offs between these limitations at every phase, as well as across the whole lifespan of a tangible asset. The consequences of implementing these inventive tendencies result in a fundamental change away from the traditional cost theory commonly observed in maintenance or terotechnology.

Findings of another study in sports according to Bahrami (2021), showed after the conclusion of data collection, a series of statistical analyses were performed utilizing the SPSS software. The conducted studies encompassed many statistical techniques, such as descriptive statistics, Kolmogorov-Smirnov tests, Pearson correlation, and multistage regression. The study's results indicated a statistically significant correlation between the physical and quantitative characteristics of a service and its overall quality, as well as its influence on client satisfaction. Moreover, a notable association may be observed between customer satisfaction and the perceived characteristics of dependability, responsiveness, and empathy. Moreover, the variables associated with physical and quantitative attributes, together with the quality of services, exhibit significant predictive potential in connection to the customer satisfaction variable. In the event that the quantitative and physical data, along with the quality of services offered by health clubs, satisfy a suitable criterion, it may be concluded that. Under such conditions, it is likely to lead to improved levels of consumer satisfaction and higher rates of client retention within the sports industry. This study acknowledges and sheds light on the hitherto unexplored connections between tangible aviation training evidence, student pilot pleasure, and sponsor loyalty inside aviation facilities, therefore making a valuable contribution to the current scholarly literature in this field.

In view of the foregoing the study acknowledges that in Zambia, ZASTI has no serviceable training aircraft, flight synthetic devices, online aviation training syllabus, outdated aviation library whilst the combined flight schools of Academy and Sky Trails have 04 single engine training aircraft, no synthetic flight training devices and no modern aviation library and online examination criteria. The existing PPL examinations are still manually managed by the Civil Aviation Authority of Zambia.

Profit and Cash Flow: In contextualizing ZASTI operations ,the study noted that the UNIP government, in its role as the policy driver, had a specific objective and mission to provide domestically trained pilots for the aviation industry. Considering the forementioned, it can be observed that a significant portion of government-funded educational and technical education initiatives were adequately allocated to ZASTI as an institution. This included the provision of special grants and the financing of local student pilot fees through bursaries. The MMD administration ultimately terminated the student pilot bursaries program, allowing only the completion of the last course for Commercial pilots, which had graduated as course number 14 in 1992. The cash flow

issues at ZASTI became evident after to the graduation of the last cohort of CPL students in 1992. The government undertaking ZASTI necessitates a grant in order to begin its activities. This grant should be sufficient to effectively utilize its primary assets and resources for the purpose of offering training programs for Commercial Pilots. The government, on the contrary, should undertake a comprehensive evaluation of its bursary program and use the opportunity to provide financial assistance for pilot training, with the expectation that these individuals will afterwards repay the loans upon securing employment. There exists a global shortage of pilots, and the provision of bursaries might potentially alleviate cash flow challenges faced by Air Training Organizations (ATOs), hence potentially facilitating the exportation of pilot jobs from the country. This will resolve the cash flow problems in critical institutions such as ZASTI or other ATOs selected by government to provide pilot training courses.

In view of the existing ATOs, the study referred to the Airline Operating Cash Flow Model (Douglas Aircraft Company, Incorporated, 1968) as a valuable tool for finance and aerospace management as it offers a comprehensive framework for sales, financial analysis, and strategic planning. This model facilitates data-driven issue resolution and aids in the decision-making process. The dataset comprises anticipated annual cash flows and additional expected financial and operational indicators for airlines. A more comprehensive understanding of the decision-making process may be attained by employing probability theory to analyze and include many key factors within the model. An endeavour is undertaken to establish a quantifiable assessment of the likelihood of attaining different magnitudes of these important factors, with the aim of deriving a probability distribution for future years' levels of operational cash flow. The examination of these distributions enables management to assess the many options available more effectively. This study acknowledges the examined use of the Cash Flow Model and its associated risk analysis, considering the perspectives of both the training equipment manufacturer and the customer. According to Hishitongo (2013), a study investigated the financial flows and operating loss of Air Namibia (Pty) Ltd, a state-owned enterprise, over the period from April 1, 2006, to March 31, 2011. The researcher chose this specific matter to investigate the fundamental elements that contribute to the parastatal's operating deficit and cash flow challenges. The researcher's findings (Hishitongo, 2013) indicate that the absence of a strategic plan, jointly developed by management and supervising government stakeholders, is likely to result in continued financial losses for the aviation operations. The potential consequences of this situation may include persistent challenges, significant economic setbacks, and a continual need on economic policy that renders positive governmental support in the foreseeable future.

Management: Several African aviation (Mukhezakule, 2019) firms have positioned themselves at the forefront of global marketplaces, despite indications that a significant portion of these enterprises lack competitiveness. The downfall of the company is not just attributed to its lack of supremacy in the global aviation business, but also to deficiencies in its leadership. The absence of a proficient and productive aviation service has the potential to negatively impact and impede the expansion of the aviation training sector . Hence, it is imperative for the aviation sector to fortify itself and cultivate a strong sense of competitiveness, thereby bolstering the aviation pilot training industry and ultimately contributing to the overall economic growth of the nation. The Republic of South Africa has seen a complete breakdown of equitable competition as a result of anti-competitive practices exhibited by certain aviation businesses. The prevailing economic conditions and the competitive landscape have given rise to a barrier that poses challenges for a new entrant seeking to establish a foothold in the market. Furthermore, a majority of airlines have constraints when it comes to acquiring and maintaining a competitive edge. The aforementioned issue might be ascribed to the difficulties that the sector encounters in relation to its leadership. The aviation industry necessitates the presence of strategic executives who possess the capability to proficiently develop and execute plans. Given the aforementioned considerations, this study encourages ATOs to undertakes a comprehensive examination of relevant scholarly works, afterwards formulating and presenting a framework that elucidates the interconnections among corporate strategy, strategic leadership, and sustainable organizational performance. Furthermore, this study aims to provide a valuable contribution by addressing the imperative of providing guidance for corporate strategic leadership in Approved Training Organizations the

pursuit of attaining a sustainable competitive advantage within the challenging context of Zambian aviation industry success in pilot training.

Know-How: The Zambian Civil Aviation Authority (CAA) has exhibited a lack of promptness in evaluating appeals made by firms like Sky Trails (Farmer, 2023) to employ uncertified aircraft, specifically the South African-manufactured Sling. The economic efficiency of this aircraft has been demonstrated in its use by South African Approved Training organizations (ATOs), since it has received approval from the South African Civil Aviation Authority for its application in pilot training inside that country. It is noteworthy that pilots who undergo training on the sling are provided with an International Civil Aviation Organization (ICAO) license, which is then converted into a Zambian license upon their repatriation. The effectiveness of aircraft models like the Sling has been demonstrated via rigorous testing, particularly in the context of delivering cost-efficient pilot training overseas. However, Zambia has been slow to adopt and implement similarly cost-efficient solutions for its Aviation Training organizations (ATOs).Considering the global scale, the utilization of simulation has emerged as a notable transformation (Salas, 1998) in aviation training inside recent decades. The advancements in simulation technology have significantly expanded the possibilities for aviation training, providing a wide range of capabilities. Indeed, contemporary aviation training has witnessed significant advancements in terms of realism, safety, cost-effectiveness, and flexibility. However, it is our contention that within the simulation community, there are certain misunderstandings or unfounded assumptions that hinder our ability to fully capitalize on recent scientific advancements in several related disciplines, hence limiting the potential for additional improvements in aviation training. The aforementioned assumptions pertain to the excessive dependence on high-fidelity simulation and the improper utilization of simulation as a means to augment the acquisition of intricate abilities. The objective of this paper examines these assumptions with the aim of fostering a discourse between professionals in the fields of behavioural science and Approved Training Organizations bearing in mind that there are no approved civil aviation synthetic flight training devices operational in Zambia.

Chapter Four

4.1 Methodology

The research methodology encompasses the organized and methodical approach to planning and implementing many activities that guide the study from its initial conception to the specific techniques employed in data analysis, data collection, and data interpretation. The term "research approach" is utilized to define this specific methodology. Furthermore, the research technique acknowledges the need of exercising informed decision-making to guarantee the proper execution of the study (Bannister and Booth, 2005). The utilization of research techniques is a fundamental aspect of the study, playing a pivotal role in obtaining precise findings that align with the researcher's aims. Historically, researchers have utilized two unique research procedures in order to conduct their investigations. The study also recognized that case study approaches are commonly associated with the inductive method, while the deductive approach is also used when aligning data in the analysis.

4.1.1 Case Philosophy

This study aims to explore the use of a case study methodology, drawing upon the research conducted by Imenda (2014), which emphasises the significance of incorporating theory in the research process. The researcher thereafter makes a distinct distinction between study topics that frequently utilize deductive and inductive methodologies, particularly in regard to the analysis of literature and the acquisition of data. The conceptual framework of this study encompasses various ideas, each of which carries implications in terms of ontology or epistemology. The ontological assumptions pertain to the fundamental understanding of the nature of reality, the existence of entities, and their actual activities (Guba, 1994). The epistemological assumptions revolve around the understanding of the fundamental nature of reality and the way it functions This study acknowledged Harrison(2017), that the foundation of several research methodologies is rooted in established philosophical systems. Nevertheless, according to Rosenberg and Yates (2007), case study does not adhere to a predetermined ontological, epistemological, or methodological stance, thereby allowing for a certain level of flexibility in its

practical use. Case study research can be informed by several philosophical principles, such as realism and positivism, which assert the existence of an objective world that is distinct from the observer and can be observed, investigated, and quantified. Additionally, relativism and interpretivism are also influential in guiding case study research. An interpretivist or relativist perspective assumes the existence of several realities and meanings, which are contingent upon and mutually constructed by the researcher (Lincoln, Lynham, & Guba, 2011; Yin, 2014). Researchers may employ different methodological techniques while conducting case studies, depending on their philosophical orientations (Stewart, 2014; Yin, 2014). Subsequently, the present study showcases the illustrative demonstration of the conceptual disparities among the works of MERRIAM (2009), STAKE (1995), and YIN (2014). According to LUCK et al. (2006), case study research serves as a means of connecting different paradigms within the healthcare research domain, with a particular emphasis on nursing (p.103). As a result, specific case study procedures exhibit varying degrees of reliance on either quantitative or qualitative methods, with some methodologies incorporating both approaches (MERRIAM, 2009; MILES, HUBERMAN & SALDANA, 2014; YIN, 2014). Denzin and Lincoln (2011) acknowledge the case study's capacity for development and adaptability in accommodating many ontologies, epistemologies, methodologies, and approaches. However, they emphasize the qualitative significance of this method. Due to its adaptable nature, case study research methods are particularly well-suited for investigating complicated research problems (ANTHONY & JACK, 2009; CASEY & HOUGHTON, 2010; FLYVBJERG, 2011; FARQUHAR, 2012; LUCK et al., 2006; MERRIAM, 2009; STAKE, 2006; YIN, 2014). The study provided numerical reference from multiple scholars (Creswell, 2014; Denzin & Lincoln, 2011; Merriam, 2009; Miles et al., 2014; Stake, 2006) concur that case study research is most effectively comprehended as a type of qualitative investigation. The objectives of qualitative paradigms encompass a range of aims, such as the exploration of new phenomena, the provision of explanations, the interpretation of meaning, and the provision of detailed descriptions. According to Denzin and Lincoln (2011), Several qualitative research designs include narrative research, phenomenology, grounded theory, and ethnography. Various techniques employ distinct ways in order to investigate, analyze, and ascertain the significance of events as seen by the individuals involved. Nevertheless, it is important to note that all of these actions are propelled by a common underlying reason (ibid.; also refer to MERRIAM, 2009). In pursuit of this objective, qualitative researchers employ several techniques and interpretative approaches in their studies (DENZIN & LINCOLN, 2011; MERRIAM, 2009). These approaches frequently entail participant observation, interviews, and content analysis. Denzin and Lincoln (2011, pp. 8-10) outline five key characteristics that distinguish qualitative investigations. Firstly, it is recommended to adopt perspectives that are less inclined towards positivism and post-positivism. Secondly, it is advisable to embrace postmodern sensibilities in one's approach. Thirdly, it is important to prioritize the subjective perspective of individuals. Fourthly, it is crucial to explore the constraints and limits inherent in everyday life. Lastly, it is essential to provide comprehensive and detailed descriptions. These attributes are frequently employed as illustrative instances in the examination of case studies. The fundamental aim of case study research is to conduct an in-depth investigation of a particular issue by analyzing it within its natural context and via the perspectives of those directly engaged with the topic (MERRIAM, 2009; SIMONS, 2009; STAKE, 2006; YIN, 2014). Similar to other forms of qualitative research, the researcher in this particular study will want to establish proximity with the participants inside their authentic setting in order to investigate, comprehend, and articulate their perspectives. The level of researcher's engagement and integration into the field is seen in the extent of contact required for data generation. The use of this particular methodology frequently incorporates elements of constructivism and interpretivism. Case studies commonly employ several methods such as observation, interviews, focus groups, document analysis, and artefact analysis in order to facilitate the process of co-constructing data (MERRIAM, 2009; SIMONS, 2009; STAKE, 1995;2006; STEWART, 2014; YIN, 2014). The nature of research is inevitably subjective and interpretive due to the inclusion of the researcher's personal perspectives and interpretations (Creswell, 2014).Academic researchers adopt a contemplative stance in their investigations (Denzin & Lincoln, 2011; Miles et al., 2014; Stake, 2006; Yin, 2014) and employ strategies like as memorizing and journaling to manage their own subjectivity.

4.2 Different Types of Case Study Philosophy

The selection of a methodological (Harrison, 2017), position in conducting this case study was guided by the researcher's worldview and the study's aim. This involved a careful evaluation of the many case study approaches available. The alignment of the researcher's philosophical perspective, research subject, study methodology, and methods for data collection and analysis was essential for achieving coherence in the research process (Farquhar, 2012; Luck et al., 2006; Stewart, 2014; Yin, 2014). Yin (2014), Stake (1995), and Merriam (1998, 2009) have each developed qualitative case study approaches, which were examined separately to enhance comprehension and attainment of this alignment. The researcher elucidated the impact of certain scholars' concepts on their adoption of the case study approach. The discourse revolves around the theoretical framework of post-positivist realism. According to YIN (2014), case study research is a methodology commonly employed in the field of social sciences. The researcher's conceptualization of "case study as a form of empirical inquiry" has characteristics reminiscent of post-positivism. According to YIN, he adopts a realist viewpoint while conducting case studies and emphasizes the need of maintaining objectivity throughout the scientific methods included in the study design. The notions of objectivity and generalizability hold significant importance in the research conducted by post-positivist qualitative scholars (ELLINGSON, 2011). Despite recognizing the inherent constraints of measurement, researchers that adhere to the post-positivist paradigm strive to employ scientific methods in order to get a deeper understanding of the surrounding environment. In order to minimize the repetition of errors and achieve a more accurate understanding of the current state of affairs, it is crucial to employ diverse methodologies and employ triangulation to corroborate findings (LINCOLN et al., 2011). To facilitate statistical analysis, researchers commonly categorize qualitative data in order to generate quantitative data. The importance of adhering to rigorous techniques in data collecting and analysis cannot be overstated, since it is essential for establishing the validity of research findings through peer scrutiny. Furthermore, proponents of post-positivism recognize that individuals own pre-existing assumptions and biases that influence their selection of research methods. Hence, it is important that the researchers restricted the interaction with participants and in maintaining objectivity in the study's perspectives (ibid). YIN (2014) outlines several key principles of post-positivist case study design. These principles encompass the utilization of diverse qualitative and quantitative data collection and analysis techniques, the potential for generalization when appropriate, the mitigation of subjectivity, and the active exploration of alternative explanations and the falsification of hypotheses. While impartiality is highly regarded, YIN recognizes that case studies possess descriptive and interpretive worth as well. According to YIN, a notable distinction between case study research and experimental studies lies in the fact that the former focuses on examining a phenomena within its authentic and natural environment (YIN, p.16). The selection of case studies is guided by the research issues and their corresponding theoretical hypotheses. YIN suggests employing replication logic, wherein cases are carefully chosen to provide either contrasting outcomes (theoretical replication) or comparable discoveries (literal replication), following thorough screening to ensure their unique relevance to the themes of interest. The YIN approach of case study is distinguished by its emphasis on accuracy, methodological rigour, and practical applicability. The sequential structuring of design aspects is driven by empirical relevance. The position expressed aligns with the post-positivist axiology, which emphasizes the importance of intellectual integrity, the mitigation of prejudice, acknowledging the limitations of the study, meticulous data collection, and accurate reporting (KILLAM, 2013; YIN, 2014). Merriam's theoretical perspective might be characterized as a combination of constructivism and pragmatism. The researcher adopts a constructivist perspective by embracing the idea that reality is constructed intersubjectively through socially and experientially established meanings and understandings, as shown by MERRIAM's (1998) case study research. In line with YIN's (2014) perspective, MERRIAM (1998, 2009) asserts that employing methodologies that facilitate comprehension, categorization, and organization of information, as well as adapting findings to enhance their clarity and usefulness, is imperative in the context of handling substantial volumes of data and abstract concepts. The MERRIAM perspective, in this regard, presents a pragmatic approach to constructivist inquiry. According to MERRIAM (2009), in the context of case study research, it is possible to employ both quantitative and

qualitative techniques. However, MERRIAM says that when conducting qualitative case studies, it is preferable to emphasize methods that facilitate the development of inductive reasoning and interpretation, rather than those that focus on hypothesis testing. Cases are selected based on their ability to provide light on the phenomenon or topic of interest in relation to the research question. There is a demand for a thorough and illuminating explanation of the phenomena (Merriam, 1998). While Merriam does not prescribe a particular strategy for data collection or analysis, she underscores the need of employing rigorous procedures to organize the research process. Among many qualitative data collection methods, interviews are found to be the most commonly used. In order to ensure that case study research possesses the necessary traits of manageability, rigour, credibility, and relevance, MERRIAM (1998, 2009) provides a comprehensive explanation of pragmatic frameworks that guarantee these attributes. In order to assure the quality of procedures such as descriptive, thematic, and content analysis and triangulation, it is imperative to have a well-structured and systematic approach to data collecting and analysis, supported by a comprehensive chain of evidence (MERRIAM, 2009).Researchers in many academic disciplines often utilize theoretical frameworks and develop research questions as part of their scholarly investigations (Merriam, 1998). According to BROWN (2008), the author contends that Merriam's tone introduces a practical application of the diverse approaches that guide constructivist study. The user did not provide any text to rewrite. The discussion revolves around the stakes associated with the relativist-constructivist-interpretivist perspective. The STAKE (1995, 2006) framework adopts a qualitative approach that aligns with constructivist and interpretivist perspectives in the context of case study research. STAKE adopts a systematic approach to the procedure and acknowledges that while it is possible to employ quantitative tools in a case study, STAKE's methodology is primarily driven by a profound desire to uncover significance and gain comprehension of experiences within their own contexts. The researcher plays a crucial part in generating knowledge, and STAKE underscores the researcher's interpretative function as indispensable in the whole process. The interpretive stance posits that reality is characterized by its multiplicity and subjectivity, contingent upon the diverse meanings and interpretations attributed to it. The knowledge produced during the research process is contingent upon the specific temporal and contextual circumstances of the study. Additionally, the researcher plays an active role and engages in the investigation. According to STAKE, within the realm of epistemology, the action, experience, and interpretation of a case are influenced by the scenario at hand. According to STAKE (2006), comprehending the case necessitates immersing oneself in the action of the case within its specific setting and circumstance. The researcher endeavours to capture their subjective understanding of the case, while doing a situational study allows for an analysis of the interconnected system in which the case takes place. Like YIN (2014) and MERRIAM (2009), the selection of a case or instances is based on their potential to provide insights into a specific issue of interest, taking into consideration the objectives and circumstances of the research. A case is chosen based on its inherent interest or its potential to enhance comprehension of another subject; it serves as a valuable tool for gaining understanding of a particular topic (STAKE, 2006). In the context of STAKE (Stakeholder Analysis and Knowledge Elicitation), a variety of sources and methodologies can be employed for data collection and analysis. Nevertheless, interviews and observations are commonly regarded as the favoured and predominant means of gathering data. The researcher assumes a collaborative role with participants in the pursuit of comprehension and significance, actively engaging in the process of knowledge discovery and creation. This involves employing various approaches such as direct interpretations, as well as organizing data into categories or themes. In his work published in 1995, STAKE advocates for the use of vignettes, which are narrative episodes, to effectively demonstrate various parts of a case. Additionally, he suggests the use of dense descriptions to effectively communicate research findings. These recommendations align with STAKE's constructivist and interpretivist approach to doing case study research. According to BROWN (2007), the seminal researchers employ three different approaches that can be positioned on a continuum between quantitative and qualitative methodologies. YIN (2014) adopts a post-positivist methodology, which is situated at one end of the continuum. On the other end, STAKE (1995, 2006) utilizes an interpretivist design. MERRIAM (1998, 2009), as a pragmatic constructivist, incorporates elements from both approaches and occupies a position closer to the centre of the continuum. According to

BROWN (2008), the impacts of each method may be summarized as follows: case study research is backed by the pragmatic approach of Merriam, informed by the rigour of Yin, and embellished by the creative interpretation suggested by Stake (p.9). There is a debate among scholars over the potential impact on study validity when combining qualitative and quantitative techniques (BOBLIN et al., 2013; SANDELOWSKI, 2011). However, MERRIAM's methodology illustrates that methodological flexibility may be effectively included without compromising the integrity of the research design.

This case study was an esteemed research methodology, particularly in the first phases of research since it facilitates the generation of ideas and the identification of behavioural and experiential patterns. Nevertheless, this study has been deliberately exposed to criticism due to the subjective and arbitrary nature when contrasted to quantitative research methodologies. It is therefore acknowledged that the replication of case studies has significance in validating findings, facilitating the dissemination of novel insights, and establishment of stronger foundations for research reliability.

4.3 Research Design

The term "research design" encompasses the strategic framework or blueprint employed by researcher to accomplish the research objectives and address their research inquiries. The research design played a crucial role in the study process by providing a structured framework for the researcher to achieve the objectives and solve the research questions. The choice of a case study design depends on several factors, giving the researcher the opportunity to utilize quantitative, qualitative, or mixed methods approaches. The importance of ethical considerations in qualitative research cannot be emphasized, since they play a pivotal role in upholding the integrity and credibility of the study. This case study places significant importance on the conceptual framework that highlights the correlation between External and Internal factors and the performance of Approved Training Organizations engaged in the training of commercial pilots. Consequently, it contributes to the understanding of the ontological status of these factors in generating innovative ideas and offering a comprehensive understanding of the behavioural and societal issues linked to the decline in commercial pilot training in Zambia.

The framework includes various components that encompass a range of variables. These components consist of the overarching objective of the study, the type of inquiry being pursued, the level of researcher engagement, the research context, the techniques used for data collection and analysis, and the design of the sample population. The careful consideration of a research design is essential in identifying the nature of the study, which may be categorized as either exploratory or descriptive.

The primary objective of qualitative research is to examine inquiries pertaining to the understanding and interpretation of human existence and societal interactions in Zambia, specifically concerning the difficulties encountered in ensuring a sufficient supply of pilots for the aviation industry. The efficacy of the research hinges upon its capacity to provide light on the subjective perceptions of the individuals involved. This study adopts a research methodology that aims to comprehensively explore the human experiences associated with the decline of commercial pilot training operations in Zambia. This study used open-ended questions and text analysis to examine the impact of social or personal variables on the observed drop. The significance of qualitative researchers' contributions lies in their utilization of interpretative abilities and inductive reasoning to develop insights, hence playing a crucial role in the generation of knowledge. The study was designed as a case study, use inductive reasoning to develop a theoretical framework based on the data obtained. The area of qualitative research places substantial weight on ethical issues, as the standards employed for evaluating the quality of studies are fundamentally interconnected with these concerns. It is crucial for the researcher to adhere to ethical standards when conducting this research and accurately represent the viewpoints and experiences of the participants. When evaluating qualitative research, it is crucial to consider the ethical norms and guidelines that regulated the study.

4.3.1 Study Population

The research population comprised key management people from Zambia Air Services Training Institute (ZASTI), Aero Academy , Sky Trails , and the Civil Aviation Authority. The collection of primary data w

conducted through several methods, including surveys, in-person interviews, and document reviews. The study had a total of 23 participants, all of whom were employed by Zambia's prominent Aviation Training Centres/Approved Training Organizations. The researcher allocated adequate amount of time to collect a total of responses, which have been deemed satisfactory in fulfilling the study's aims and objectives.

4.3.2 Sampling Technique

At present in Zambia, the number of flying training schools available is three (03), with a combined fleet of five (05) operational training aircraft and an additional three(03) aircraft that are now non-operational. The combined personnel of the three flying schools consists of fifteen (15) full-time employees, five (05) part-time employees, and three (03) staff members affiliated with the Civil Aviation Authority (CAA) who are involved in ATO approvals and have prior experience with ZASTI operations. In this study, purposeful sampling was employed, specifically utilizing the relevant Case Sampling strategy. This method entailed the deliberate selection of a limited number of noteworthy examples for comprehensive analysis. In scenarios characterized by limitations on accessible resources, this methodology was utilized to ascertain the imperative nature of doing a more exhaustive inquiry. The choice of these scenarios is based on the likelihood that the issues presented will occur in future circumstances.

In order to improve the overall quality of the data, additional information was integrated from a range of aviation sources, air operators, and numerous publications. The objective of this study is to offer further viewpoints and understanding of the obstacles encountered by the three Approved Training organizations in Zambia in order to develop a successful pilot training enterprises.

4.3.3 Study Tools

This study included a combination of questionnaires, interviews, and document analysis as methods for data gathering, in order to achieve a comprehensive understanding of the pilot training challenges being examined, a research methodology that embraced various types of case study qualitative methodologies was utilized. This strategy involved conducting interviews with relevant stakeholders and analyzing pertinent documents. This methodology will facilitate the collecting of dependable data on the challenges encountered by the selected Zambian Approved Training Organizations.

4.3.4 Data Analysis

The viability of this study is contingent upon optimizing the utilization of the allocated resources, namely time and financial constraints. Prior to commencing data collection, it was imperative for the researcher to ascertain the precise facts and information required to address the research questions reflected in this study. The Researcher had access to a wealth of data or information from both primary and secondary sources. Primary sources are essential components of every dataset since they provided the researcher with direct access to raw data from its original source. One of the key benefits associated with the use of primary sources was the increased likelihood of obtaining correct and pertinent material that aligns with the subject matter of the study. Secondary data referred to information that was derived from previously published sources, such as books and journals. Consequently, the present investigation placed significant reliance on both of these sources. To procure information and data from primary sources, the researcher devised a questionnaire (Amaratunga, 2002).

In addition, the use of secondary sources was also prevalent in academic research, wherein the researcher engaged in the examination and analysis of scholarly literature authored by other experts within the respective subject. These literature materials provided the researcher with the opportunity to get knowledge regarding the most significant issues and obstacles within the field. The collection, consolidation, and analysis of information from the aforementioned sources were essential components of this study since data collection played a pivotal role in facilitating the accurate formulation of conclusions.

4.3.5 Data Analysis Methods

This study included a variety of data collection methods, including the examination of documents and archival materials, conducting interviews, engaging in direct observation, employing participant-observation techniques, and analyzing artefacts.

The process of data collection held significant promise, although it was not without its share of obstacles. The major method of data collecting in case studies often involved the utilization of interviews. Interviews may be classified into four main types:

1. Open-ended questions: During an unstructured interview, the primary participants were queried on specific occurrences. The participants' replies offered resolutions or alternate approaches while also providing corroborating evidence. The researcher employed other sources in order to corroborate the material.
2. Focused Interview: A focused interview methodology was employed to efficiently obtain responses from participants within a limited timeframe, utilizing predetermined questions. This approach is frequently employed to authenticate data obtained from diverse sources.
3. Organized, or Structured interviews are commonly employed in local community studies of a survey kind for the purpose of data collection. The questions in the survey exhibit a high level of craftsmanship.
4. Survey based Interviews. The case studies gathered empirical data using this method of conducting field trips and directly seeing the phenomena under investigation. The data was gathered using both informal and methodical methodologies in order to investigate and record patterns of conduct. This approach yielded a greater amount of information pertaining to the topic matter. The quantification of work performance was shown to be similarly trustworthy when assessed by a greater number of observers.

Documents play a crucial role in formulating theories pertaining to various phenomena under investigation. In the present case study, the participants engaged in communication through narratives and written papers, while the researcher assumed the role of an observer. The investigator's knowledge and understanding of this phenomenon served as a safeguard against any misinterpretations and distortions during the process of data analysis.

Archives house a variety of valuable materials, including service records, organizational records, name lists, survey data, and other pertinent information. Prior to using the records, the researcher conducted a thorough examination of sources of records data required in the verification of information that is quantitative in nature.

According to Glesne and Peshkin (1992), it is advisable to utilize wall charts as a means of facilitating anonymous research. The methodology of participant-observation study entails the active involvement of the researcher in the observed activity. Studies conducted on local communities or social circles frequently demonstrate this phenomenon.

According to Stake (1995) and Yin (1994), it is recommended that case studies analyze data within the minimum of six sources of evidence. The analysis compilation comprises study findings from Yin (1994) and Stake (1995). The six main qualitative data analysis are listed below as:-

- Content Analysis
- Narrative Analysis
- Discourse Analysis
- Thematic Analysis
- Grounded Theory
- IPA (interpretive Phenomenological Analysis)

4.3.6 Triangulation

Various forms of written communication, such as letters, notes, agendas, administrative files, and media, were utilized in the course of the enquiry. The articles diligently employ cross-referencing techniques to confirm the quality and reliability of the evidence. The researcher procured various instruments, equipment, and artefacts on field excursions for the purpose of examination and analysis. The recent finding expanded the researcher's perspective by acknowledging the utilization of sources in case studies, as discussed by Yin (1994).

Consequently, the researcher effectively managed circumstances that required such approaches. Nevertheless, this particular situation presented distinctive prospects for data gathering, since the researcher gathered a portion of the data prior to developing the study inquiries (Yin, 1994).The researcher endeavoured to cultivate expertise as an investigator, tasked with the responsibility of integrating divergent ideas and theories to enhance the rigour and reliability of case study analysis, which constituted another crucial aspect to be taken into account. The researcher was able to establish credibility and impartiality by adhering to principles of neutrality and critical thinking.

The examination of empirical evidence in case studies is considered to be the most challenging component of the case study approach, as it is the least well-established. A number of scholars proposed that enhancing the conditions under which studies are conducted in order to ease statistical analysis will streamline the process and enhance its credibility. According to Miles and Huberman (1984), the use of many analytic methodologies can facilitate the process of analysis. Examples of tasks that include manipulating data and analyzing patterns include rearranging arrays, organizing evidence into a matrix, producing flowcharts or data presentations, tabulating event rates, and utilizing statistical measurements such as means, variances, and cross tabulations to examine correlations.

The process of making novel discoveries necessitates the use of analytical methodologies. Yin (1994) proposed two distinct utilization approaches for this purpose.

4.3.6.1 Theoretical frameworks that facilitate the analysis and evaluation of research findings. An alternative approach would involve the creation of a case description as a means of structuring the case study. Lynd conducted the seminal "Middletown" study in 1929. The task of analysis was facilitated by the implementation of a consistent and structured chapter organization. The primary objective of a case study often involves identifying causal relationships for analytical purposes. Research on pattern matching is of utmost importance. This argument involves a comparison between a predicted pattern and an observed one. The utilization of pattern matching techniques contributes to the enhancement of internal validity. In the context of an explanatory case study, the observed patterns might potentially be attributed to either the dependent or independent variables.

4.3.6.2 Descriptive research that in the context of research, necessitates the formulation and articulation of the anticipated pattern prior to the commencement of data collection. This study encompasses a comprehensive examination of all pertinent data, encompassing all significant explanatory factors. The analysis also underscores the crucial element of the case study. The researcher used prior knowledge and specialized expertise to further investigate the data.

According to Yin (1994), when independent variables are present, it is advisable to employ pattern-matching as a method for considering different interpretations. The task entails developing many theoretical assumptions in order to compare a given pattern with an anticipated pattern. Yin (1994) posits that researchers ought to exert considerable effort in order to furnish analyses of superior quality. According to the author, it is imperative for the researcher to assess four crucial variables.

During the period of data analysis, according to Stake (1995), it was proposed the researcher embraces the use of category aggregation as an analytical approach to enhance the quality of case study research. The study further used pattern-matching concepts to provide more evidence for Yin's (1994) assertions. In a multiple-case analysis, Runkel (1990) employed aggregated data to compute relative frequencies. Stake (1995) proposed the utilization of coding as a methodological approach for data analysis, with the aim of identifying and emphasizing significant themes within the data. Eisner and Peshkin (1990) expressed a preference for the direct interpretation of events over the interpretation of measurement data. Numerous researchers and experts in the field have offered valuable insights and recommendations about the development and execution of case study techniques. These include Hamel et al. (1993), Stake (1995), and Yin (1984, 1989a, 1994). The forementioned study investigated the methodology for constructing survey instruments as suggested in scholarly literature. Consequently, the aforementioned component plays a crucial role in the collection of inquiry data. The

utilization of the case study approach is widely favoured in several research endeavours owing to its distinctive attributes. Moreover, an AMO may be utilized in conjunction with other aircraft operators . If researchers fully comprehend the use and dependability of this methodology, they ought to employ triangulation more extensively.

Chapter Five

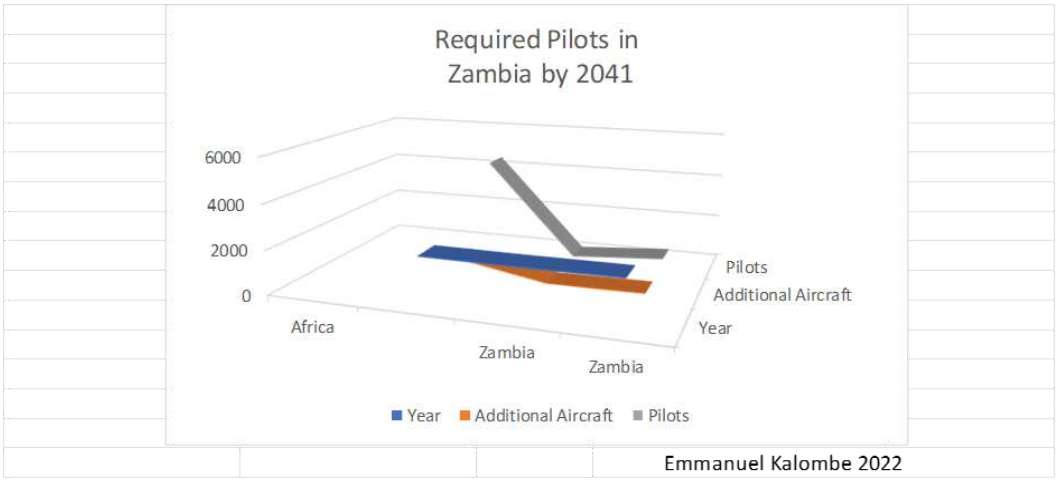
5.1 African Pilot Demand by 2041

The researcher referred to chapter 2.9 in this study and therefore follows that Projections on the Growth of the Aircraft Fleet in Zambia. According to Boeing's projections, it may be anticipated that a total of 740 aircraft will have a minimum crew complement of 3 individuals or 6 pilots, thereby necessitating an additional 4,440 pilots by the year 2041. Despite the fact that a total of 44 African governments have endorsed the Yamoussoukro Decision, which aims to establish a Single African Air Transport Market (SAATM), the continent now possesses a mere 30 carriers. Based on Boeing's analysis, an additional 740 aircraft need a minimum of two pilots (Flight Deck crew) or two more pilots per aircraft. However, operating these aircraft poses challenges because of the limitations imposed by flight and duty time rostering regulations such as days of rest or non-working days and absence from work for personal reasons.

5.2 Zambian Pilot Demand by 2041

In view of the foregoing, it is observed that Zambia's existing carriers own a limited fleet of seven (07) regional aircraft. Consequently, this situation presents a potential avenue for expansion in the market of single-aisle regional aircraft by the year 2041. Based on the aforementioned data, it can be inferred that the fleet size of Zambian Airlines is projected to see a substantial increase obtaining a 3% share of 740 aircraft by the year 2041. The product of 3% share of 740 aircraft is calculated to 23(22.2) additional aeroplanes by the year 2041. The quantity of 23 aircraft corresponds to an estimated increase of 138 Zambian pilots by the year 2041. The projected number of retirements in 18 years does not include the data provided. In 2022, Proflight Zambia made

FIGURE3: ZAMBIAN PILOT DEMAND PROJECTIONS



an expansion to its fleet by incorporating two regional aircraft, potentially resulting in the creation of employment opportunities for four to six pilots.

Based on the aforementioned study, it can be inferred that Proflight Zambia has potentially recruited around five pilots in the year 2022. Zambia Airways (2014) and Proflight Zambia are two prominent airlines operating both domestic and regional flights. According to Boeing's projection, it is anticipated that African airlines will increase their fleet size by an average of 24.66 aircraft by the year 2041. However, for the purpose of more realistic estimations, this study has chosen to consider 3% of the African market share, which corresponds to an interpolated figure of 23 aircraft out of a total of 740 aircraft by the year 2041. When distributing a total of 4,440 pilots evenly across the 30 African airlines, each airline would have around 148 pilots. Alternatively, if we consider the specific case of the two local airlines which have a total of 7 aircraft, it will require 138 pilots to fully staff its operations with 23 aircraft. Based on the flight training criteria established by the International Civil Aviation Organization (ICAO), an Approved Training Organization (ATO) is required to accumulate a total of 27,600 flight training hours over a period of 18 years. This equates to an annual average of 1,533.33 flight training hours or the successful training of about 8.70 new pilots each year.

Based on the aforementioned scenario, it is evident that the analysis indicates a projected requirement of 7.6 pilots year to achieve the expected progress. It is important to highlight that since 2009, all Approved Training Organizations (ATOs) have experienced unsuccessful outcomes in training candidates for the Commercial Pilot License. Consequently, it becomes evident that Zambian Approved Training Organizations (ATOs) have not achieved success in producing any commercial pilots, in contrast to overseas ATOs that graduate two Zambian commercial pilots annually. It is crucial for Zambia to promptly develop strategies for producing a cumulative number of 138 pilots during a duration of 18 years.

5.3 Case Study Respondents

Respondents were grouped as follows;

5.3.1	**ATO Administration**	
5.3.2	ZASTI Administration	ZP1,ZP2,ZP3
5.3.3	Sky Trails school Administration	SA1
5.3.4	Aero Academy Administration	AA1,AA1
5.3.5	**Flight Instructors**	
5.3.6	ZASTI Flight Instructors	ZF1
5.3.7	ZASTI Flight Instructors Part time	ZFP1,ZFP2,
5.3.8	Aero Academy Flight Instructors	AF1,AF2,AF3
5.3.9	Aero Academy Part Time Flight Instructors	AFP1,AFP2,AFP3
5.3.10	Sky Trails Flight Instructors	SF1,
5.3.11	**Ground Instructors**	
5.3.12	ZASTI Ground Instructor	ZG1
5.3.13	Aero Academy Ground Instructor	AG1,AG2,AG3
5.3.14	**CAA Staff**	
5.3.15	CAA Staff	CA1,CA2,CA3

5.4 Required Additional Pilots in Zambia by 2041

From the above forementioned projections, it is needed to produce an extra 138 pilots to cater to the demands of the Zambian Aviation Market. The analysis included predictions regarding anticipated crew retirements, with an contingency that has not been accounted for. The assumptions support the inclusion of a contingency number of pilots to be added to the existing necessary pilot count, resulting in more pilots by the year 2041.The report acknowledges the existence of a global scarcity of pilots, which implies that extra pilots are faced with the decision of either remaining in Zambia or seeking employment elsewhere. The inquiry pertains to the appropriate measures that should be taken by the Government and flight training institutions in response to the shortage of pilots that is currently been projected.

5.5 Flying Instructor Response (ZF1,SF1,AF1,AF2,AF3,AFP1,SF1,CA2)

5.5.1 Available Qualified Flying Instructors (QFI)

Additionally, this research recognizes the presence of a limited number of civilian Qualified Flight Instructors (QFI). The current flight schools provide a combined total of 5 full-time and 6 part-time Qualified Flight Instructors (QFIs).The insufficient number of instructors in Zambia might be attributed to the absence of CPL approved flying schools in the country. Currently, none of the three (03) flying schools possess the necessary approval for conducting Commercial Pilot training. Consequently, none of these schools are capable of attracting potential flight instructors for long-term employment. Most schools have a small number of student pilots, which does not lead to economic advantages in terms of hiring extra instructors.

5.5.2 Zambia Air Force CAA approved QFIs (AA1,CA1,ZP1,SF1,SFP1,SFP2)

Notwithstanding the issue of instructs, the Zambia Air Force possesses a significant number of flight instructors as a result of its ongoing flight training operations with the tactical air formations. The presence of this resource has significantly enhanced the sustainability of flight training programs, since about half of all instructors accredited by the Civil Aviation Authority (CAA) are either currently employed by or have previously served in the Zambia Air Force (ZAF). A portion of the instructors at ZAF are included in a pool of part-time instructors who also work with private flying schools and ZASTI. a global scarcity of pilots, which implies that extra pilots are faced with the decision of either remaining in Zambia or seeking employment elsewhere. The present investigation concerns the suitable actions that should be undertaken by the country and required assistance from the Zambia Air Force in relation to flight training establishments in light of the existing scarcity of Qualified Flying Instructors (QFIs). In general, it is widely acknowledged by the flying schools that the acquisition of necessary Qualified Flight Instructors (QFIs) to fulfil training requirements poses a significant challenge.

5.5.3 Existing Training Aircraft (ZP1,AA1,SA1,AFP1,CAA1)

Furthermore, the researcher acknowledges the existence of an established fleet of aircraft utilized for instructional purposes. Sky Trails had a fleet of three Cessna 172 aircraft, whilst Aero Academy employed the Cessna 182 and Piper Cherokee 180 models for its instructional purposes. The organization known as ZASTI possesses a Cessna 152 Aerobat aircraft that is now in an inoperable state, as well as a twin-engined Piper 28-Aztech aircraft. The existing flight schools supply a combined total of 7 aircraft of which the combined impact of age and spares are not a cost-efficient aircraft and as a consequence seem to be cost prohibitive in delivering inexpensive flight training activities.

5.5.4 The South African “Sling” Uncertified Aircraft(SA1,SF1,CAA1,CAA2,ZFP1)

In view of the above with regards to training aircraft, the evaluation of applications made by enterprises (Farmer, 2023) such as Sky Trails to utilize uncertified aircraft, particularly the South African-manufactured Sling, has been characterized by a lack of expediency on the part of the Zambian Civil Aviation Authority (CAA). The cost effectiveness of this aircraft has been substantiated by its utilization by South African Approved Training organizations (ATOs), as it has obtained authorization from the South African Civil Aviation Authority for its use in pilot training throughout the nation. It is worth mentioning that pilots who get training on the sling are issued an International Civil Aviation Organization (ICAO) license, which is then converted into a Zambian license upon their return. The efficacy of aircraft models such as the Sling has been substantiated via meticulous testing, notably within the realm of facilitating economical pilot training abroad. Nevertheless, Zambia has exhibited a sluggishness in embracing and executing comparably cost-effective measures for its Aviation Training Organizations (ATOs).An example that is related but bears similarities can be found in the contrasting requirements for acquiring a Private Pilot's license and a hypothetical Recreational Light Aircraft Pilot license. The latter license, which does not currently exist in Zambia, would potentially be issued by a national flying club as a National Light Aircraft license, catering specifically to the needs of recreational pilots operating uncertified light aircraft like "sling" aircraft. Both licenses are essential to fulfil the distinct criteria of qualified and uncertified pilots operating small aircraft.

5.6 Ground Instructor Responses and the CAA Respondents (ZG1,SA1,AG1,AG2,AA1)

5.6.1 Ground School Syllabus

The study further discovered that the current Approved Training Organizations (ATOs) seem to lack clearance from the Civil Aviation Authority (CAA) for their Commercial Pilot License training curriculum. This is evident from the insufficient follow-up by the CAA in approving the submissions made by the flight schools. The issue at hand pertains to a historical circumstance wherein the establishment of ZASTI resulted in the exclusive administration and evaluation of aviation examinations by the British Civil Aviation Authority examining body, primarily inside the confines of the United Kingdom. The lack of effective oversight by the successive Department of Civil Aviation (UNIP-MMD-PF) during the transition to the current Civil Aviation Authority (PF to UPND) has resulted in insufficient efforts to ensure the optimal functionality of the examination body in line with contemporary standards.

5.6.2 Digital and eLearning Requirements(ZG1,SF1,AF1,AG1,AA1,AG1)

It is widely acknowledged that flying schools must enhance their practices by including e-learning platforms to cater to the needs of contemporary student pilots. Additionally, a significant portion of the training material should be transitioned to a digital format. None of the currently operating flying training institutions have reported that they have implemented a digital library within their facilities. However, the delayed approval of the Commercial Pilot License (CPL) program by the Civil Aviation Authority (CAA) for certain Approved Training Organizations (ATOs), such as Sky Trails and Aero Academy, is crucial to the next step required to improve on training aides needed in a flight school. This approval would enhance the potential for increased business opportunities in the domestic market for ATOs.The Ground School curriculum necessary for all the flight schools may be validated since most of the topic are modified to be in compliance with ICAO regulations for ATOs.

5.6.3 CAA Examination Criteria and Test Bank (ALL 23 Respondents)

Furthermore, all three flying schools expressed their concerns regarding the manual nature of the Civil Aviation Authority (CAA) testing and examination process. The task at hand presented a significant obstacle because to the limited time available for student pilots and training organizations to adhere to deadlines. The efficacy of the CAA testing criteria is contingent upon the presence and availability of the relevant inspector to administer and evaluate the tests and examinations. All submissions received on this matter indicated that flight schools have provided a digital test bank including an ample number of questions and corresponding answers, which may be utilized for the development of a Civil Aviation Authority (CAA) test bank. Despite the provision of this data to the CAA, there has been no indication of the implementation of a digital testing and examination platform that is devoid of intervention by examiners.

5.7 Fuel Cost (All 23 Respondents)

From this study, it was very evident that the impact of aviation fuel costs on pilot training expenses is a significant concern, as a substantial portion of the training fees is allocated towards fuel expenditures. Further investigation by the government is needed in order to ascertain the underlying factors contributing to the relatively low global costs of aviation fuel juxtaposed with the disproportionately high cost of fuel in Zambia. Given the substantial quantities of fuel necessary for flight operations and its major influence on cost estimation, there is a legitimate apprehension that a 10% decrease in fuel prices, while seemingly minor, might have a noteworthy effect on the yearly operational expenses of an authorized Aviation Training Organization (ATO) conducting flying training. The matter of aviation aircraft operations in Zambia has been a persistent concern over the past years, prompting curiosity among aviation enthusiasts regarding the reasons behind neighbouring regions' consistent ability to offer more affordable aviation fuel. This phenomenon remains unexplained despite the fact that some of these regions are also geographically landlocked.

5.8 Government Policy and lack of Student Bursaries :(ZP1,ZF1,ZG1,CA1,CA2,AF2,AF3,AG2,AG3)

Having reviewed much the enabling environment as discussed with respondents ,It was apparently clear as a serious concern poses a challenge to determine the appropriate course of action, given the inherent difficulties in implementing aviation policies pertaining to pilot training within the country. Specifically, the enforcement

of these policies at institutions like ZASTI proves to be a complex task, requiring the cooperation and support of three key stakeholders: ZASTI itself, the Civil Aviation Authority (CAA), and the Government as a shareholder.

Despite the forementioned points, it is worth noting that some crucial policy technocrats involved in formulating aviation policies at the governmental level lack a relevant background in aviation. Furthermore, they have failed to recognize the significance of introducing fundamental aviation concepts in secondary schools as a means to generate interest among the youthful Zambian population. The policymakers have yet to evaluate the significance of addressing the imminent pilot shortage through the implementation of government-sponsored programs and scholarships. These initiatives would aim to maintain the continuity of the aviation industry while minimizing any adverse impact on the sector. A significant proportion of policy makers within the Ministry of Transport are appointed or seconded from industries unrelated to aviation.

5.9 Synthetic Flight Training devices (All 23 Respondents)

All three flight schools emphasized the need to include Synthetic Flight Training Devices (SFTDs) or aircraft simulators as a crucial element in contemporary flying training. Flight simulators have the capacity to acquaint students with fundamental aspects of aviation, therefore providing them with a competitive advantage over those who lack exposure to aircraft operations. This advantage extends to the use of advanced navigational tools such as Garmin navigators. This is particularly advantageous if the student intends to operate an aero All three flight schools emphasized the need of including Synthetic Flight Training Devices (SFTDs) or aircraft simulators as a crucial element in contemporary flying training. Flight simulators have the capacity to acquaint students with fundamental aspects of aviation, therefore providing them with a competitive advantage over those who lack exposure to aircraft operations. This advantage extends to the use of advanced navigational tools such as Garmin navigators. This is particularly advantageous if the student intends to operate an aero plane in the flight simulator that possesses similar equipment to the aeroplanes they are likely to pilot. Certain flight simulators, exhibit a high level of intricacy by replicating the identical systems and operational procedures found in their real-world counterparts. economically advantageous because to their ability to replicate real-world scenarios without incurring the expenses associated with physical equipment or resources. Additionally, they may aid in comprehending instrument indications, their functionality, and the specific information they convey to pilots.

From a procedural standpoint, simulators may provide valuable assistance to students who encounter difficulties with checklists, instrument scans, or even basic tasks such as pattern work. plane in the flight simulator that possesses similar equipment to the aeroplanes they are likely to pilot.

5.10 Approved Maintenance Organizations (ZF1,ZG1,AA1,SA1,SF1,AF1,AFP2,CA1,CA2,)

The objective of this study was to observe the effect of an Approved Maintenance Operation (AMO) affiliated to the flight school on the improvement of repair turn-around times for flight school aircraft. Sky Trails and Aero Academy each has an Approved Maintenance Organization aim was to increase the amount of operational time available for the esteemed clients of the flight school. The flight training program provides a comprehensive understanding of the several professional opportunities within the technical aspects of the aviation industry. An Aircraft Maintenance Organization (AMO) grants an Approved Training Organization (ATO) the authority to do third-party maintenance, hence creating other options as a viable alternative to generating required revenues besides the existing flight school revenues. One additional benefit of such a facility is its capacity to provide a valuable chance for both flight students and technical students to engage in practical mechanical activities. This hands-on exposure may significantly enhance their comprehension of the intricate workings of aircraft.

5.11 ATO Finances and Operating Cash (ZP1,ZP2,ZF1,ZG1,AA1,AF1,SA1,AA2,AA3,CA1)

The study found from all flying schools indicating that Zambian Banks had challenges in providing easily Aircraft finance, which pertains to the acquisition and operational funding for aircraft. Aircraft finance, especially for commercial operations, encompasses several arrangements; nonetheless, it is frequently organized as a secured loan. Aircraft funding exhibits notable differences between private and commercial

aircraft, necessitating a distinct examination for each category in order to facilitate comprehension. Government funding for pilot training programs at institutions like ZASTI is insufficient, resulting in the institution's current position of failing to achieve the certification requirements for CAA ATO approval. The lack of re-investment prospects and recapitalization inside Zambia poses significant challenges to improving the financial picture of the ideal flying school.

5.12Flight school Administrative and Operational Statistics (All 23 respondents)

This research examined statistical data collected from the three Zambian flight schools (ATOs) under review and professionals from Civil Aviation Authority that are involved in the implementation of international standards. Aviation statistics have significant importance within the industry, serving many purposes such as monitoring the overall performance of the aviation sector, facilitating comprehensive network design, and enabling benchmarking against would be competitors. The data obtained from each institution in the below tables is sufficient to identify the current operational and administrative challenges in the Zambian flight training school industry. The tables below depict a picture on the state of the schools ability and capacity to facilitate the training of the required number of 138 pilots Commercial Pilot License by the year 2041.

5.12.1 Zambia Air Services Training Institute

TABLE 1: ZASTI VARIABLES FROM 1971 TO 2023

1.	Total Number of Pilots enrolled from	1971 to 2014	248 Student Pilots
2.	Total Number completed CPL course	1971 to 1990	14 Courses.
3.	Approximate Number of Completed CPL	1971 to 1990	136 pilots
4.	Bursary@ $50k/Student incl Drop outs	$7,22 Million	@2.0ZMK/USD
5.	Zambian Budget (Including Drop outs)	ZMK 14.44million(Old Currency)	
6.	ZASTI's Last CPL Course	1990	33 Years Ago
7.	Total number of PPL Courses	1990 to 2015	12
8.	Total number of PPL students	1990 to 2015	82
9.	PPL Courses	2015 to 2023	0
10.	PPL Completed	2015 to 2023	0
11.	Total number of aircraft	1971 to 1990	10
12.	Total number of aircraft	1990 to 2015	3
13.	Total number of Serviceable aircraft	2015 to 2023	0
14.	Total number of aircraft owned but U/S	2015 to 2023	2
15.	Total number of simulators	2015 to 2023	0
16.	Total number of School staff employed	2015 to 2023	3
17.	Total number of Full time QFIs	2015 to 2023	1
18.	Total number of Part time QFIs	2015 to 2023	3
19.	Total number of ground instructors	2015 to 2023	1

Administration of Flying School

1.	Source of funding	GRZ grants
2.	Administrator	ZASTI Management
3.	Approval status with CAA	Flying School has no ATO approval.
4.	Digital Library	Nil
5.	AMO approval	Nil

6.	PPL/CPL Syllabus available	Yes but not approved
7.	Student Hostels/Classrooms	Yes
8.	Training aids	outdated and mostly damaged
9.	Source of Challenges	Insufficient GRZ grants, training aircraft unserviceable, High Cost of Fuel,Shipping related challenges on Aircraft Spares, lack of Maintenance Repair and Overhaul facilities (MROs) in Zambia Insufficient Civilian QFI, inadequate Compliance Capacity to meet CAA ATO requirements and ZASTI time management Constraints due to inadequate school operating capital, Flying training fees are cost Prohibitive to ordinary citizens
Prospects		To recapitalize and re-organize administration of the school as it is transferred to operate under the CAA (This is also likely to introduce some Regulator "Oversight" complications)

Emmanuel Kalombe,2022

5.12.2 Aero Academy Flight School

TABLE 2: AERO ACADEMY VARIABLES FROM 2022 TO 2023

1.	Total Number of Pilots enrolled from	2021 to 2023	0 Student Pilots
2.	Total Number completed CPL course	2021 to 2023	0 Courses
3.	Approximate Number of Completed CPL	2021 to 2023	0 Pilots
4.	Average Cost to GRZ @ $90,000/Student	$0	@20.5ZMW/USD
5.	Zambian Government Budget Incentive	ZMW 0	
6.	Aero Academy Last CPL Course	NIL	0 Years Ago
7.	Total number of PPL Courses	2021 to 2023	2
8.	Total number of PPL students	2021 to 2023	8
9.	PPL Courses	2021 to 2023	2
10.	PPL Students Completed	2021 to 2023	3
11.	Total number of aircraft	2021 to 2023	3
12.	Total number of aircraft	1990 to 2015	0
13.	Total number of Serviceable aircraft	2021 to 2023	2
14.	Total number of aircraft owned but U/S	2021 to 2023	0
15.	Total number of simulators	2021 to 2023	0
16.	Total number of School staff employed	2021 to 2023	3
17.	Total number of Full time QFIs	2021 to 2023	2
18.	Total number of Part time QFIs	2021 to 2023	3
19.	Total number of ground instructors	2021 to 2023	3

Administration of Flying School

10.	Source of funding	Corporate Aero Shareholders
11.	Administrator	Corporate Aero Management
12.	Approval status with CAA	Approved for PPL training.
13.	Digital Library	Nil
14.	AMO approval	Corporate Aero Maintenance
15.	PPL/CPL Syllabus available	Yes but not approved
16.	Student Hostels/Classrooms	No
17.	Training aids	Acceptable
18.	Source of Challenges	Recapitalization plans exist, older aircraft, High Cost of Fuel, Shipping related challenges on Aircraft Spares, lack of Maintenance Repair and Overhaul facilities (MROs) in Zambia Insufficient Civilian QFI, CAA Compliance Costs and time Constraints, Flying training fees are cost Prohibitive to ordinary citizens
19.	Prospects	To Expand Business

Emmanuel Kalombe,2022

5.12.3 Sky Trails Flight School

TABLE 3: SKY TRAILS FLIGHT ACADEMY VARIABLES FROM 2022 TO 2023

1.	Total Number of Pilots enrolled from	2022 to 2023	0 Student Pilots
2.	Total Number completed CPL course	2022 to 2023	0 Courses
3.	Approximate Number of Completed CPL	2022 to 2023	0 Pilots
4.	Average Cost to GRZ @ $90,000/Student	$0	@20.5ZMW/USD
5.	Zambian Government Budget Incentive	ZMW 0	
6.	Sky Trails Last CPL Course	NIL	0 Years Ago
7.	Total number of PPL Courses	2022 to 2023	2
8.	Total number of PPL students	2022 to 2023	22
9.	PPL Courses	2022 to 2023	2
10.	PPL Students Completed	2022 to 2023	0
11.	Total number of aircraft	2022 to 2023	3
12.	Total number of aircraft	1990 to 2015	0
13.	Total number of Serviceable aircraft	2022 to 2023	3
14.	Total number of aircraft owned but U/S	2022 to 2023	0
15.	Total number of simulators	2022 to 2023	0
16.	Total number of School staff employed	2022 to 2023	6
17.	Total number of Full time QFIs	2022 to 2023	3
18.	Total number of Part time QFIs	2022 to 2023	2
19.	Total number of ground instructors	2022 to 2023	3

Administration of Flying School

20. Source of funding	Sky Trails Shareholders
21. Administrator	Sky Trails Management
22. Approval status with CAA	Approved for PPL training only.
23. Digital Library	Nil
24. AMO approval	Sky Trails Maintenance
25. PPL/CPL Syllabus available	PPL Syllabus approved
26. Student Hostels/Classrooms	No
27. Training aids	acceptable
28. Source of Challenges	Recapitalization plans exist, older aircraft, High Cost of Fuel, Shipping related challenges on Aircraft Spares, lack of Maintenance Repair and Overhaul facilities (MROs) in Zambia Insufficient Civilian QFI, CAA Compliance Costs and time Constraints, Flying training fees are cost Prohibitive to ordinary citizens.
29. Prospects	To Expand Business

Emmanuel Kalombe,2022

5.13 Conclusion

5.13.1 World Pilot Demand: Opportunity for Flight Schools

In conclusion, it can be inferred that the information provided supports the notion that there is a looming world aviation pilot shortage. The study's findings suggest that the projection indicate an increase in the aircraft fleet for the Zambian aviation sector, as well as the possibility of expanding single-aisle regional aircraft by the year 2041. According to Boeing's estimations, the researcher's extrapolation of Boeing's projected 740 aircraft has yielded research data suggesting that a minimum crew complement of 3 persons or 6 pilots is necessary. This would entail an additional requirement of 4,440 pilots for the African continent. Despite the fact that the Yamoussoukro Decision has been ratified by 44 African states, the number of carriers on the continent now stands at 30. The data analysis further suggests that the current fleet of regional aircraft in Zambia is restricted, hence indicating a possible opportunity for expansion. According to projections, the fleet size of Zambian Airlines is anticipated to see a substantial rise and maybe stand at 3% share of 740 aircraft by the year 2041. This expansion is expected to result in a corresponding increase in the need for pilots. This corresponds to a projected hypothetical rise of 23 additional aircraft or 138 required pilot jobs in Zambian by the year 2041.
Nevertheless, African airport arrival stood at 19.4 million arrivals for 2022 and Zambia recorded 1.7 million arrivals which equates to 8.7% of the market share. Considering all carrier operating in Zambia we can split the arrivals 5.7% due to foreign carriers and 3% due to the domestic airlines. While considering the current carriers in Zambia Airways (2014) and Proflight Zambia, which are the two significant airlines in operation inside the nation, it can be observed that both airlines are projected to expand their fleet by an average of 3% share of aircraft numbers by the year 2041. To ensure the optimal functioning of its operations, every airline requires around 138 pilots to adequately staff their workforce. Nevertheless, since 1994, all Approved teaching Organizations (ATOs) have had a lack of success in teaching applicants for the Commercial Pilot License. The rapid generation of a total of 138 pilots in Zambia over a period of 18 years, while ensuring a consistent yearly contribution rate is of utmost importance.

5.13.2 Zambia's Hypothetical Pilot Requirements by 2041

1) Training 138 new pilots for Zambia will cost about $13,800,000 @$100,000 per CPL student.
2) Training 138 new pilots will fly 27,600hrs.

3) This number interprets into 7.6 pilots per year and 1,533hrs per year (Impossible to complete CPL in 1 year)
4) One Aircraft can train an average of 6hrs per day for 5 days in a week or 20 days in a month interpreting into 120hrs per month or 1440 per year.
5) 7.6 pilots per year will require a minimum of 3 training aircraft.
6) Training aircraft will require a minimum of 3 flight instructors.
7) 7.6 pilots interpret into 2.53 student pilots per flight instructor.
8) 6 Second hand Single engine training aircraft will cost about $150,000 each or $900,000 for 3 aircraft.
9) 3 Second hand twin engine training aircraft will cost about $300,000 each or $900,000 for 3 aircraft.
10) A CPL program will realistically be completed in 3 years because of Ground School
11) Each ATO Having 3 aircraft will only provide 45.6 pilots by 2041.

4.0 Economy of Scale measure to meet Target by 2041

12) 9 aircraft will be required to produce 138 pilots by 2041.
13) 9 Instructors will be needed to produce 138 pilots.
14) 6 Pre-owned single aircraft will cost about $900,000.
15) 3 pre-owned twin engine trainers will cost about $900,000.
16) 9 instructors will cost $45,000 @$5000 per month or $540,000 per year or $9,720,000.
17) Difference $4,080,000
18) Average Cost of Fuel at 50L/hr for 27,600hrs will cost about $2,290,800@$1.6/Litre of Avgas

5.13.3 Short Term Solution to re-invest in all 3 ATOs.

The minimum re-capitalization of all three schools, taking into account existing physical assets such as school buildings, office assets, administrative personnel, and current operational capital, as well as the existing human resources in place.

19) 7.6 pilots will require 3 Advanced Training Device/or FNPT I simulators.
20) Two Cessna 172 single engine link trainer simulator cost to buy and install $100,000.
21) A Twin-engine Beechcraft Piper Seneca link trainer simulator cost to purchase and install $100,000.
22) Total cost of ATD simulators about $300,000
23) 9 instructors will cost $45,000 @$5000 per month or $540,000 per year
24) Total Cost of aircraft $1,800,000
25) Shipping costs $120,000 for aircraft and simulators
26) Minimum Investment Required $2,760,000 for the 3 Zambian ATOs.

5.13.4 Opportunity to Export Pilot Jobs

The report recognizes the worldwide lack of pilots, emphasizing the necessity for the Zambian government and stakeholders (flight training institutes) to implement suitable steps in order to mitigate this scarcity as well as take advantage and produce pilots for the Zambian Aviation market and the world aviation job market in general. Nevertheless, a worldwide shortage of pilots has resulted in a situation where an increasing number of pilots are compelled to either stay in Zambia or pursue job opportunities in other countries.

5.13.5 A Review on available CAA approved QFIs

The scarcity of civilian Qualified Flying Instructors (QFIs) in Zambia can be ascribed to the lack of flying schools in the nation that are authorized to offer Commercial Pilot License training. This study data results showed the necessary measures and support that the Zambia Air Force should undertake in response to the shortage of Qualified Flying Instructors (QFIs) at flight training schools. The findings of the study also suggest that the Zambia Air Force possesses a considerable number of flight instructors, a role that has contributed to the long-term viability of around 50% of the civil flight training initiatives inside the nation.

5.13.6 Suitable and Cost-efficient Training Aircraft

Flight schools often utilize a range of aircraft for instructional reasons, such as Sky Trails, Aero Academy, ZASTI, as well as the commonly employed Cessna and Piper light aircraft models. Nevertheless, the older generation of Cessna and Piper aircraft exhibit a lack of cost-efficiency, rendering them ineffective in facilitating affordable flight training endeavours. The uncertified "Sling" aircraft from South Africa has been seen as an ideal option for cost-effective flying instruction. However, the Civil Aviation Authority (CAA) has faced criticism for its perceived delay in granting approval for the use of this aircraft in training activities. The aircraft's cost efficiency has been validated by its adoption by South African Approved Training Organizations (ATOs), who have received authorization from the Civil Aviation Authority (CAA) to employ it for pilot training purposes across the country.

5.13.7 Mechanism to Support Approval of CPL programs in Zambia

Moreover, the research findings also indicate that current Approved Training Organizations (ATOs) seem to lack the necessary permission from the Civil Aviation Authority (CAA) for their Commercial Pilot License training curriculum. This issue is exacerbated by the insufficient follow-up within the CAA, which hinders the timely approval procedure for flight schools. The data results indicate a lack of adequate utilization of the digital platform by all training institutions, which is crucial for enhancing contemporary training delivery. The training aids now offered at flight schools are largely traditional in nature, although they appear to be outdated in relation to the contemporary day. In order to improve their operations, flying schools should consider augmenting their methodologies through the incorporation of e-learning platforms and the use of a digital framework.

5.13.8 Digitalizing of Training Syllabus and CAA Examinations

The labour-intensive nature of the CAA testing and examination procedure poses a notable challenge, as it imposes time constraints on student pilots and training organizations, making it difficult for them to meet deadlines. The Civil Aviation Authority (CAA) could enhance its current process by implementing the utilization of digital test banks to facilitate ground training aviation tests and examinations.

5.13.9 Enabling Business Environment and Cost of Fuel

The financial implications of aviation fuel costs on pilot training expenses are a matter of considerable importance, given that a large proportion of training fees is dedicated to covering fuel expenditures. Additional research conducted by the government is imperative in order to comprehensively comprehend the fundamental elements that contribute to the comparatively reduced regional expenses associated with aviation fuel, in contrast to the disproportionately elevated costs of gasoline in Zambia. A reduction of 10% in fuel costs has the potential to exert a substantial impact on the annual operating expenditures of an officially recognized Approved Training Organization(ATO) engaged in the provision of flight training.

5.13.10 Insufficient Aviators in Government Policy Jobs

The findings of the study also indicate that the insufficiency of Government policy and the absence of student bursaries are obstacles in the effective implementation of a comprehensive aviation pilot training program in Zambia. It is imperative for governments to establish partnerships with the corporate sector in order to effectively implement proactive policies aimed at addressing the imminent global shortage of pilots. Government-affiliated entities such as ZASTI need complete collaboration and backing from three essential stakeholders: ZASTI itself, the Civil Aviation Authority (CAA), and the Government in its capacity as a shareholder. The assessment of the potential impact of government-sponsored programs and scholarships in solving the impending pilot shortage is pending among policymakers.

5.13.11 Lack of Suitable Ground Training Devices-Flight Simulators

Furthermore, the utilization of Synthetic Flight Training Devices (SFTDs) or aircraft simulators is crucial in modern aviation training, since they offer pupils a distinct edge over individuals who lack familiarity with aircraft operations.

5.13.12 Coordination with Local Approved Maintenance Organizations

The research indicates that flight schools benefit from the association with Approved Maintenance Organizations (AMOs) as it leads to enhanced efficiency in repairing flight school aircraft. This association also offers valuable insights into the many career prospects available in the technical parts of the aviation business.

5.13.13 Financial Support and Investments Opportunities

The matter of investment and financing in flight schools has raised concerns over the limitations faced by Zambian banks in offering aircraft aviation funding. This is particularly evident in the context of commercial operations, where securing a loan is typically a need. The absence of adequate opportunities for reinvestment and recapitalization inside flight training institutions in Zambia presents substantial obstacles to enhancing the financial security of an exemplary flying school. Given the substantial financial investment required to establish commercial aviation businesses, it is imperative to seek insights from nations that possess a well-developed aviation sector. Banks play a significant role in aviation finance for corporate operations and asset acquisition. Additionally, they participate in facilitating student loans, which are overseen by certain governments. For instance, the United States offers Federal Student Pilot loans, while banks provide financing options for pilot training.

5.13.14 Student Pilot Bursaries

The cost of a comprehensive Commercial Flying training Course in the Southern African Development Community (SADC) region typically ranges from $60,000 to $100,000, dependent upon the educational institution and the supplementary programs it provides. The cost of obtaining a Private Pilot License (PPL) typically ranges from $16,000 to $20,000. However, it is important to note that the PPL does not hold any direct significance in the context of Commercial Pilot Operations. A PPL does not serve as the minimum requirement for admission into commercial aviation activities. The aforementioned expense implies that those who aspire to become pilots and come from modest backgrounds may only have the opportunity to pursue this career path if they are selected as direct entrants by the ZAF. It is imperative for the government to proactively collaborate with flight schools and employ a randomized selection process to enlist a limited number of Zambian nationals in a program aimed at training a minimum of 20 student pilots every 2-3 years.

5.13.15 Good Climate and Topography

The study data also showed that geological qualities of plateaus serve as a protective precaution against aviation training mishaps, particularly those involving forced landings. Zambia gets diversified bright weather with summer rains season between November and March. The rainfall activities are seldomly damaging but are highly intermittent during the rainy season thus allowing a possibility for good visibility and limited actual instrument flight circumstances. The topography of Zambia mostly consists of plateaus, accompanied by subordinate hills and highlands. The Zambezi river exhibits a nadir at an elevation of 329 metres (1,079 feet) above sea level. The Mafinga Hills boast an elevation of 2,339 metres (7,674 feet) above sea level, making it the highest summit in the region. Zambia is a landlocked nation that shares borders with many eight other countries.

5.13.16 Statistics on Flight School Business Operations- External and Internal factors

The collection and analysis of flight school administrative and operational statistics plays a vital role in the evaluation of the aviation sector's overall performance. These statistics are crucial in aiding the development of complete network designs and allow for comparisons with rivals through benchmarking. The aforementioned condition has been satisfactorily satisfied within the framework of the Conceptual theorem of research which follows the pattern of factors as being both External and Internal to the operations of a successful flight School.

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