Enablers and Obstacles of Aviation's Role in Socio-Economic Development in Land-Locked Developing Countries: Evidence from the Republic of Rwanda

Thesis

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Doctorate of Business Administration

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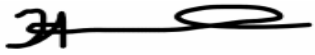
Signature: 

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I confirm that I have verified all content from these sources for factual accuracy and fair representation of the cited material.

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Abstract

This thesis examines aviation's impact on Rwanda's socio-economic landscape, focusing on trade volume, tourism revenue, and employment. It identifies key enablers and constraints shaping the sector and offers strategic recommendations to enhance aviation's economic contributions, addressing the unique challenges of Land-Locked Developing Countries (LLDCs). The research combines quantitative data on trade, tourism, and employment with qualitative insights from industry stakeholders, confirming that aviation plays a critical role in economic expansion through enhanced connectivity, workforce development, and regional integration. Strategic recommendations emphasize workforce training, regulatory reforms, and international partnerships to strengthen the sector's contribution to sustainable growth.

The thesis integrates Institutional Theory to analyze how governance structures, regulatory frameworks, and policy alignment influence Rwanda's aviation development. Institutional Theory explains how structured regulatory reforms and investments in aviation governance contribute to economic stability and sectoral expansion. Additionally, Disruptive Innovation Theory illustrates how drones in healthcare logistics serve as a transformative aviation solution, showcasing the role of emerging technologies in overcoming traditional infrastructure challenges. Findings highlight aviation's direct and indirect socio-economic impact, reinforcing Rwanda's aviation model as a scalable framework for other LLDCs. The study provides policy-driven insights that underscore aviation's vital role in enhancing connectivity, trade, and sustainable development in landlocked regions.

Chapter 1: An Introduction to Rwanda's Aviation

This research examines the role of aviation in the socio-economic development of Landlocked Developing Countries (LLDCs), with a specific focus on Rwanda. As a landlocked nation, Rwanda faces unique geographic challenges that limit its access to global markets. Aviation, therefore, plays a critical role in facilitating trade, tourism, and economic growth. This study seeks to explore how Rwanda's aviation sector can be leveraged to promote sustainable development, focusing on key factors such as infrastructure, policy frameworks, and regional collaboration. The primary objective of this research is to identify the enablers and obstacles affecting the growth of Rwanda's aviation industry and its contribution to the broader socio-economic landscape. The research addresses three key research questions: 1) How does aviation impact Rwanda's socio-economic landscape, focusing on key indicators such as trade volume and tourism revenue? 2) What are the factors that support and impede the development of Rwanda's aviation sector? 3) What strategic recommendations can be made to enhance the growth and economic benefits of Rwanda's aviation sector? By answering these questions, the study aims to provide actionable insights that can guide policy formulation and industry practices in Rwanda and other LLDCs.

The significance of this research lies in its potential to contribute to both academic literature and practical applications. Rwanda's aviation industry, while growing, still faces many challenges, such as limited infrastructure, high operational costs, and regional competition. This study seeks to address these issues by providing a comprehensive analysis of the sector, identifying best practices from other LLDCs, and proposing strategic recommendations to optimize the benefits of aviation for Rwanda's economic development. The research also fills a gap in current literature, which often overlooks the aviation sector's specific challenges in LLDCs. The study's findings will offer practical, policy-driven solutions aimed at fostering sustainable aviation growth, enhancing connectivity, and boosting economic opportunities.

Through this research, strategic insights will be developed to guide aviation growth in Rwanda, contributing to broader socio-economic goals. In addition, Rwanda faces significant economic disadvantages, including the strive for economic and social independence. Simply stated, being landlocked means a country is completely surrounded by land with no access to the sea or ocean, as opposed to coastal countries, which are nations that have a coastline, meaning they border a sea or ocean. These challenges often hinder their development compared to countries with maritime access (Faye, McArthur, Sachs, & Snow, 2007). With Rwanda's geographic and infrastructural challenges, the country's landlocked status means it

relies heavily on neighboring countries for access to ports, significantly increasing transportation costs (Group, 2013). This geographical disadvantage is a persistent obstacle to economic growth and development (Group, 2013).

Sub-Saharan Africa has seen limited improvement in road conditions in some countries since the departure of colonial regimes. For example, road infrastructure and maintenance in Rwanda and the East African Community (EAC) have seen limited improvement. A significant challenge is the poor state of the Northern and Central Corridors, crucial for trade but suffering from inadequate maintenance and deterioration (Kagabo, Nkurunziza, & Kamanzi, 2022). With the departure of colonialism, expertise and resources to maintain infrastructure, of which roads are a central part of inter-African connectivity, also left. Although many African countries adopted reforms that included funding road agencies, the challenge remains to address them. As the roads continue to deteriorate, the operating costs increase in accident rates, and other associated dilemmas continue (Hassan, 2018). This is not to say that transport by roads has lost its place in modern society; quite the contrary, it is still an essential part of society that fills the gap where air transport is not available.

Air transport excels in long-distance journeys and transporting high-value, time-sensitive goods, offering exceptional speed and efficiency. Conversely, road transport is better suited for shorter distances and regional distribution, providing greater flexibility and accessibility. In regions with limited road infrastructure or urgent delivery needs, air transport can serve as a valuable alternative. To optimize transportation and supply chain operations, a strategic integration of air and road transport is essential, leveraging the unique strengths of each mode (Abdulkadr, Juma, Gogo, & György, 2022). The challenges faced by road transport have been, in some part, addressed by air transport. For instance, the issue of speed for transport is better achieved as goods arrive and move with less time in between for better consistency, especially when agricultural goods are concerned. Also, the challenge of topography (mountains, hills, lakes, swamps, etc.) is eliminated; there are no requirements for the maintenance of airways, except where navigational equipment is concerned, and that is solved due to the various backup air navigation systems.

Another challenge is the political and social relations with neighboring countries, i.e., borders, and the conditions of the road to be traveled. There is also the difficulty of accessing specialized goods such as refined petroleum and tin ores, and services that are not available from neighboring countries, thus increasing the amount of time and delivery (Group, 2013). Political instability in neighboring countries, known as regional instability, has a considerable

adverse effect on a nation's economic performance (Ades & Chua, 1997). In nations affected by high regional instability, trade flow is disrupted, resulting in decreased volumes of merchandise and manufactured goods.

The effect of the 2019 COVID-19 pandemic introduced new challenges in the aviation industry, compounding existing difficulties. The pandemic led to health disruptions and economic setbacks that affected global and local aviation sectors. This crisis highlighted vulnerabilities and underscored the need for resilience and sustainability in aviation operations. Despite recent challenges such as the COVID-19 pandemic, which further strained transportation systems, Rwanda's strategic investments and regulatory improvements in aviation and other transport sectors aim to mitigate these obstacles. To address the transportation challenges and enhance economic growth, Rwanda is actively developing its transportation infrastructure across various modes, including road, rail, and air.

1.0 Transportation in Rwanda

The main modes of transport in Rwanda are road (land transport), inland water transport and air transport. These are regulated by the Rwanda Ministry of Infrastructure (MINIFRA). Rwanda is also looking to include a railway network as a future mode of transport. Land transportation is the main method of transportation in Rwanda. The country is projected to have 5,145 kilometers of feeder roads constructed by 2024, up from 3,248 kilometers in 2020. The national paved road network is also expected to increase by 2,652 kilometers by 2024, from 1,425.5 kilometers in 2020. (Rwanda Ministry of Infrastructure, n.d.). MINIFRA is responsible for ensuring that the national road network is expanded, rehabilitated, upgraded and maintained according to Rwanda Transport Development, which is an implementing agency affiliated to MINIFRA. Part of MINIFRA's mandate is to put in place connecting roads to different countries, which will open up the country to ease the land-locked status (Rwanda Ministry of Infrastructure, n.d.).

Due to the proximity of the nearest port, Dar-Es-Salaam, being approximately 1,400 km away, the majority of transport activities, including trade, are conducted via road. (Republic of Rwanda Ministry of Infrastructure, 2013). In Rwanda, the export product value chain for road transport, which is under national control, is primarily concentrated on downstream activities rather than upstream, where more value-adding processes typically occur. Consequently, this downstream focus refers to the stages of the road transport value chain that are closer to the end consumer. This downstream orientation presents challenges in

stimulating demand for logistics services, as the value-added activities that could enhance the appeal of these services are less emphasized (Republic of Rwanda Ministry of Infrastructure, 2013). These stages include the transportation of goods and people, as well as related services such as freight forwarding, trucking, and logistics. In the context of road transport, the upstream stages of the value chain would include the manufacturing of vehicles and the construction of roads.

These stages are typically more capital-intensive and require specialized skills and knowledge. As a result, many countries, including Rwanda, do not have the resources to be involved in these stages of the value chain. Thus, developing an efficient freight transport system in Rwanda is challenging due to the lack of economies of scale, which is essential for cost-effective logistics operations. (Republic of Rwanda Ministry of Infrastructure, 2013). In addition, the current status of freight transport in Rwanda suffers from constraints such as imported fuel, few transport operators, and–Axle Load Control Regime. Axel Load Control regime shows that overloading trucks is still a big problem in Rwanda. This damages the roads and makes them more expensive to fix. This also makes it harder to transport goods efficiently (Republic of Rwanda Ministry of Infrastructure, 2013).

The primary cause of early damage to the paved road system is attributed to the excessive loading of heavy goods vehicles (HGVs). On average, HGVs with three axles showed the highest levels of excess loading, with 5% of axle loads surpassing the limit when traveling from Kigali and 25% when traveling to Kigali. This led to axle loads exceeding the acceptable limit of 10 tons. (Republic of Rwanda Ministry of Infrastructure, 2013).

Rail transport is also part of Rwanda's future plans, with projects to rehabilitate and construct new railway links. Rail transport is planned for Rwanda with hopes to rehabilitate and upgrade Isaka to Dar es Salaam railway line (African Development Bank, 2013).. There is also planned erection of a new connection of Isaka to Kigali in Rwanda with connections to Burundi. It will have to be determined if the standards for quality for both passenger and freight services are assessed by factors such as reliability, frequency, capacity, safety, cleanliness, security, and speed. Not to mention, integration with road networks, efficiency in cross-border coordination and the allowing of concessionaires to enjoy significant commercial freedom, flexibility, and incentives to offer services that meet customer demand (African Development Bank, 2013). Inland water transport is recognized as a mode of transport in Rwanda, although limited in its capacity. By comparison to other modes of transportation, cost for inland waterways with substantial quantities of heavy goods would be

lower than road transport, mainly due to much lower consumption of energy, and less maintenance on infrastructure (Rwanda Ministry of Infrastructure, n.d.).

To add, social, safety and environmental impacts are more favorable on waterway transportation. The main Lake Kivu is the biggest lake, shaping the border of the Democratic Republic of Congo (DRC). Ferry services operate intermittently between the ports Cyangugu, Kibuye and Gisenyi mostly for tourism. The entirety of the lakeshore is operated by local fisherman and the Rwandan navy operates a few boats as part of border patrol. The other lakes are used for transportation across bodies of water. (African Development Bank, 2013). Nonetheless, the Government of Rwanda is looking at making maritime transport a key alternative for persons and goods. There are currently plans to implement an already completed detailed design study for lake Kivu water transport and the Akagera river navigability study is also about to be launched. These aim to develop integral inland waterway transport systems from the Akagera River from Kagitumba (Rwanda) to Lake Victoria (Republic of Rwanda Ministry of Infrastructure, 2013).

1.1 Rwanda's Aviation Regulatory Framework

Aviation in Rwanda has seen consistent growth with significant investments planned for airport expansion and development and in annual passenger traffic rate. This supports the project Rwanda has in expanding and developing its airports, namely the New Bugesera Airport in Kigali. The National Strategic Plan (NST1) outlines investments in the building of a new international airport and the enlargement and renovation of Kigali International Airport and two regional airports. To support the operations of the airport and the associated industry activities, a proficient workforce is essential, which is why a strong focus on capacity building is embedded in NST1 (Republic of Rwanda, 2017). This objective includes the development of highly trained professionals through institutions like the Akagera Aviation Training Organization, which operates a helicopter flying school based in Kigali. Established in 2018, the school has since expanded to include fixed-wing pilot training. One of the key goals is to increase the proportion of locally born pilots, which currently stands at approximately 20% of the country's flight crew (Aviation Benefits Beyond Borders, n.d.).

Rwanda is investing in various modes of transportation to connect the country and increase its economic viability. Air transport is the sector growing at the highest rate,, with an estimated investment of $789 million between 2019 and 2023 (Aviation Benefits Beyond Borders, n.d.). Rwanda's aviation regulatory body is known as the Rwanda Civil Aviation

Authority (RCAA). The RCAA responsibilities are the administration, oversight, and regulation of air transport infrastructure and services within the Republic of Rwanda. Managing the development and maintenance of airport infrastructure also involves overseeing civil aviation operations to safeguard alignment with International Civil Aviation Organization (ICAO) standards and recommended practices and other international regulations, and acting as the regulator for all civil aviation services. (African Development Bank, 2013). Prior to 2004, RCAA was part of Rwanda Airport Company (RAC). In 2004 the Civil Aviation Authority (CAA) Law No. 21/2004 of 10/08/2004 was promulgated.

The law was later revised in 2006 to create Rwanda Civil Aviation Authority (RCAA), with the mandate includes both regulatory functions and the operation of airports, including the provision of Air Navigation Services (ANS). This dual role function as the regulator and the manager of airports was seen as a possible conflict of interest by ICAO. In 2017, Law No 03/2017 of 21/02/2017, the separation policy was issued. The separation policy separates operational from regulatory functions. Finally, Law No. 007/2019, enacted on April 13, 2019, designates the Rwanda Civil Aviation Authority (RCAA) to undertake regulatory functions (Rwanda Civil Aviation Authority, n.d.). The RCAA is tasked with, among other duties, the development and upkeep of the air transport framework and the enforcement of aviation safety and security regulations in Rwanda. Currently, Rwanda's air transport sector includes key players such as RwandAir, Akagera Aviation, and more recently, the introduction of Unmanned Aircraft Systems (UAS). The laws and regulations reflected in the civil aviation act and the civil aviation regulations, respectively, conform to ICAO regarding the oversight of Akagera Aviation and RwandAir, but noticeably differ in oversight of (UAS) both manned and unmanned system, because ICAO has no regulatory framework for UAS. This promulgation of Performance- Based regulatory framework is unique to Rwanda as Rwanda was the first country to do so in the world. Birthed out of necessity, the Drone Steering Committee was established with the aim of streamlining the Unmanned Aerial systems (UAS) industry, focusing on optimizing regulations and processes. Additionally, the Drone Technical Advisory Committee was formed to conduct a thorough analysis of the conditions and feasibility for implementing UAS in the country. This committee explored various technical, regulatory, and operational aspects to ensure effective integration and management of UAS technology within the national framework. (Rwanda, 2019) In 2016 oversight framework for UAS was officially gazette and Performance-Based regulations Rwanda Civil Aviation Regulations (RCAR) Part 27 Unmanned Aircraft Systems implemented. In 2019,

the oversight framework was amended and the Official Gazette no. Special of 08/02/2019 was implemented.

1.2 Determinants of socio –economic development in landlocked developing countries (LLDC)and its impact on sustainable development in Africa

The determinants of socio-economic development in LLDC's are influenced by a combination of both internal and external factors. Countries in Africa are different from those in other countries due to their unique geographic and logistical challenges. The internal factors include, but not limited to; the quality of transportation with infrastructure, effective governance for a favorable environment for economic growth, human capital development, the management of natural resources, and economic diversification. External factors, among others, include the most challenging aspect: geographic location. Subsequently, Rwanda became a member of regional economic communities and trade agreements as well as global economic trade (World Bank, 2022). These nations face unique challenges due to their lack of direct maritime access and their geographical position, which can impact their economic growth and social progress (UNCTAD, 2021). It is essential to highlight that the determinants of socio-economic development are interconnected, and progress in one area can positively impact others. Implementing comprehensive and well-coordinated policies that address these determinants is essential for unlocking the potential of LLDC and fostering sustainable advancement.

The air transport sector plays a significant part in promoting sustainable advancement on the African Continent. The effect of the aviation sector in Africa is significant in achieving sustainability for development (Oxford Economic Forecasting, 2003). This significance includes the need for the expansion of air services that will lead to a more differentiated base for trade, and spreading out of tourism. Improvements in air transport infrastructure can raise living standards and alleviate poverty by lowering transport costs supporting an increase in rapid growth in economics and increased personal mobility (Oxford Economic Forecasting, 2003). Regarding this section, the focus on Africa highlights the air transport sector's broader impact on sustainable development across the continent. Air transport drives economic growth by diversifying exports and boosting tourism. For LLDCs like Rwanda, improved air services are vital for overcoming geographic isolation and accessing global markets. This shows how advancements in air transport benefit both landlocked and coastal nations, significantly contributing to Africa's overall economic development (Aviation: Benefits Beyond Borders, 2018).

In Africa, there are 731 airports and 419 airlines that service approximately 6.9 million jobs and US80 billion in economic activities and IATA predicts aviation to expand by nearly 5% in the next 20 years. In Africa, airlines traffic rose from 12.8% in January 2023 as opposed to a year ago. January capacity was 82.5% and load factor climbed by 13.9 percentage points to 73.7% (IATA, 2023).

1.3 The purpose and intended contribution of the thesis

This thesis investigates the function of air transport in socio-economic development in LLDCs, focusing on Rwanda. with a particular focus on the Republic of Rwanda. By harnessing Rwanda's unique journey as a case study, the research aims to not only illuminate the specific contributions of aviation to its progress but also contribute to the broader discourse on African development. This pursuit extends beyond knowledge creation, striving to formulate data-driven policy recommendations, which is achieved through National Institute of Statistics of Rwanda (NISR) and Ministry of Information and Communication Technology (MINICT), (MINICT, 2024) for Rwanda and transferable insights for other LLDCs. Additionally, the thesis tackles pervasive myths surrounding African aviation, showcasing its transformative potential and dispelling negative stereotypes. Ultimately, this research seeks to demonstrate the role aviation plays in enhancing connectivity, fostering tourism, driving trade, and ultimately raising living standards across Africa. To support these studies, there is a need to understand the unique challenges confronting LLDC's, identifying the impact of these challenges, and providing evidence for the support for combating the enablers and obstacles of aviation's role in Socio-Economic development.

This is done by using case studies with similar context, policy implications and academic contributions.

- Filling a Research Gap: The study will fill a research gap by providing valuable insights into enablers and obstacles of aviation in Rwanda's socio-economic development. Research on this topic within the country is limited. Case Study for Similar Contexts: Rwanda's socio-economic context is similar to that of other developing countries or regions, making its findings a valuable case study for drawing comparisons and offering lessons to other similar contexts, such as Zambia and Ethiopia
- Policy Implications: The study's findings can help policymakers and stakeholders understand the impact of aviation on various sectors in Rwanda. This information can

inform the formulation of policies to support sustainable development and benefit the aviation industry.

- Academic Contributions: This research will contribute to the expanding literature addressing the part of aviation in Africa's socio-economic development.

In summary, studying how air transport helps socio-economic development in LLDCs will provide valuable understanding into the specific needs of these countries, detect opportunities for growth and sustainable development, and build more resilient communities. By analyzing Rwanda's aviation strategy, the thesis presents a scalable model, demonstrating how targeted investments and partnerships drive sustainable growth. The thesis is intended to challenge the notion that African aviation is secondary, instead highlighting its role as a catalyst for economic transformation, regional integration, and global market access. These insights reinforce aviation's potential in Africa's economic growth, trade expansion, and resilience.

This thesis will show evidence to this and provide valuable insights into the specific needs to build more resilient communities.

1.4 Research Questions

The Research Questions outlined in this research paper serve as guiding principles, providing a roadmap for the study and analysis to follow. Through rigorous examination and careful consideration, we aim to achieve the following questions:

RQ1: How does aviation impact Rwanda's socio-economic landscape, focusing on key indicators such as trade volume and tourism revenue?

RQ2: What are the factors that support and impede the development of Rwanda's aviation sector?

RQ3: What strategy should be adopted to enhance the economic benefits of Rwanda's aviation sector? ?

In this thesis, the research objectives will be achieved through a well-defined methodology that integrates both quantitative and qualitative approaches. By focusing on Rwanda, the study aims to identify strategies that can address the unique obstacles faced by LLDCs in leveraging aviation for socio-economic development. The methodology involved collecting and analyzing data to uncover the impact of aviation on Rwanda's socio-economic growth and to develop recommendations that can be applied to similar nations for achieving sustainability. This approach ensures a comprehensive understanding of aviation's role and provides actionable insights for enhancing socio-economic outcomes (Creswell & Poth, 2023). To further strengthen the study's empirical foundation, an aviation risk assessment was conducted to analyze key economic and operational risks affecting Rwanda's aviation sector. This assessment complements the quantitative and qualitative analyses, offering a comprehensive evaluation of the sector's sustainability and long-term viability.

1.5 Thesis structure

This thesis begins by exploring the unique obstacles that LLDCs like Rwanda face in achieving socio-economic development, emphasizing the critical role of aviation in overcoming geographical isolation and limited market access. The introduction highlights that while aviation complements road transport, it is especially vital for LLDCs, where it helps address challenges posed by poor infrastructure and remoteness. The broader significance of the air transport sector in Africa is also discussed, particularly its role in promoting sustainable development through expanded exports, tourism, and economic growth. For Rwanda, improved air services are essential for enhancing economic resilience and integrating into global markets.

The thesis then identifies key internal and external factors influencing development in LLDCs, including infrastructure, governance, human capital, and trade relations. These factors are crucial in shaping Rwanda's growth trajectory. The research methodology is designed to meet the study's objectives by Combining both quantitative and qualitative approaches, providing a thorough analysis of aviation's impact on Rwanda’s development. The thesis is structured to first address these determinants, followed by methodology, findings, and data-driven policy recommendations that can be applied to Rwanda and other LLDCs.

Chapter 2: The Significance of Aviation and a Review of Relevant Literature

2.0 The Evolution of Aviation

Throughout history, humanity has been captivated by the prospect of flight, evident in both mythological narratives, such as the tale of Icarus, and pivotal moments in aviation history, exemplified by the groundbreaking achievements of the Wright brothers. In 1903, Wilbur and Orville Wright's successful sustained flight represented a pivotal moment in the annals of aviation. Subsequently, the inauguration of the world's first airline, the St. Petersburg-Tampa Airboat, in 1914 heralded the dawn of modern air transportation. Notably, the establishment of Alderney Airport in the United Kingdom during the 1930s further underscored the burgeoning significance of aviation infrastructure. The establishment of Alderney Airport in the 1930s might seem less significant because it is a small airport on an island, especially with Croydon being the UK's first major airport. However, Alderney Airport was important for connecting remote areas like the Channel Islands to the mainland, showing how aviation can link isolated places and boost regional connectivity. This idea of expanding air travel beyond big cities is still relevant today (Morris, 2019). These developments illustrate the broader trajectory of aviation's impact, which includes not only direct effects on industry stakeholders but also indirect influences on supply chains and catalytic effects on ancillary sectors like tourism and investment. (Air Transport Action Group, 2005).

Air Transport's role in economic development is impacted by several factors including its impact on tourism, trade, and investment (Njoya, Semeyutin, & Nicholas, 2020). Air transport as a driver of economic development encourages investment, stimulates infrastructure expansion, and fosters linkages within various industries (Oxford Economics, 2012) . Furthermore, tourism can promote peace, environmental conservation, the alleviation of poverty, health & wellness, human fairness, and global partnerships for sustainable development, aligning with the United Nations' Sustainable Development Goals (SDGs) and creating a more sustainable future (Njoya, Semeyutin, & Nicholas, 2020). In their research, the authors focused on air transport in Africa. The relevance of aviation has grown in the modern context, especially in land-locked developing countries. This is attributable to factors, such as an increase in the global economy, the rise of tourism, and the need for trade.

2.1 A Global Perspective on Aviation

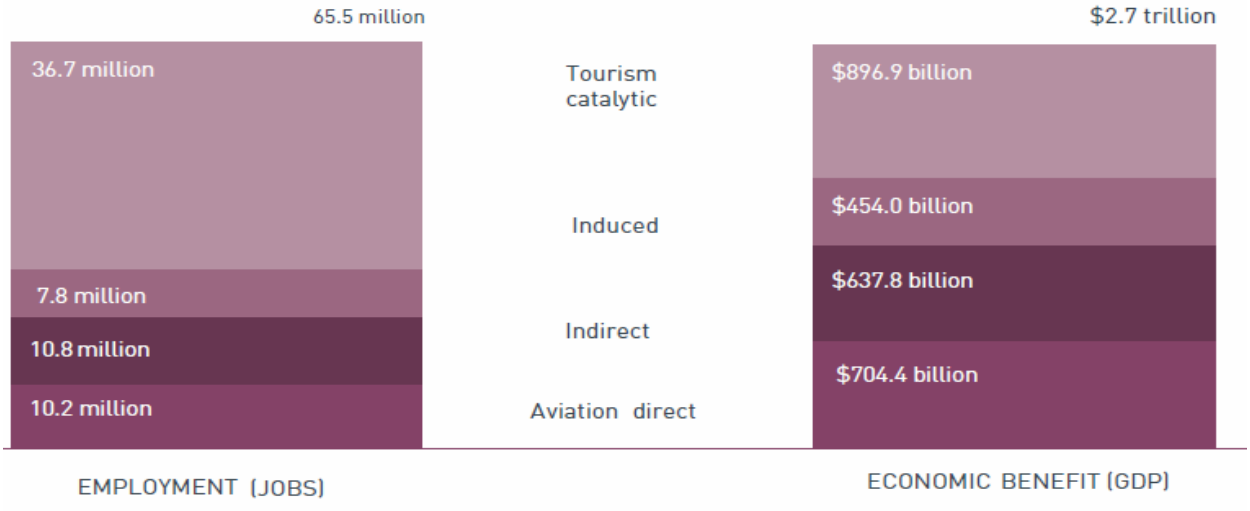
The growth of the global economy has led to an increased demand for connectivity between countries. Aviation is essential for facilitating this connectivity, as it allows people and goods

to travel quickly and easily. This is notably important for land-locked developing countries, which often have limited access to other modes of transportation. The global aviation industry reports that in 2018, global airlines transported approximately 4.3 billion passengers, generating 8.3 trillion Revenue Passenger Kilometers (RPKs). Air freight moved 58 million tons, reaching 231 billion Freight Ton Kilometers (FTKs). Daily operations involved over 100,000 flights, carrying nearly 12 million passengers and goods valued at approximately USD 18 billion (ICAO-IHLG, 2019).

Source: A view of the global aviation industry: Aviation Benefits Report (Aviation Benefits, 2019)

Figure 1 Global Perspective

Figure 1 gives a snapshot view of the global aviation industry showing increases from 2017 to 2019. Global airlines transported 4.3 billion passengers and 58 million tonnes of freight, representing a 6.4% rise in the number of passengers and a 2.4% increase in freight tonnage.. Airlines operated 38 million scheduled commercial flights, marking a 3.5% increase. There were 48,500 routes globally, including over 2,900 new routes. Airlines flew a total of 54 billion kilometers, a 4.7% increase, and accumulated 85 million flight hours, reflecting a 4.9% increase. These figures indicate growth from 2017 to the release of this report in 2019. This figure is significant because it gives a clear and concise overview of the growth of the industry over a two-year period. This information can be used to track trends, recognize areas of opportunity, and make well-informed decisions based on available data and analysis about the future of the industry.



Source: Aviation's global employment and GDP impact: Aviation Benefits Report, 2019

Figure 2 Global employment and GDP

Figure 2 highlights the cumulative economic impact of USD 2.7 trillion, supported by air transport stakeholders in a total of 65.5 million jobs globally (ICAO-IHLG, 2019). The aviation industry created 10.2 million direct jobs and contributed USD 704.4 billion to global GDP, while nearly 11 million indirect jobs worldwide are sustained by the procurement of products and amenities by companies within aviation.. Worldwide, nearly 8 million induced jobs with global contributions to economic activity estimated at USD 454 billion. In 2016, this industry supported approximately 37 million jobs in tourism, contributing roughly USD 897 billion annually to worldwide GDP (ICAO-IHLG, 2019).

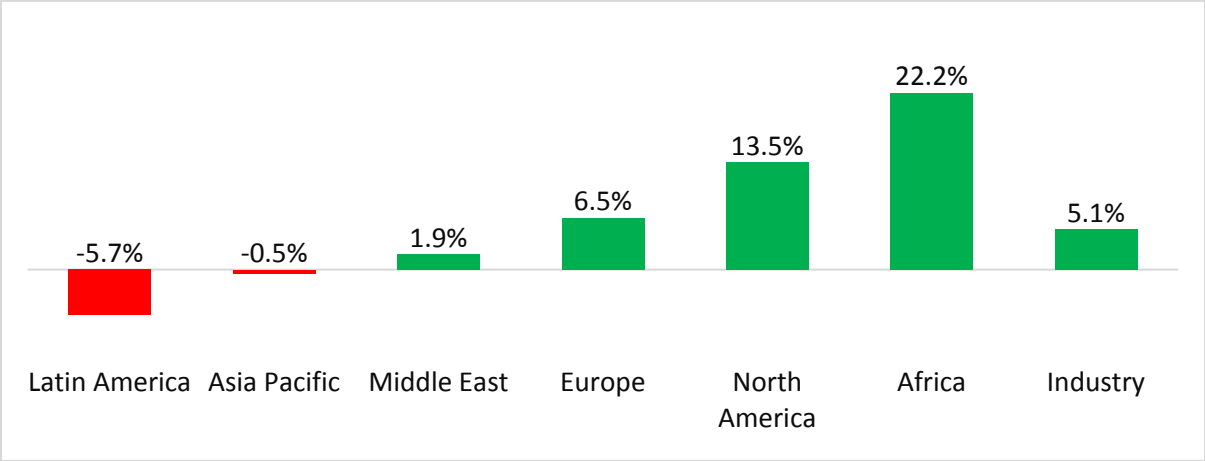
Global trade and e-commerce are other areas where aviation has improved significantly. In 2018, air transport was projected to carry goods worth approximately USD 6.8 trillion internationally, accounting for 35% of global trade by value. Despite representing less than 1% of global trade by volume, air freight was instrumental in transporting e-commerce goods, with around 90% of business-to-consumer (B2C) packages transported by air. There are also significant social benefits to aviation, such as providing improved means to access necessary services such as health & well-being, education, safe living environments, and basic necessities. Aviation plays a vital role in delivering healthcare, food supplies, and humanitarian aid to remote communities. Regarding educational opportunities, students from developing countries have the chance to study abroad for higher quality education, and enhance quality of life through expansion and diversification. of travelers' leisure and cultural experiences (ICAO-IHLG, 2019). The paper, initiated in 2021, relies on 2019 data because it provides a comprehensive benchmark for understanding the economic impact of

aviation before major disruptions. This practice aligns with academic standards where historical data is used to establish baseline trends. For instance, a study by Doganis (2022) in The Economics of International Airline Transport used data from previous years to analyze industry trends and impacts, reflecting on the necessity of historical data for longitudinal analysis. This approach ensures robust analysis and comparison with newer trends as updated data becomes available (Doganis, 2022).

On 11th May 1978, the African Civil Aviation Commission (AFCAC) was conceived by the Consecutive Conference convened by ICAO and the Organization of African Unity (OAU) to become this Specialized Agency (African Civil Aviation Commission, 1978) of OAU/AU (African Union). AFCAC is responsible for the technical, administrative and financial management of African states and is entrusted as the Executing Agency for the Yamoussoukro Decision (YD). YD initiated the setup among State parties for the gradual deregulation of fixed-flight schedule and chartered-on-an-ad-hoc-basis intra-Africa air transport arrangements (United Nations Economic and Social Council, 1999). Two goals are encapsulated in the YD: the complete deregulation of air transport and aviation on the African Continent and the removal of intangible barriers to the movement of persons, products and services. When these two intentions are realized, the socio-economic gains to Africa will be unprecedented (International Air Transport Association). It is in this vein that civil aviation authorities and by default the African aviation industry must keep a clear eye on the activities and statistics that are forecasted for aviation in Africa. In the Report of the Africa-Indian Ocean Traffic Forecasting group (AFI-TFG) 7th meeting (ICAO Africa-Indian Ocean Traffic Forecasting Group, 2013) if there is an assumption that the GDP growth rate of 4.4% would lead to a 9.1% increase in passenger traffic during the period 2017-2032, then the projected overall growth rate for the decade spanning 2017 to 2030 is anticipated to reach 9.4% (ICAO Africa-Indian Ocean Traffic Forecasting Group, 2013). This is the projection based on intra-Africa traffic.

In addition, in a quarterly report from Airports Council International World, stated passenger traffic for Africa has shown a recovery (recovery refers to the condition after the COVID-19 pandemic) rate of 114.8 million (50.1% of 2019 level) in 2021, to 178.6 million in 2022 (77.9% of 2019 level) (Hobson, 2023). The recovery trend is expected to continue through the year 2023 with approximately 94.0% of 2019 levels – and onwards, making a full recovery to 2019 levels in the year 2024 (Hobson, 2023). African carriers performed the best, with cargo tonne-kilometers (CTKs) going up from 4.5% to 22.2% above 2019 levels

between December and January. However, this very noticeable enhancement was in part because of the base effect from comparing to 2019. Seasonally adjusted CTKs only increased slightly by 4.0% month-on-month (IATA, 2022).



Source: IATA monthly statistics March 2023 (IATA, 2023)

Figure 3 Growth in Cargo volume (CTKs), by region

The demand for aircraft in Africa is set to rise. As of March 2022, African airlines were anticipating receiving 29% more aircraft deliveries in 2022 than they did in 2021. Moreover, the aircraft manufacturer Boeing projects that African airlines will need 1,030 state-of-the-art jet aircraft over the next 20 years. This represents an 80% increase from the current Boeing fleet and is valued at a substantial $176 billion. (Boeing, 2023). Airbus also provides its forecast for Africa stating intra-regional connectivity will drive the hoped-for demand for 860 small aircraft (100 to 210 seats), 150 medium-sized aircraft (210 to 300 seats), and 90 large aircraft (exceeding 300 seats) by the year 2040 (Airspace Africa, 2023).

Further supporting these projections, the African Union (AU) and the African Development Bank (AfDB) emphasize the economic benefits of increased air connectivity, pointing to the Single African Air Transport Market (SAATM) (African Union, 2019) initiative as a catalyst for competitive intra-African air travel and infrastructure development, both essential for accommodating this anticipated demand (AfDB, 2023). Additionally, the European Union Aviation Safety Agency (EASA) has provided a framework for enhanced safety and regulatory compliance in collaboration with African aviation authorities, a critical element to ensuring the sustainable growth of fleet and route expansions across the continent (EASA, 2023). Such collaborative efforts not only boost regional confidence in African airlines but also attract foreign investment, thereby positioning Africa as a critical player in the global aviation industry.

There are growing industrial sectors in Africa serving a substantial populace and economic performance is exhibiting signs of growth, though it is still struggling to attain parity globally (ICAO-IHLG, 2019) According to IATA in their "Focus Africa" initiative, Africa, despite making up 18% of the world's population, only accounts for 2.1% of global air travel. IATA's initiative aims to bridge this gap, enabling Africa to reap the benefits of improved connectivity, job creation, and economic growth that aviation can offer (International Air Transport Association, 2023). Specific examples include Rwanda and Malawi. In Rwanda, the government has invested in the development of its aviation sector in order to boost tourism and trade (Bank, 2015). As a result, the number of tourists visiting Rwanda rose markedly in the current era, and the country has become a major exporter of coffee and tea. In Malawi, the government has partnered with a private company to build a new airport. The airport is expected to open in 2023 and will help to improve connectivity within the surrounding countries, including Malawi. This will be a major boost for the country's economy, as it will streamline business trade methods, making it easier for businesses to trade and for tourists to visit (ICAO, 2016).

The addition of the Aviation sector, inclusive of the national airline, airports, and capacity building through the establishment of a Center of Excellence for Aviation in its high-level government plans – NST1 and Vision 2050 shows the Government of Rwanda's (GoR) commitment to the development of the aviation sector. The Republic of Rwanda President Paul Kagame has been an advocate for aviation and air-transport in Africa, and often states that "*Rwanda is not land-locked" but "Air-Linked"* and uses Rwanda as a platform to prove aviation and air transport are key factors in improving socio-economic development in Rwanda and the African continent (Kagame, 2022). The Republic of Rwanda is one of sixteen "Air-Linked" countries in Africa, almost one-third of Africa and thus, connectivity, and the removal of restrictions on goods movement, services and persons will lead to a steady increase for commercial air services in the year ahead (Kagame, 2022). In Kagame's subsequent statement, he points out that "*this steady movement means many more high-quality jobs for African pilots, engineers, and service personnel to operate and maintain this equipment professionally and above all, safely*" (Kagame, 2022).

In keeping with the MICE program, Rwanda hosts major aviation meetings and conferences. Rwanda is the host to one of the biggest conferences and exhibitions in Africa known as Aviation Africa Summit and Exhibition, usually opened by President Kagame. The premier industry expo for the aerospace and defense sectors brings together leaders from African

airlines, civil aviation authorities, business aviation, and supporting industries. The accompanying exhibition showcases around 100 international aviation companies (ADB Safegate, 2022). In 2022, Rwanda hosted the ICAO Twenty-Fifth Meeting of the Africa-Indian Ocean Planning and Implementation Regional Group (APIRG/25). In 2021, Rwanda hosted the 33rd plenary session of AFCAC for the first time bringing together 200 delegates attending the meeting both in person and virtually. The delegates include the Ministers in charge of Civil Aviation, dignitaries from ICAO delegates from Agency for Aerial Navigation Safety in Africa and Madagascar, Qatar Civil Aviation Authority, Arab Civil Aviation Commission, European Civil Aviation Conference, Latin American Civil Aviation Commission, European Union Aviation Safety Agency, USA Federal Aviation Administration, representatives from UAE General Civil Aviation Authority and African Civil Aviation Authorities (Rwanda Ministry of Infrastructure, 2021).

RwandAir and the government have kept to its program as per NST1 22 (bullet 1), which emphasizes the expansion of RwandAir to connect Rwanda to Africa, Europe, America and Asia; as the national carrier has flights to these locations, with the addition of 3 weekly operations to Conakry (Guinea), Bamako (Mali) and Dakar (Senegal) from its new hub in Cotonou (Benin) (RwandAir, 2021). In 2021, additional destinations of Lubumbashi and Goma, two towns of Democratic Republic of Congo (DRC) in Africa. In the same year RwandAir and Qatar Airways signed a comprehensive codeshare agreement, providing travelers with more options, improved service, and increased access to over 65 destinations worldwide and throughout Africa. As part of this agreement, the flag carrier will introduce direct flights between Kigali and Doha (RwandAir, 2021). In 2022, the national carrier increased its fleet by the addition of another Airbus 320 for passenger transport and the acquisition of its first cargo aircraft, a Boeing 737.

In the same year 2022, Rwanda signed an agreement to manage its air space to regain full control of its upper aerial airspace, after almost five decades of it being controlled by Tanzania. The development followed a transfer agreement was signed by both governments following Rwanda's announcement of its intention to withdraw from providing air traffic services in its upper airspace and assume direct responsibility for these operations (Ashimwe, 2022). To do this, Rwanda researched and submitted different perspectives on its capability to improve safety in Kigali Flight Information Region (FIR), including meeting regulatory requirements for obligations relating to Search and Rescue (SAR). After successful coordination meetings with ICAO, Rwanda was authorized to commence the process of

assuming responsibility for the management of its airspace. (Ashimwe, 2022). Capacity building is cited as a key strategy under NST1 22 (bullet 3) call for "Establishing a center of excellence in aviation to develop critical skills in the Sector" (Republic of Rwanda, 2017) has begun to take shape through the establishment of Akagera Training Organization. The training organization trains both fixed wing and rotor-craft pilots to meet the growing demand for skilled aviators and increase the number of Rwandan pilots among the country's flight crew today. There are plans to expand the school to offer aircraft mechanics, service crew and a UAS training (Republic of Rwanda, 2017).

In recent years, the national carrier, RwandAir, has become one of Africa's fastest-growing airlines. RwandAir, established in 2002, was aimed at enhancing performance at KIA, by increasing competition, connections and seat availability through flight connections. Its routes include many African destinations, and several routes to Europe, United Kingdom and Asia. However, the-less-than-desirable state of Kemebe Rubavu, Musanze, Huye, and Nemba airports is slowing down the growth of local air transport in Rwanda. Furthermore, the limited capacity of Kigali International Airport and the other local aerodromes is inadequate to accommodate the expected increase in aviation activity in Rwanda, which is projected to handle 1.3 million passengers, 15,500 tons of cargo and 17,712 aircraft movements per year by 2025 (African Development Bank, 2013).

Using a 2013 report for 2025 aviation projections may seem unusual, but it is justified in research. Foundational reports like those from the African Development Bank offer valuable baseline data and long-term trends. These projections, while older, provide a benchmark for comparing more recent data. Aviation planning requires understanding historical trends, so using older reports helps align past forecasts with current data. Combining both historical and recent sources allows for a comprehensive analysis of aviation trends, offering a clearer picture of future infrastructure needs. (IATA, 2023). The literature review presented so far offers a comprehensive exploration of the historical evolution of. aviation, its global perspective, its significance in Africa, and its specific impact on the Republic of Rwanda. It covers various aspects of aviation, including its origins, growth, economic impact, and potential for development in both global and African contexts.

Table 1 Aircraft movements, Commercial passengers and Cargo in Rwanda

	2017	2018	2019	2020	2021	2022
1. Aircraft Movement						
a) Passenger & Combination Aircraft	18,567	18,192	19,775	7,871	11,317	15,632
b) All Cargo Aircrafts	764	772	785	1,069	1,092	1,013
c)Total Air Transport movement (a+b)	**19,331**	**18,964**	**20,560**	**8,940**	**12,409**	**16,645**
d)General Aviation and other Aircraft Movements	4,658	5,378	7,488	6,205	7,870	7,336
Total Aircraft movements (c+d)	**23,989**	**24,342**	**28,048**	**15,145**	**20,279**	**23,981**
2.Commercial Passengers						
a) International Passengers(emplaned+deplaned)	584,657	679,948	832,934	256,768	371,981	645,771
b) Domestic passengers(emplaned+deplaned)	19,892	19,281	20,959	5,922	11,016	15,821
c)Total terminal passengers (a+b)	**604,549**	**699,229**	**853,894**	**262,690**	**382,997**	**661,592**
d) Transfer passengers	221,036	278,402	291,974	87,661	111,958	189,879
Total passengers (c+d)	**825,585**	**977,631**	**1,145,867**	**350,351**	**494,955**	**851,471**
3. Cargo (Freight&Mail) in Metric Tonnes						
a) International Freight (loaded+unloaded)	8,226.09	10,732.41	12,094.79	11,176.73	12,775.34	11,905.50
b) Domestic Freight (Loaded+unloaded)	0	0	0	0	0	0
c) Total Freight (loaded + unloaded)	**8,226.09**	**10,732.41**	**12,094.79**	**11,176.73**	**12,775.34**	**11,905.50**
d) Total Mail(loaded+unloaded)	266.55	339.70	254.87	173.59	308.27	239.86
Total Cargo (c+d)	**8,492.64**	**11,072.11**	**12,349.66**	**11,350.32**	**13,083.61**	**12,145.36**

Source: NISR National Institute of Republic of Rwanda Statistics of Rwanda, Statistical yearbook 2023

Figure 4 describes a summary of RwandAir aircraft movements over a specified time. The figure is divided into three parts; part 1 - Aircraft movement, part 2 - Commercial passengers, and part 3 - Cargo which covers mail and freight. Part 1 and 2 are further subdivided to reflect the activities required to determine the numbers per annum. It takes into account both international and domestic movements. Although transfer passengers may not contribute directly to services outside the airport such as hotels, public transport or local city restaurants, fees and taxes are collected during transit (RwandAir Limited, 2023). Part 3 shows that the majority of activity is in international movement of loaded (import) and unloaded (export) cargo, with no activity at the time of this paper in domestic loaded and unloaded cargo and freight.

For changes to be a reality in a society, there must be high level government commitment. This commitment has been part of a desire to see measurable results through strategic planning. For Rwanda, this is developed in its document, the Rwanda National Strategy for Transformation (NST1). The success that Rwanda has seen thus far is a combination of protocols from section 22 – Develop a Vibrant Aviation Sector and Section 6.18 under "The Real Sector". Under developing a vibrant sector, the government plans to expand RwandAir regional and international connectivity, completion, and operationalization of the Bugesera airport, establishing a center of excellence for capacity building and the rehabilitation and expansion of the Kemembe and Rubavu airports (Republic of Rwanda, 2017). This ties well with section 6.18 of NST1 in which it discusses services that will continue to drive Rwanda's economy. It points out the benefits of a vibrant sector in attaining projected growth rate of 9.3% during 2017-2024. A substantial amount of this growth will come from exporting services such as tourism and hospitality, the MICE (Meetings, Incentives, Conferences, Events & Exhibitions) programme, which can be seen in Figure 5 under *"Purpose of visit"*, with the spill-off to hotels and restaurants projected at 17.8%.

Table 2 Arrivals in Rwanda by purpose of visit and region of origin into Rwanda

Region/Year	Purpose of Visit											
	Holiday / Vacation		Visiting Friends & Relatives (VFR)		Business/Conference/ Official		Tran sit		Other Purposes		Total Tourist Arrivals	
	N	%	N	%	N	%	N	%	N	%	N	%
2016												
Africa	21,129	37	404,830	90	376,943	91	389,334	90	40241	97	**1,232,477**	89
America	13,538	24	12,294	3	7,784	2	6,565	2	383	1	**40,564**	3
East Asia/Pacific	3,939	7	3,626	1	4,477	1	2,752	1	72	0	**14,866**	1
Europe	16,263	29	21,376	5	16,373	4	14,116	3	471	1	**68,599**	5
Middle East	469	1	1,139	0	1,190	0	781	0	52	0	**3,631**	0
South Asia	1,215	2	3,712	1	5,233	1	17,946	4	136	0	**28,242**	2
UN	223	0	865	0	714	0	828	0	9	0	**2,639**	0
Total	**56,776**	**100**	**447,842**	**100**	**412,714**	**100**	**432,322**	**100**	**41,364**	**100**	**1,391,018**	**100**
2017												
Africa	75,783	65	428,669	90	424,122	92	396,994	90	71451	97	**1,397,019**	89
America	16,001	14	12,804	3	7,973	2	9,145	2	833	1	**46,756**	3
East Asia/Pacific	4,875	4	4,349	1	4,507	1	1,930	0	207	0	**15,868**	1
Europe	18,165	16	22,951	5	16,947	4	16,184	4	1,050	1	**75,297**	5
Middle East	339	0	1,035	0	1,193	0	466	0	39	0	**3,072**	0
South Asia	1,522	1	4,267	1	5,253	1	16,281	4	155	0	**27,478**	2
UN	207	0	895	0	449	0	895	0	7	0	**2,453**	0
Total	**116,892**	**100**	**474,970**	**100**	**460,444**	**100**	**441,895**	**100**	**73,742**	**100**	**1,567,943**	**100**

Source: NISR National Institute of Republic of Rwanda Statistics of Rwanda, Statistical yearbook 2023

Figure 5 describes the movement of people in reference to the purpose of travel. The numbers are based on information provided by the Department of Immigration and Emigration. The numbers are reflected under the column “N”, its corresponding percentage in the column with the “% “symbol. In subsequent columns, the table shows the purposes for travel into Rwanda, with column 4 related to the MICE initiative.

2.2 Literature review: Empirical evidence

Comprising 48 nations worldwide, landlocked countries present a compelling case for deeper understanding. Their unique challenges, stemming from isolation from the sea and its resources, demand careful deliberation to illustrate their development trajectories. The majority of these countries, 31 in total, are classified as LLDCs, with notable concentrations in Africa, Asia, and Europe. Furthermore, the discussion extends to include small island nations, which face similar trade and travel challenges due to their reliance on air transportation. The narrative in this section then shifts to highlight global initiatives aimed at promoting air transport accessibility and recognizing aviation as a key-driver for socio-economic development. Notably, the International Civil Aviation Organization's (ICAO) "No Country Left Behind" campaign and its emphasis on enhancing air connectivity for all States. The discourse underscores the pivotal role of aviation in driving socio-economic growth, as emphasized by various stakeholders, including ICAO Secretary General Fang Liu (Grey, 2017).

Case studies of LLDC’s and affluent European nations like Austria and Luxembourg provide tangible examples of aviation's substantial contributions to GDP and employment. Additionally, these examples illustrate the intricate linkages between aviation, tourism, and overall economic prosperity. The section further delves into detailed analyses of aviation's economic impacts in various regions, including Europe, Africa, and the Caribbean. Reports and studies highlight the significant employment and GDP contributions of the aviation sector, particularly in supporting tourism and trade. Moreover, discussions on national development plans, such as Zambia's Seventh National Development Plan, underscore governments' recognition of aviation's pivotal role in fostering economic growth and infrastructure development. Case studies and research findings from countries like Ethiopia and Zambia elucidate the intricate connection between economic development and air transport demand. Ethiopia's ambitious objectives for its aviation sector and its comparative

advantage as a natural hub underscore the potential for air transport to drive economic growth and facilitate other industries such as tourism.

In 2014, Olumuyiwa Benard Aliu, launched the ICAO No Country Left Behind campaign, with the purpose of ensuring all States benefit from safe and reliable air transport. In 2016, at a speaking event in Burkina Faso, ICAO secretary general Fang Liu referred to aviation as a catalyst for socio-economic development. She stated, "*The development of safe, secure, and efficient air connectivity is a strategic global objective for ICAO as it is a vital lever for development,"* She further emphasized, saying *"For landlocked countries in particular, such as Burkina Faso, aviation should be identified as a priority sector within its national strategy"* (Grey, 2017). According to Eva Grey, Austria, in Central Europe is among the world's wealthiest landlocked nations. Austria has around 280,000 aircraft land and take off from Austria on a yearly basis, with an estimated $5.2 billion gross value-added contribution to GDP in Austria in 2014. This is according to joint reports by both IATA and Oxford Economics (Grey, 2017). The aviation industry and foreign tourism arriving via air routes played a significant role in the country's economy in 2017, contributing approximately 1.6% to the GDP. Vienna International Airport, ranked among the top 100 airports worldwide, serves as a major gateway for international travelers arriving in the country in terms of number in passenger arrivals (Gleave, 2015). In a report by Steer Davis Gleave for DG MOVE, European Commission (EU), in his methodology, the authors use employment data classification and reporting to assess the immediate and secondary effects of air transport and associated industries, including aircraft manufacturing, air-related tourism (such as travel agencies and tour operators), flying schools, local ground transportation services, and airport catering and hotel operations, on the economy and employment (Gleave, 2015).

In employment analyses, amongst the nine EU states saw a growth above 2.0% passenger arrivals on average over the 2008–2013 period. The report looked at emerging patterns in employment practices among airlines, including Austrian. Assessments of employment trends in the air transport sector indicated that several respondents reported an increase in the prevalence of fixed-term contracts, while a few identified a growing trend towards part-time employment and atypical working hours (Gleave, 2015). IATA employs several forms of methodology in their research that include data collection from airlines, travel agencies, airports, and other industry stakeholders. Data is typically collected through surveys, interviews, financial reports, and transactional data. Statistical Analysis utilizes statistical

analysis techniques to examine the collected and forecasting models. Economic modeling helps comprehend the effects of various factors on the aviation industry by developing quantitative models that simulate the behavior of airlines, passengers, and other market participants under different scenarios, alongside case studies and literature reviews..

The IATA in 2018 report, "The Importance of Air Transport to Austria", measured Austria's air transport's sector's contribution to the economy in three aspects (International Air Transport Association (IATA), 2019).
First aspect: The workforce and spending produced by airlines and their supply chain:

- Airport clients, business within the airport (eateries and commercial vendors), manufacturers of aircraft, and air navigation service providers employ: 35,000 jobs;
- Products and services from local suppliers supported by the sector generate 28,000 jobs;
- Wages paid to support employees which subsequently spend on consumer goods and services: 14,000 jobs;
- Money spent in the local community by Austrians support employment: 18,000 jobs;
- Air transport estimates favor US $7 billion GDP in supply chain, foreign currency spending by tourists US $1.5 billion totaling US $8.4 billion.

Inputs to the air transport sector and foreign tourists arriving by air contribute 2.1% to the country's GDP. Collectively 95,000 jobs are supported by the air transport sector, US $8.4 billion Gross Value Added contribution to GDP and 2.1% supported by air transportation and international air travelers. Second aspect: the trade, tourism, and investment flows resulting from airline activity:

- High connectivity rate of direct flight into Austria from economically important cities;
- Austria has connectivity at a regional level;
- Connection flight to Asia-Pacific doubled between 2013 and 2018;

- The air connectivity scores are based on the total number of available seats per 1,000 people, weighted by destination. IATA's Air Connectivity Indicator calculates this by dividing the cumulative route capacity (in available seats) scaled by the location airport's relative side (compared to the busiest airport) by the country's population. Countries with a connectivity threshold of 0.15% or lower in 2013 were included. Third aspect: the city pairs served by these flights happen are from Direct flights from North America, Europe, Middle East and Asia-Pacific;
- The number of city pairs direct service.

In another work by Eva Grey, she cited Luxembourg as another of Europe's richer Landlocked nations like Luxembourg rely heavily on aviation for economic growth. Aviation contributes 3.6% (€1.3 billion) to Luxembourg's GDP, with €636 million coming directly from airlines, airports, and ground services, €155 million indirectly from the aviation supply chain, and €195 million from spending by aviation sector employees. Additionally, tourism contributes €362 million (Grey, 2017).

A study by Alby and Wedig, it was found that aviation has a substantial positive impact on socioeconomic development by creating jobs, boosting the economy, and improving access to education, healthcare, and disaster relief (Alby and Wedig, 2023). The mixed concept in terms of environmental impacts, mainly air and noise pollution. The report is supported by the IATA study from 2018, titled "The Importance of Air Transport to Luxembourg." This sector supports 9,000 people in various roles, including airlines, airport operators, airport businesses like food service and retail, aircraft manufacturers, and air navigation service providers. local suppliers are 1,100, the sector estimates additional 730 jobs through wages it pays its employees, and spending money locally supports an additional 3,300 jobs. This is a total of approximately 14, 000 jobs by air transport and tourism. Spending by the contributors to the air transport chain involving airlines and their suppliers, it is projected to support US $1.5 billion of GDP, spending by foreign tourists support a further $0.55 billion of Luxembourg's GDP, thus giving a total of $2 billion. In addition, 3.5 % of the country's GDP is supported by inputs from the contributions of the air transport sector and foreign tourists arriving by air.

Luxembourg's air cargo center is the sixth largest in Europe, with an annual handling capacity of 1.2 million tons of air freight. Alby states that the cargo industry supports around 10,000 jobs in Luxembourg and generates around €2 billion in economic activity. Air cargo

is also a major driver of tourism in Luxembourg, as it allows businesses and individuals to easily import and export goods. Grey (2017) identifies that Zambia's government injected $1 billion to invest in its civil aviation sector with the intention of increasing both domestic and international passenger arrivals, as well as the number of international passengers transiting through the country (Grey, 2017). Although the country's sector was seen as stagnant for a lack of proper infrastructure, growth has become a forefront as evidenced by a President's Recognition Certificate Award from ICAO, awarded in October 2017, which will hopefully have a positive impact on Zambia's economy.

Forbes and Wilson (2018) carried out the Zambia Aviation Sector Business Environment Assessment, which was published by the Business Environment Reform Facility (Forbes & Wilson, 2018). Much like Rwanda, the government of Zambia has provided strong advocacy for the expansion of the aviation sector in its higher government policies, and is bolstered in Zambia's Seventh National Development Plan, from the Government of Zambia. The Plan emphasizes the need for enhancements to the country's transnational and regional airports and the necessity to establish a national carrier for both commercial and freight traffic (Forbes & Wilson, 2018). Section 7.9.2 on the development of aviation infrastructure and operations states:

> *'Focus will be on construction and upgrading of airport infrastructure to provide modern equipment and facilities which will enable the country to handle higher volumes of traffic, both passengers and cargo. Provincial and strategic airports will also be upgraded to increase the capacity to handle more traffic.'*
>
> *As a way to diversify the economy, establishment of a national airline will be critical to transportation of passengers and cargo. During the Plan period, focus will be on acquiring aircraft to serve domestic, regional and inter-continental routes. Further, arrangements will be made to acquire cargo planes that will assist in exporting agricultural produce to markets in the region and beyond.*
>
> *Programmes:*
>
> *a) Provincial and strategic airport up-grading;*
> *b) International airport upgrading and construction;*
> *c) Civil aviation capacity development; and*
> *d) National airline establishment.'*

Most of Zambia's global passenger and cargo movement is handled by foreign airlines, including Kenya Airways, Ethiopian Airways, RwandAir, Emirates, South African Airways,

Fastjet, and SA Airlink. In the 10 years leading to 2018, air traffic in Zambia had grown exponentially, due to the rise in the number of foreign carriers facilitated by Zambia's 'open skies' policy in accordance with the Yamoussoukro Decision (YD).

Air traffic at Zambia's four largest airports, which handle over 98% of all air travel in Zambia, increased from 1.1 million passengers in 2010 to 1.62 million passengers in 2016, representing an average annual growth rate of 6.9%. Rwanda, as a signatory to the Yamoussoukro Decision (YD), supports 'open-skies' policies with the goal of achieving at least a 39% increase in intra-Africa passenger traffic due to liberalization across the African Union. This liberalization of African skies is projected to have a significant economic impact, including the creation of 7,050 jobs, an incremental GDP increase of US $21.9 million, and a GDP impact of 0.21%. In comparison, the Zambia Airports Corporation Limited (ZACL) controls upper and lower airspace, and also undertakes approach control at its main airports. The Air Traffic Control Center at Lusaka Airport controls enroute airspace and generates most of its Air Navigation Services (ANS) proceeds from overflights through Zambian upper airspace (Forbes & Wilson, 2018).

Rwanda's recent agreement in 2022 to reclaim its airspace aims to capture revenue from overflights, following a model similar to Zambia's approach (Forbes & Wilson, 2018). In 2016, Zambia handled 17,000 tons of air freight, reflecting a 12.4% increase from the previous year, which includes traffic originating from connecting flights and transported directly to the airport by road. Lusaka Airport serves several dedicated cargo airlines, including CargoLux, Luxembourg's premier cargo company. The Zambian government has been in discussions with Cargolux and Martinair regarding beginning dedicated freight flights to Europe (Forbes & Wilson, 2018).

Zambia's tourism sector is an important part of its economy, contributing approximately 3.5% to GDP. In 2016, visitor expenditures generated $734.1 million (11.4% of total exports), and the sector directly supported 115,000 positions (1.9% of total employment). This is projected to increase by 5.2% annually to 206,000 job positions (2.3% of total employment) by 2027. Including indirect jobs, tourism contributed 5.0% of total employment in 2016 (306,000 jobs). This is expected to grow to 475,000 jobs (5.3% of total employment) by 2027. In 2015, tourism accounted for 7% of government revenue (Forbes & Wilson, 2018). Tourism in Zambia, especially to the Victoria Falls region, has seen a positive trend despite the challenges posed by COVID-19. In 2021, Zambia recorded a 43.6% increase in visitors to

Victoria Falls, with numbers rising from 86,308 in 2020 to 123,972 in 2021. Overall, tourist arrivals to Zambia saw a 10.5% increase in 2021, though they remained below pre-pandemic levels. National park visits also surged, with a 47.8% increase, reflecting the growing interest in Zambia's natural attractions. Tourism's contribution to GDP rose to 5.8% in 2021 from 4.7% in 2020 (Republic of Zambia, 2022). Projections indicate that passenger totals could rise from 1.62 million in 2016 to 4 million in 2030. In a high-growth scenario, this number could reach 5 million, while in a low-growth scenario, it might only reach 3 million (Forbes & Wilson, 2018).

Bernadette Deka-Zulu's 2021 report, highlights similarities between Zambia's investments in the Simon Mwansa Kapwepwe International Airport and Rwanda's investments in the New Bugesera airport. In August 2021, Deka-Zulu, the Executive Director of the Policy Monitoring and Research Center (PMRC), announced the completion of the Simon Mwansa Kapwepwe International Airport in Ndola. This airport, with a capacity of 1 million visitors and a 50-room luxury hotel, is a major milestone for Zambia's aviation stakeholders. The airport connects to the country's mining hub on the Copperbelt and the Northern Tourism Circuit, expecting investment to these areas. Deka-Zulu also emphasized the airport's crucial role in advancing Zambia's tourism and industrialization agendas, as well as its potential to elevate the country's overall development. Additionally, the reopening of Kenneth Kaunda International Airport (KKIA) in Lusaka coincided with the proposal of a new Qatar Airways route into Zambia.

Recalling RwandAir's agreement with Qatar Airlines in 2021, investment into these two Zambian airports will provide employment, increase capacity for tourism, and avail air travel geared toward business travelers (business travelers tend to expend more than leisure travelers). Ultimately, both airports are expected to be instrumental in job creation and tourism growth, helping Zambia achieve some of its goals outlined in the Seventh National Development Plan and the Economic Recovery Programme. Zambia has now become a major aviation hub (Deka-Zulu, 2021). Njoya (2013) examines the escalating recognition of tourism as a significant driver of economic development, particularly in developing nations. For the intent of this research, the focus will be on the portions of Njoya's paper regarding Ethiopia, as Ethiopia is the LLDC of the three countries presented in his paper.

Commonly labeled as labor-intensive, low-skill and a growth industry, tourism aids in reducing poverty by creating new employment opportunities for those living in poverty and

tourism expansion also increases tax collection (Njoya, 2013). In 2008, Ethiopia's tourism sector, driven by aviation, contributed 0.77% to the country's GDP. By 2012, the sector had generated $462 million in revenue, attracting 584,000 visitors. The majority of these visitors (86%) arrived by air, according to the Ministry of Culture and Tourism. Europeans accounted for the largest share of visitors (58%), with significant numbers being of German, English, French, and Italian origin. The Americas made up 18% of visitors, while Africa and the Middle East/Asia each contributed 27% and 9%.

Ethiopia, like Rwanda, has high-level government policy with objectives set for their air transport industry, aiming to:

1) Ethiopia established as a preferred visit in Africa;

2) Boost tourism injection from the current US $250 million to US $3 billion by 2015; and

3) Generate 3.5 million direct capacities for its citizens.

As the Government of Rwanda intends for RwandAir to have its national carrier create greater accessibility to the country, similar efforts of Ethiopia, where Ethiopian airlines is expanding opportunities and enhancing connections with other countries (Njoya, 2013). According to the International Air Transport Association (2018), the aviation air transport sector supported 19,000 stakeholders (restaurants and retail), aircraft manufacturers, and air navigation service. Goods and services from local suppliers support an additional 179,000 jobs, while wages paid to employees contribute to 80,000 jobs. Foreign tourists arriving by air to Ethiopia, spending from within the State, are estimated to support another 815,000 mixed placements. Altogether, this accounts for approximately 1.1 million jobs (IATA, 2018) generated by air transport and air-bound tourism. Africa remains the largest market for visitor traffic to or through Ethiopia, in trail by the Middle East and Asia-Pacific. Of the total passengers, 4.3 million arrived from Africa (60%), 1 million from the Middle East (14%), and 900,000 from Asia-Pacific. (12%) (IATA, 2018). Rwanda is amongst those African countries that receive both scheduled passenger and cargo direct flights on Ethiopian airlines.

Tolcha, Bråthen, & Holmgren (2020), examined aviation in Ethiopia and identified the potential correlations between air transport demand and economic development as a complex issue. While debates persist about whether improved air transport promotes economic development, Tolcha et al. (2020) concluded there is a unidirectional causal relationship (in

which the influence flows in one direction only) from air transport demand to economic development in Ethiopia.

Although Ethiopia is a growing country, it has a keen advantage due to its geographical position as a hub and home to the region's largest airline group (Tolcha, Bråthen, & Holmgren, 2020). Therefore, growth in air transport could enhance economic development, suggesting that economic development strategies should place a strong emphasis on air transport, which will, in turn, boost other sectors like tourism (Tolcha, Bråthen, & Holmgren, 2020).

Therefore, the growth in air transport could enhance economic development, suggesting that economic development strategies should place a strong emphasis on air transport, which will, in turn, boost other sectors like tourism (Tolcha, Bråthen & Holmgren, 2020). Ethiopia is now more linked with more global locations than other sub-Saharan African States with its international routes from Ethiopia increasing by 49.4%. Grey (2017) highlights that given the geographical layout and although by general definition the Caribbean islands do not fit as a land-locked country, they share similarities. This includes air transport as an important tie for the local community inclusive of supporting socio-economic developing activities (Grey, 2017). The Caribbean's economy is largely dependent on tourism, with the majority of visitors to the region arriving by air. In the Caribbean, air connectivity is an enabler, like the previous mentioned countries. It has the potential to enhance the outlook for both a government and an individual (International Air Transport Association, 2016).

2.3 Air Transport as a Catalyst for Economic Growth in the Caribbean

According to the IATA report, many tourist destinations such as Cuba, Guyana, Martinique, St. Lucia, Trinidad and Tobago, and the Dominican Republic receive over 90% of visitors arriving by air. In 2014, the aviation sector contributed $27 billion to tourism spending in these areas, with $24.3 billion coming from leisure travel and $2.7 billion from business trips. This revenue is enough to cover the combined public expenditure on healthcare and education in the region. (International Air Transport Association, 2016). A study on the socio-economic effects of supporting flag carriers in the Caribbean Community (CARICOM) highlighted that 50% of tourism contributes to a GDP of $10.9 billion, which represents 4% of the Caribbean's overall GDP. Additionally, this sector supports 490,000 jobs, equating to 4% of total Caribbean employment (Warnock-Smith & Morrell, 2011)." Aviation plays a big role in Caribbean tourism. In 2016, air travel supported $27 billion in tourist spending, which

made up 14% of the Caribbean's GDP. This created 1.6 million jobs, or 13% of all jobs in the Caribbean. Overall, aviation's total economic impact in the Caribbean was $24.3 billion from leisure spending, $2.7 billion from business spending, and $18.3 billion from visitor exports (24% of total exports). For the Caribbean, strengthening air connectivity through national carriers is a key focus (Warnock-Smith & Morrell, 2011).

In regions where air travel is essential for business and tourism, the loss of a major carrier can have a ripple effect throughout the economy (Warnock-Smith & Morrell, 2011). By creating new opportunities for international travel, the sector also plays a big role in driving the tourism industry. Warnock-Smith & Morrell (2011) also quotes a study conducted by Air Transport Action Group (2005) that the impact of a reduction in air services on an airport's capacity concentration and target impact is less impactful if there are less obstacles to entry for foreign carriers and less reliance of national carriers at the airport. In these cases, the continuation of services will help to ensure that employment density remains high, and the direct impact remains buoyant.

2.4 Research Gap

Identifying research gaps is a crucial part of the literature review process. While it is widely accepted that literature reviews should identify research gaps, there is no standardized methodology for doing so in qualitative literature reviews that ensures rigor and replicability. While the existence of research gaps may pose challenges, they can also provide valuable opportunities for initiating new research endeavors. Although research gaps are often emphasized as an output of literature reviews (Robinson, Saldanha, & McKoy, 2011), they can also serve as an input, motivating further research. While outlining research gaps differs from pinpointing them in a more specific context, we posit that identifying research gaps naturally raises the query of how to effectively present them within the relevant literature review. Researchers make a range of decisions regarding the manner in which they articulate these research gaps (Müller-Bloch & Kranz, 2015), for this paper the manner is analyzing the gaps in the literature i.e., what are the areas where there is still uncertainty or disagreement?

The first research gap identified in this research is the general lack of reference material on connecting social-economic development and aviation or air transport and its effect on Rwanda. As seen in the literature and empirical review of this paper, IATA has conducted studies on socioeconomic development and landlocked countries in many countries, but none on Rwanda. The reason having reference material is important and valuable is because each

time you come across news of a groundbreaking scientific discovery or a global crisis, you gain from the investigations conducted by those who communicated it, individuals who, in turn, reaped the rewards of the extensive research conducted by numerous predecessors (Booth, Colomb, & Williams, 2016).

Another research gap is the lack of research on the enablers and obstacles that the aviation sector presents for socio-economic development in Rwanda. Research studies frequently overlook landlocked countries, primarily due to their smaller size, comparatively lower economic resources, and limitations in funding research initiatives when compared to coastal nations (UNCTAD, 2022). The aviation sector is a complex and dynamic industry. It is difficult to evaluate the full impact of the aviation sector on socio-economic development, as it is affected by a number of causes, such as the global economy, government policies, and technological advancements (IATA, 2022).

One research gap relates to airport capability and the lack of data on airport capacity and its impact on socio-economic development in Rwanda. Airport capability is a complex concept that encompasses a wide range of factors, such as runway capacity, terminal size, and cargo handling facilities (UNCTAD, 2022). Rwanda, as a developing nation, faces some constraints in research capacity, which can pose challenges for local researchers in conducting extensive studies on the influence of airport capabilities on socio-economic development. Some of the potential challenges is that airport capability is a complex concept that encompasses a wide range of factors, such as runway capacity, terminal size, and cargo handling facilities. Additionally, it can be difficult to measure the impact of airport capacity on socio-economic development, as it is influenced by other factors, such as the global economy, government policies, and other modes of transportation (UNCTAD, 2022). Finally, another research gap is the lack of published academic references, journals, or writing on the connection between socio-economic development and air transport in Rwanda, especially in relation to capacity building. The aviation sector in Rwanda is somewhat new and changing, and there is a lack of data on its impact on the Rwandan economy and society. The Rwandan government is focused on a number of other research priorities, such as poverty reduction, education, and healthcare. This can make it difficult for researchers to secure funding and conduct large scale research on the force of air transport on socio-economic development and capacity (AfDB, 2023).

The research gaps outlined in this section directly inform the thesis research questions. RQ1 addresses the gap in literature on aviation's economic impact in Rwanda, while RQ2 investigates the enabling and constraining factors affecting aviation's role in development. RQ3 provides strategic recommendations to bridge knowledge gaps in capacity building and policy-driven aviation expansion. By aligning with these gaps, the study ensures its findings contribute both theoretically and practically to the discourse on aviation's role in LLDCs like Rwanda.

Chapter 3 Methodology

3.0 Methodology: A Comprehensive Approach to Analyzing Aviation's Role in Rwanda's Development

The methodology chapter of this dissertation provides a thorough overview of the research methods used to explore the challenges of landlocked developing countries. While aviation holds immense potential for growth, LLDC's face unique challenges in leveraging it. By examining Rwanda's case, the research aims to shed light on broader strategies that LLDCs can employ to harness aviation for socioeconomic sustainability. The objectives are laid out in the Research Problem and describe the methodology employed to gather and analyze data. It highlights the need for a nuanced approach that integrates both quantitative and qualitative methods to capture the full scope of aviation's impact on Rwanda's socioeconomic development (Creswell & Poth, 2018).

3.1 Research Problem and Objective

Rwanda is grappling with significant socio-economic challenges, including a high prevalence of unemployment rates, pervasive poverty, and underdeveloped surface transport infrastructure. These challenges hinder the country's economic growth and overall development, limiting access to markets, services, and opportunities for its population. The lack of efficient transport options exacerbates these issues, making it difficult for Rwanda to leverage its potential for growth and development (Bertelsmann Stiftung,, 2024). In this context, aviation emerges as a critical component in addressing these socio-economic challenges. As a land-locked nation, Rwanda's connectivity to the global market is heavily dependent on its air transport sector. Through the facilitation of trade, tourism, and job creation, the aviation sector serves as a significant propellant for economic development. This research investigates the intricate role of aviation in improving socio-economic indicators in Rwanda, aiming to provide a comprehensive understanding of how air transport can drive development in such challenging contexts (Mwangi & Kisimbi, 2020).

This study has the potential to inform Rwanda's future trajectory and serve as a valuable blueprint for other landlocked developing nations aiming to harness aviation's potential for sustainable socio-economic development (IATA, 2023). By improving air connectivity, Rwanda can facilitate the efficient movement of goods, open up international markets for Rwandan products, attract international tourists, generate revenue, create jobs in the hospitality and service sectors, and ultimately contribute to GDP growth. This research, in

addition to the above investigative angle, aims to explore the significant role of aviation in addressing those socio-economic challenges. It will provide valuable insights and strategic recommendations to enhance the sector's contribution to Rwanda's development (Kalulu, Tushabe, & Chondo, 2020).

3.2 Research Design

To explore this potential, our study focused on three primary research questions (RQs). To thoroughly investigate these questions, we utilized an integrative research approach that incorporated both qualitative and quantitative methods. This strategy enabled a comprehensive analysis by integrating numerical data with contextual insights, enhancing the depth and breadth of our findings. Data were presented through tables and graphs to facilitate clear and effective interpretation.

RQ1: How does aviation impact Rwanda's socio-economic landscape, focusing on key indicators such as trade volume and tourism revenue? The first question (RQ1) was addressed using quantitative data from multiple sources that highlight trends in air transport in Rwanda and their connections to socioeconomic variables. This involves the importance of aviation for tourism and trade in Rwanda, with a particular focus on key indicators such as trade volume and tourism revenue.

- First, this data, encompassing metrics like trade volume, tourism revenue, and passenger numbers, offers advantages due to its precision and objectivity (IATA, 2021). Using these methods, the researcher demonstrated trends in air transport and their associated impacts on socioeconomic variables. Quantitative data was analyzed objectively.
- Next, quantitative data is well-suited for statistical analysis, allowing it to be analyzed using mathematical rules and principles. This significantly reduces the potential for bias in how the results are interpreted by analysts or researchers. (Stevens, 2023). Additionally, the readily available nature of this data from Rwanda (NISR, 2024) and international sources like the World Bank (World Bank Group, 2024) and African Union (African Union, 2021) facilitates comprehensive analysis. Policymakers and stakeholders particularly benefit from quantitative data, as it translates into concrete evidence for informed decision-making. Clear numerical data on how aviation impacts trade and tourism can directly influence policy decisions

on infrastructure development, investment, and regulations (Johnson & Onwuegbuzie, 2004).

- Finally, the generalizability of findings derived from large datasets allows for broader application of these insights to other developing nations (Tashakkori & Teddlie, 2010). This broader picture can inform wider strategies for aviation development in similar contexts. In essence, quantitative data serves as a cornerstone for objective, replicable, and policy-relevant analysis of air transport's influence on Rwanda's socio-economic landscape.

It should be noted that the socio-economic landscape does not include ecological since the focus in RQ1 is mainly on how aviation impacts Rwanda's socio-economic landscape through key indicators like trade and tourism revenue. Expanding the scope to include environmental aspects would dilute the focus on these core socio-economic impacts (Flick, 2020). The environmental aspect becomes pronounced when discussing the construction of the New Bugesera International Airport (NBIA), as this will have the greatest collective impact on the environment. The Environmental and Social Impact Assessment (ESIA) for the NBIA already provides a comprehensive evaluation of environmental impacts, ensuring that these concerns are addressed thoroughly without overloading the socio-economic research (AFDB, 2018)

RQ2: What are the factors that support and impede the development of Rwanda's aviation sector?

The second question (RQ2) was achieved by means of qualitative approach. This involved conducting in-depth interviews with key stakeholders in the aviation industry, including government officials, aviation experts, airline executives, and regulatory bodies.

- The reason for using the qualitative approach for RQ2 is because qualitative research, through methods like interviews, offers a deeper understanding of policymakers, stakeholder experiences and perceptions (Nyumba & Willis, 2022). A point of note is that it is not equally valid to use a quantitative approach for this question because qualitative data provides the detailed, context-specific information needed to address particular issues and challenges faced by policymakers. This depth is crucial for identifying both the challenges and opportunities that quantitative data might not capture. Moreover, Rwanda's aviation development is intricately linked to its unique

infrastructural landscape (Creswell & Poth, 2023). Qualitative research excels at exploring this very factor, providing a subtle understanding of how infrastructure influences aviation growth. The flexibility and adaptability of qualitative research are also advantageous (Ugwu & Eze, 2023).

- Unlike rigid quantitative approaches, qualitative methods allow researchers to delve deeper into emerging themes that may surface during the study, which is particularly valuable in a dynamic sector like aviation. However, standardized qualitative methods like thematic analysis and grounded theory research ensure the data collection and analysis remains systematic and reliable.

RQ3: Based on the findings from RQ1(quantitative approach) and RQ2 (qualitative approach), what strategic recommendations can be made to enhance the growth and economic benefits of Rwanda's aviation sector? The third question (RQ3) used the Convergent-parallel Approach.

- This concurrent approach involves collecting both qualitative and quantitative data simultaneously (with an emphasis on both), and then combining and comparing these different types of data. Essentially, the two methods are merged. (Edmonds & Kennedy, 2024).

- The Convergent-Parallel Approach will be used to formulate strategic recommendations drawing upon the valuable insights acquired from the quantitative data analysis (RQ1) and the qualitative findings (RQ2). This approach ensures data-driven recommendations informed by real-world context to enhance the aviation sector (Edmonds & Kennedy, 2024). For instance, quantitative data may reveal an increase in tourism revenue, while simultaneous qualitative interviews can uncover whether this growth is due to specific factors such as ease with visa-on-arrival into Rwanda.

Developing an integrated analysis framework that combines numerical trends with qualitative themes provides a holistic view of the sector's performance and challenges. For policymakers, the Convergent Parallel Design offers immediate and practical insights that are both data-driven and contextually informed. Simultaneous data collection and cross-validation provide a stronger basis for decision-making, as qualitative insights can explain and support quantitative trends and vice versa. This integrated approach is particularly

beneficial in dynamic sectors like aviation, where timely and well-informed decisions are critical (Edmonds & Kennedy, 2024).While employing a combination of qualitative, quantitative, and convergent parallel approaches might appear comprehensive, a more strategic selection of methods tailored to each research question can enhance effectiveness by ensuring that the chosen methods directly address the specific objectives and subtleties of each inquiry.

3.3 Rationale for Criteria Selection

Using all three methods for each research question might dilute the clarity and focus of the research. Each research question had a distinct focus that aligned well with a specific method. Mixing all methods for each question would lead to overlapping data and redundant findings, making it harder to derive clear, actionable insights (Flick U. , 2020). Combining all three methods for each question was likely to be resource-intensive and time-consuming. This is because for RQ1, adding qualitative methods can significantly increase resource demands and time commitments. Qualitative research involved identifying and recruiting diverse stakeholders, such as government officials and industry experts, which required extensive coordination and logistical efforts. Conducting in-depth interviews to gather qualitative data is a time-intensive process that involves transcription, thematic analysis, and interpretation of narrative data (Creswell & Poth, 2023). This additional workload can divert resources away from the primary quantitative analysis, potentially delaying the research timeline. By aligning the method with the nature of the question, efficient use of resources and time allowed for a more thorough and focused investigation (Bryman, Bell, Reck, & Fields, 2021).

Each method has its strengths and weaknesses. By matching the method to the question, we can leverage the strengths of each approach without overcomplicating the research design (Creswell & Poth, 2023).

To ensure triangulation, findings from the quantitative phase can be validated and expanded upon by the qualitative phase (Creswell & Clark, 2018). Employing a combination of qualitative, quantitative, and convergent parallel approaches for each research question might seem logical, it is not always the most practical or necessary strategy. A more effective approach lies in aligning each research question with the most appropriate method. This targeted approach ensures clarity, efficiency, and methodological integrity, ultimately yielding more precise, actionable, and contextually relevant insights (Bryman, 2021; Creswell & Creswell, 2018; Flick, 2020).

In summary, the chosen methodological approaches for each research question were justified by their ability to provide precise, reliable, and comprehensive answers to the specific aspects of aviation's impact and development in Rwanda.

3.4 Quantitative Data Collection and Analysis

Quantitative data, collected from Rwanda air transport statistics, offered invaluable insights into the "what" of aviation's impact. By analyzing metrics like passenger traffic, cargo tonnage, and capacity building, trends and correlations were identified.

The different types of quantitative data criteria to be used, the sources for each criterion and an explanation for how these were chosen and others excluded in this research are as follows:

- Air Trade Trends: IATA and NISR reports highlight the economic impact of aviation in facilitating trade activities, especially for time-sensitive and high-value commodities.
- Tourism and Revenue: UN World Tourism Organization (UNWTO) (UNWTO, 2024), Tourism revenue, driven by increased tourist arrivals and spending facilitated by aviation, highlights the sector's significant economic contribution.
- Employment, and Job Creation: International Labor Organization (ILO) (International Labour Office, 2018); Insights into job creation and employment dynamics in the aviation sector in Rwanda and neighboring countries.
- Capacity building: ICAO; explores capacity building initiatives in a country's aviation sector, focusing on infrastructure and human resource development.

3.5 Criteria Justification and Data Sources excluding Environmental Factors

It is important to emphasize that across various literature regarding the four criteria (literature as indicated next to the four criteria), those used in this research were the most occurring and most relevant to this research. Focusing on specific environmental impact criteria rather than addressing all of them can lead to more targeted and effective sustainability measures. This focused approach allowed for more practical and feasible sustainability efforts, compared to trying to address all environmental impacts simultaneously (Josimović, Krunić, Gajić, & Manic, 2021). There do exist other criteria such as regulatory frameworks and technological advancements, which are discussed in other related areas of the research. They were excluded

from this list due to the specific focus on the economic and developmental aspects in this section. This selection process ensured that the research remained concentrated on the most pertinent issues. The criteria chosen are thus, those that align most closely with the research objectives (Josimović, Krunić, Gajić, & Manic, 2021).

Data on air trade trends, including the volume and value of air cargo, was sourced from RwandAir Limited and the National Institute of Statistics Rwanda (NISR). This data helped quantify the importance of air freight, particularly for high-value goods like coffee, fruit, nuts, other edible parts of plants, vegetables, flowers, cut roses, and buds of a kind suitable for bouquets and perishable items (NISR, 2024). For tourism and aviation revenue, financial performance reports from Rwanda Airport Company (RAC) and annual reports from the RCAA were analyzed to assess revenue trends and the economic impact of the aviation sector, especially post-pandemic recovery. Employment and job creation data, including direct and indirect employment figures, were gathered from RAC, RCAA, and RwandAir Limited. This facilitated the evaluation of the sector's contribution to job creation and workforce development. Additionally, capacity-building efforts were examined through reports from the Akagera Flight Training School, focusing on government investments in education and training programs aimed at enhancing the skills and capabilities of the aviation workforce. Other areas contributing to the criteria, such as health access, were gathered from RwandAir, RCAA, and OECD (Organisation for Economic Co-operation and Development).

Data was gathered from Rwanda Minecofin and OECD, with sustainable development data sourced from Akagera Flight Training Organization, RwandAir, RCAA, IATA, and ICAO. This analysis provided a more accurate and reliable view, incorporating data cleaning to remove duplicates and address missing values, normalization to standardize units and formats, and validation through cross-referencing with multiple sources. Excel spreadsheet software for basic statistical analysis was employed to perform descriptive and inferential analyses, identifying patterns, trends, and correlations within the data (SPIRES, 2024). Quantitative data analysis, while powerful, can present challenges. Potential challenges in data collection and analysis may include missing or unreliable data, discrepancies between data sources such as IATA versus ICAO, and OECD versus NISR, and other external factors influencing the data. These issues were mitigated through thorough data validation and sensitivity analysis to account for potential biases (SPIRES, 2024). Addressing these challenges was essential for ensuring the accuracy and dependability of the research findings.

3.6 Qualitative Data Collection and Analysis

While quantitative data provided a foundation for numeric understanding, qualitative data added context. For the qualitative data, the researcher designed twenty interview questions that were implemented using two distinct angles. First, is the Interpretivist approach, which focuses on lived experiences and subjective meanings to explore the "why" behind the numbers. The next was the Balanced Approach utilizing both Structured and Semi-structured interviews, allowing for the capturing of the human dimension of aviation's impact in Rwanda (Creswell, 2021). In the Balanced Approach to Interviewing, effective interviewing prioritizes fostering a human connection. This means demonstrating empathy, ensuring fairness, and actively engaging the interviewee. By creating a space for honest storytelling, the interviewer encouraged the participant to share their personality, values, and how these connect to their team's or organization's goals. Guiding the interviewee through their experiences fosters a personal connection, leading to richer and more meaningful insights (MacDonald & Maybee, 2020).

Combining Structured and Semi-structured interviews was employed depending on the research question and the interview participants' level and position in the aviation industry. Structured interview questions consisted of predefined questions that require specific, often short, responses. This approach ensures consistency across interviews, allowing for objective comparisons between participants. It is particularly useful for identifying prevalent themes and analyzing variations. The advantage of Structured interviews is that it provides reliable, easily comparable data and is efficient for large-scale studies. Structured interviews help in quickly identifying trends and patterns across a broad population (Berndtsson, 2017). Semi-structured Interviews have a series of guiding questions but allow for open-ended responses and follow-up questions. This approach enables deeper exploration of topics and can reveal rich, detailed insights. The advantage of Semi-structured interviews is that they uncover new themes and insights that Structured interviews might miss. The questions allow participants to direct their thoughts more freely, leading to richer and more refined data (Berndtsson, 2017). Combining both methods allowed the researcher to benefit from the strengths of each. Structured interviews provide a broad understanding, while semi-structured interviews offer depth and detail.

3.7 Data Collection and Processing

Qualitative data was collected through interviews with various stakeholders such as government officials, aviation industry leaders, cargo operators, and community members. This data was analyzed using narrative analysis to uncover individual stories and lived experiences.

3.7.1 Steps in Data Collection

a. Developing an Interview questionnaire:

A clear interview questionnaire ensured consistency and coherence within each category while allowing flexibility in structured and semi-structured settings. The guide included both closed-ended and open-ended questions tailored to the interviewees' roles and experiences.

b. Strategic Participant Selection:

Ensuring diverse representation was crucial. Participants were selected based on their involvement in the aviation sector, including different levels of seniority, various roles (e.g., policymakers, operational staff, community members), and different perspectives on the industry's impact.

c. Conducting the Interviews:

Interviews were conducted in person and via video conferencing, depending on logistical considerations. Building rapport and creating a comfortable environment for interviewees was prioritized to ensure candid and detailed responses. Other modes such as telephone and online were employed when face-to-face interviews were not possible (Seidman, 1998).

3.7.2 Data Processing and Analysis

a. Transcription:

All interviews were transcribed verbatim to ensure accuracy. This provided a complete record of the conversations for analysis.

b. Coding:

Using Quirkos software, the transcribed interviews were coded to identify recurring themes and patterns. Coding involved categorizing data into meaningful groups, which helped in organizing and summarizing the information (Williams & Moser, 2019).

3.8 Overcoming Obstacles in Acquiring Quality Interview Data

Inherent in research, obstacles to acquiring quality information in interviews can arise due to factors such as the interviewer's skills and the interview's design, participants engagement, and the environment in which the interview takes place. The interviewer's ability to build rapport and ask insightful questions is crucial. The interviewer should be neutral, empathetic, and professional in probing for deeper insights is essential. The design of the interview, including question choice and flexibility, impacts the quality of data. Ensuring that questions are clear, relevant, and open-ended where appropriate will help in eliciting detailed and meaningful responses (MacDonald & Maybee, 2020). Engaging participants and ensuring their comfort and willingness to share candidly is vital.

Building trust and ensuring confidentiality can enhance participant engagement. Factors like setting and timing can influence the responses. Conducting interviews in a comfortable and neutral environment at a convenient time for participants can mitigate these issues (MacDonald & Maybee, 2020). Qualitative data will complement the quantitative analysis by providing rich narratives and insights. For example, interviews with government officials can corroborate a rise in tourist arrivals by explaining how additional aircraft or infrastructure expansion has enhanced Rwanda's accessibility as a travel destination. This holistic approach moves beyond mere correlation, painting a comprehensive picture of cause and effect, and allowing for the proposing effective development strategies that leverage aviation's power for growth (MacDonald & Maybee, 2020).

Table 3 Quantitative Impact Criteria and Corresponding Data: Statistical Analysis and Interview Questions

#	Impact Criteria	Statistical data	Interview Question	Standard Criteria & Citation
1	Air Trade trends	Volume and value of air cargo, trade balance, high value goods Exports: top partners include UAE, UK, Netherlands, France, and China. Imports data: imported commodities, quantities, primary countries of origin, respective shares of total imports. Re-exports: top destination for main re-exported commodities, including their quantities and the shares of these countries in total re-exports.	GDP Growth Q1, Q2 Employment: Q3 Factors Supporting Development: Q11 Factors Impeding Development: Q14, Q15 Promoting Sustainability: Q20	IATA and NISR reports highlight the economic impact of aviation in facilitating trade activities, especially for time-sensitive and high-value commodities.
2	Tourism and Aviation Revenue	Passenger traffic, aircraft movement, revenue from tourism, GDP, post-pandemic recovery trends	GDP Growth: Q2 Poverty Levels: Q5, Q6 Factors Supporting Development: Q11 Factors Impeding Development: Q14	UN World Tourism Organization (UNWTO, 2024) indicates that tourism revenue, driven by increased tourist arrivals and spending facilitated by aviation, highlights the sector's significant economic contribution.
3	Employment, Job Creation and Human Resources	Employment rates, job categories (operations, maintenance), training and skills, innovation	Employment: Q3, Q4 Poverty Levels: Q5, Q6 Factors Impeding Development: Q14 Strengthening Infrastructure: Q17 Healthcare Access: Q9, Q10:	International Labor Organization (ILO) (International Labor Organization, 2018) provides insights into job creation and employment dynamics in the aviation sector in

				Rwanda and neighboring countries.
4	Capacity building	Training programs, education investments, government investments, flight training, RCAA	Education Attainment: Q7 Strengthening Infrastructure: Q17, Q18 Promoting Sustainability: Q19, Q20 Healthcare Access: Q9, Q10	ICAO explores capacity building initiatives in a country's aviation sector, focusing on infrastructure and human resource development.

A comprehensive understanding of the socio-economic impact of Rwanda's aviation sector involves examining various dimensions of economic and social well-being. The impact can be assessed through the criteria of air trade trends, tourism and revenue, employment and job creation, and capacity building. This criterion is based on similar studies within the aviation industry. These criteria were chosen because they are standard measures used by scholars to assess the socio-economic impact of aviation on a country's development. Scholars like Doganis (Doganis, 2019) and Graham (Graham, 2018) emphasize such dimensions as they offer a comprehensive view of how aviation influences economic growth and social progress. Studies by IATA emphasize that optimizing air cargo enhances market efficiency and extends supply chains, unlocking new economic potentials, which is crucial for developing economies. This highlights the link between air trade trends and economic integration, underscoring its importance in assessing the socio-economic impact of aviation. Aviation drives tourism, generating substantial economic benefits (UNWTO, 2024). Graham (2018) highlights the correlation between improved aviation connectivity and increased tourism revenue, which stimulates local businesses, and creates jobs in the tourism sector.

This demonstrates the link between tourism and revenue and how aviation fosters economic growth, making it a critical criterion for socio-economic assessment. Aviation is a major global employer, providing both direct and indirect employment (ATAG, 2023). This metric is used to measure aviation's socio-economic impact, noting that it directly creates jobs and stimulates related industries, contributing to overall economic development. This connection between employment, job creation, and aviation’s economic contribution reinforces the selection of this criterion (Doganis , 2019). Capacity building in aviation involves developing infrastructure, enhancing human resources, and ensuring sustainable growth. ICAO's NGAP (Next Generation of Aviation Professionals) program emphasizes preparing a skilled workforce to manage future air transport systems (ICAO, 2024), which is useful for the enduring sustainability of the aviation industry (Doganis , 2019); (Graham, 2018). This link to capacity building stresses the importance of sustained investment in human resources, training, education and infrastructure development within the aviation sector, solidifying its role in socio-economic progress.

3.9 Research Bias

Research is not without biases, whether perceived or not, and should be expected. Research biases suggest that the researcher should focus on human elements to identify and avoid such biases. Biases can manifest in various forms, influencing data collection, analysis, and interpretation. Sarniak (2015) identifies nine core types of biases encompassing confirmation bias, selection bias, and experimenter bias, among others. These biases can distort findings and undermine the credibility of research outcomes, thus, it's essential for researchers to remain vigilant and actively mitigate biases throughout the research process. For this study, recognizing biases is particularly crucial given the complex socio-economic landscape of landlocked developing countries like Rwanda. The researcher had to be mindful of any preconceived notions or assumptions that could shape the investigation. For instance, confirmation bias might lead the researcher to selectively interpret data that aligns with their hypotheses about the positive impact of aviation on socio-economic development, overlooking contradictory evidence.

Additionally, selection bias could occur if the sample of interviewees disproportionately represents certain stakeholders within the aviation industry, potentially skewing perceptions of aviation's role in development. To mitigate such biases, the researcher employed diverse data collection methods, including interviews with government officials, industry experts, and local community members, to ensure a comprehensive and balanced understanding of the topic. Additionally, transparently documenting research decisions, methodologies, and limitations can enhance the integrity and dependability of the research's findings.

The key is to be aware of the nine core biases and not to disregard them, but to address and incorporate these biases in a way that can be beneficial to the result that will add value to the research (Sarniak, 2015). The key is to be aware of the nine core biases and not to ignore them, but to address and incorporate these biases in a manner that adds value to the research (Sarniak, 2015). In this case, the researcher was concerned that government interviewees' responses might be overly favorable to the 'brand,' while responses from other government bodies might not be viewed the same way. This reflects a variation of the halo effect (Sarniak, 2015). To mitigate this effect, the researcher used comparative questions with consistent quality and focus when interviewing both government and non-government participants, ensuring balanced and unbiased data collection.

Using comparative questions with the same line and quality of questioning when interviewing government participants can help mitigate potential bias by ensuring

consistency and fairness in the data collection process. By employing this approach, the researcher was able to maintain objectivity and reduce the likelihood of skewing responses based on the participants' positions or affiliations (Creswell, J W, 2021) Essentially, it means asking each participant similar or identical questions in terms of structure, content, and depth. For instance, if the researcher asked government officials about their views on a particular policy, they should ask similar questions to representatives from other sectors or opposing viewpoints.

This consistency allows for a balanced understanding of the topic and minimizes the risk of bias in the data. For example, to show how this was done, the researcher interviewed government official BZ and an industry official RG regarding RQ2 supporting and impeding factors .

Table 4 Financial Support for Aviation Development

Policy Area	BZ (Supportive)	RG (Against)
Government commitment	"Aviation in Rwanda is considered at the national level which basically supports the development..."	"Lack of integrated regulations"

Source: Data adapted from interviews conducted for research on Rwanda's aviation sector (2023).

Both were asked the same question and both had very strong views. BZ emphasized strong government commitment 'at a high national level…' which suggested structure, however, RG stated the government had a 'lack of integrated actions...', suggesting poor cohesion. This approach ensured a balanced understanding by incorporating perspectives from different stakeholders and minimizing bias. The researcher ensured neutrality and objectivity by using comparative questions with the same line and quality of questioning across participants. This consistent approach prevented bias by avoiding leading respondents based on their positions or affiliations. For instance, both a government official and an industry representative were asked the same question about government policies, resulting in diverse, unbiased responses. This method ensured that questions did not guide participants toward specific answers, maintaining the research's neutrality (Flick, 2023).

3.10 Interview Participants

These individuals were targeted for several key reasons. First, their access to strategic insights provided a broader understanding of the long-term policies and regulations shaping this impact. Second, among them were government representatives and decision-makers,

whose involvement in key decision-making processes granted the researcher access to valuable information about the rationale behind specific policies and initiatives. Additionally, as visionaries at the forefront of their respective institutions, they were likely aware of future plans and potential challenges related to aviation's integration into the national economy. Their expertise and authority also ensured access to official data and resources. Finally, by triangulating data from various sources, including both high-level and grassroots perspectives, the researcher strengthened the authenticity and dependability of the findings.

The researcher interviewed a variety of stakeholders in the Rwandan aviation industry to gain comprehensive insights. These included government officials from the Ministry of Infrastructure, the Ministry of Economics and Finance, the Rwanda Civil Aviation Authority, the Rwanda Development Board, and other relevant government agencies involved in the aviation sector. Additionally, interviews were conducted with airline executives from RwandAir Limited and Akagera Aviation Training Organization. Airport managers from Rwanda's Airport Company were also included, along with representatives from entities responsible for capacity building in air transport and logistics. Finally, the researcher engaged with representatives from the University of Rwanda to incorporate perspectives from tertiary education and academia.

3.10.1 Guiding Principles in Selecting Interviewees

All participants consented to partake in this investigation. To maintain confidentiality and readability, references will be made to them by their initials. These leaders in organizations within the Rwandan aviation industry are connected either by policies, the necessity for development or government initiatives relevant to the air transport industry. The criteria for choosing them will be apparent from their backgrounds. The selection of interview participants was guided by carefully defined criteria aligned with the study's question, as will be discussed in the following sections.

3.10.2 Background of Interviewees

Table 5 Background of Interviewees

AN	A PhD holder with a background in transport, planning and engineering, he returned to academia as the senior lecturer in urban structure, transportation, planning, and engineering at the College of Science and Technology, University of Rwanda, for three years.
BZ	Beginning as an Aviation Maintenance Engineer, he has served as the Director of Maintenance within the airline industry and has been involved in

	various sectors of the aviation industry since 1989. He currently works for the Rwanda Civil Aviation Authority (RCAA) as the Aviation Advisor to the Director-General and the Acting Director of Aviation Planning. Additionally, he is a consultant with the Aircraft Accident and Incident Investigation departments at the Rwanda Ministry of Infrastructure, responsible for aviation.
CN	Her background is as a flight pilot and flight Instructor. She is a Quality Assurance, Quality and Safety Manager for Akagera Aviation and has served as a flight instructor for various countries across Africa.
EN	She holds a Bachelor of Science in Aeronautical Engineering Technology and has a strong interest in aviation development and management. She has been active in the aviation industry since 2018, Contributing to the construction and development of Rwanda Bugesera airport Smart-City initiative at Aviation Travel and Logistics (ATL).
ER	She holds a Master of Law degree and is the Chief Human Resource Officer at Aviation Travel and Logistics (ATL). In this role, she acts as a government consultant, providing policy guidance regarding the aviation industry at her institution.
ET	He is the Director of Human Resources for the Rwanda Airport Company and possesses a master's degree in development, administration and management. He has been involved in human resources since 2007, starting as a junior officer and progressing to his current position as director.
FG	He is responsible for the Sustainable Development Goals for Africa and has served as the Dean and Principal of the College of Business and Economics-University of Rwanda.
IB	As part of the Directorate at the Ministry of Economics and Finance (MINECOFIN), his responsibilities include forecasting, economic planning, and tax policies, focusing on financial support for the aviation sector.
NK	He holds a Master's degree in Entrepreneurship and Innovation and a Bachelor in Science in Marketing. As a Subject Matter Expert, he assists graduates and job seekers. He has been with the Rwanda Development Board since 2020, specifically in the Rural Development Board under the skills office as a Labour matching specialist.
RG	He is a flight captain at RwandAir with a unique background as a medical

	doctor. He also serves as an aviation medical examiner, holds a diploma in aerospace medicine, and is an aviation health care provider. Over the years, he has progressed within the organization, becoming responsible for different departments and serving as head of training. His experience includes medical and occupational health and fleet manager for Bombardier aircraft fleet.
GR	He has a Bachelor's degree in Business Administration and Computer Applications and Masters of Business Administration in Strategic Management. He has been in the aviation industry since 2015, starting at the Rwanda Airport Company and then transitioning to the Rwanda Civil Aviation Authority.
TR	He is a Dangerous Goods Air Transport Specialist and has worked for RwandAir for nearly 10 years. He began as a Cargo Officer in 2012 and has progressively been promoted to Cargo Supervisor, Deputy Manager Cargo, and then to Cargo Manager, where he oversees export and import activities for the airline.
YM	Her background is IT Communications and Business. She has worked for RwandAir since 2017, initially as Deputy CEO and then as CEO. In 2020, she served on the IATA Board of Governors and became the Chairperson in 2023.

3.10.3 The Interview Process

Scholars employing qualitative methodologies have devised various approaches to drive constructive transformations, thus using settings to encourage a place of comfort can open more in-depth conversations (Hannes, et al., 2022). This research explores the research topic, taking into consideration the research question. To gather rich data, the researcher conducted interviews with key individuals holding relevant positions. Due to their busy schedules, interviews spanned from October to December 2023. Prior to requesting interviews, the researcher established a rapport by informing potential participants about the project. This initial contact informed the interviewees that the session was recorded, for use by the researcher only for the assurance of quotes when analyzing the information. The consent form designed and provided by the researcher's institution of study was provided and signed by all participants. Furthermore, interview questions were sent at least two days beforehand to allow interviewees time to become familiar with the topics and raise any concerns.

The interview questions (Appendix 7-1) were designed to guide the conversation. The questions began with broad, introductory questions such as current events in their fields to

ease participants into the discussion. Subsequently, the questions delved deeper into specific areas aligned with the research question. Importantly, probes were strategically integrated to encourage interviewees to provide detailed examples and personal experiences, enriching the data collected. Ethical considerations were paramount throughout the interview process. Additionally, the importance of ethical considerations and reflexivity in research to ensure that researchers remain conscious of their own biases and their probable impacts on research outcomes is critical. Aligning with these principles, the current researcher minimizes harm, protects anonymity or confidentiality upon request, and maintains reflexivity throughout the interviews (Creswell & Creswell, 2023).

The interview process itself followed a structured format. First, the researcher introduced herself, explained the research purpose, and defined the key terms (socioeconomics and landlocked developing countries). Participants then introduced themselves and provided some background information about their roles and experience in the industry. Next, participants reviewed and signed the consent form, and their permission for recording was obtained. This ensured all parties were comfortable proceeding. With the formalities complete, the interview began. The pre-shared questions served as a springboard for the conversation, but the researcher maintained flexibility. Interviewees were encouraged to elaborate on their responses and express themselves freely.

The researcher actively listened, avoided leading questions that might bias the responses, and took detailed notes on key points (Fox, 2006). After each section of the interview, the researcher summarized the key points for confirmation. This ensured clarity and minimized the risk of misunderstandings. Finally, the interview concluded with an opportunity for participants to share recommendations or lessons learned from their experiences. The researcher expressed her gratitude to the participant before stopping the recording. This meticulous approach to the interview process ensured informed consent, ethical conduct, and a structured approach to gathering valuable data from key individuals. This data will serve as a cornerstone for exploring the impact of aviation on socioeconomics in LLDCs.

3.10.4 The data gathered and analyzed related to the thesis may be summarized in the following table

Table 6 Summary of Interviews Conducted with Key Stakeholders in Rwanda's Aviation Sector

Type of Interview	Institution	Position	Explanation
Interview data analysis	RwandAir Limited	CEO/Accountable manager	Gather insights into strategic decision-making to projected employment, capacity building, aviation activity, growth and plans as it relates to NST1 and Vision 2050 for Rwanda and the global aviation industry.
Direct Interview	RwandAir Limited	Executive Manager Aviation Cargo and Dangerous Goods	1) To gain insights into how RwandAir operates? the transportation of goods and freight and its relation to job creation, training and access to health services and; 2) To gain insights on import/export activities of goods and services in terms of tonnage social economic impact.
Direct Interview	RwandAir Limited	Fleet Crew Manager Medical doctor in charge of RwandAir AVMED department	1) A unique perspective on improved access to healthcare, healthcare infrastructure, medical regulations and compliance, and the intersection of health, safety, and socio-economic development in Rwanda.
Direct Interview	Rwanda Civil Aviation Authority	Aviation Advisor to the Director General & Director Aviation Planning	1) A comprehensive understanding of the industry's priorities and impact to advise the Director General Civil Aviation about them. 2) Understand the strategic and economic perspective of the national aviation strategy and projects their impacts on the industry.
Direct Interview	Rwanda Civil	Director General-PA	Knowledge of the civic and economic

	Aviation Authority		responsibility of the Director General of the Civil Aviation office, including interactions with airports, airlines, service providers, and other stakeholders, offering a holistic view of the ecosystem.
Direct Interview	Aviation Travel and Logistics (ATL) Rwanda	Chief Human Resources	Implementation of human capacity initiatives, future plans for capacity building programs, and aviation training center, skill development and aviation need analysis.
Direct Interview	Aviation Travel and Logistics (ATL) Rwanda	Chief Engineer Officer	Updates and plans for the infrastructure of Bugesera Smart-City Airport, and development, manpower and acquiring of knowledge, skills and abilities.
Direct Interview	Rwanda Airport Company	Director of Human Resources	1) Employment of personnel at airport and the import of skill labor and; 2) Training and education of personnel, and conducting airport human resource gap analysis
Direct Interview	Rwanda Ministry of Finance and Economic Planning (MINIECOFIN)	Director General Officer	1) What part does taxes imposed on airline operations such as fuel, purchase of aircraft and construction of aviation related activities play and; 2) Incentives to encourage investment in aviation from local and foreign investors
Direct Interview	University Of Rwanda College of Science and Technology	Professor in charge of Urban Structure, Transport, Planning, and Engineering	Connecting aviation to the various modes of transport; creating stability through education and developing future plans for economic development
Direct Interview-Virtual meeting	Rwanda Development Board (RDB)	Skills Officer	Sustainability through skill development and developing local talent and attracting specialized

			skills
Emailed interview questions	Air Transport and Logistics (ATL) Rwanda	Human Resources management	1) The role of ATL in building a Center of Excellence for Aviation and; 2) The relationship with human capacity and aviation
Direct Interview-Virtual meeting	Akagera Aviation and Training Organization Rwanda	Manager Quality and Safety	Addressing the capacity building impact in Rwanda, including hiring, training, skills development and education, while also addressing aviation personnel gap.

3.11 Analysis of interview data

The researcher used the software Quirkos Data Analysis (QDA) tool for the qualitative analysis of the interviews to facilitate analysis of textual data. Quirkos works by:

1. Importing data: First, the data is imported from the interview transcripts into Quirkos.
2. Coding: Quirkos uses a visual approach to coding, allowing the researcher to 'tag' or 'code' segments of text with thematic labels. Codes were created to represent key concepts, themes, or topics that emerge from the interviews. These codes are represented as colorful bubbles or 'quirks' in the software.
3. Coding Process: Coding is done with the assistance of the Quirkos coding system for qualitative data. This allows for a more in-depth analysis, leading to the identification of significant themes and patterns appropriate to the research question.
    a. The researcher reads through interview transcripts, identifying meaningful segments of text relevant to the research objectives. This initial reading is aimed at familiarizing the researcher with the data and identifying key ideas and concepts.
    b. As meaningful segments are encountered within the interview transcripts, the researcher designates them with codes in Quirkos. This can be achieved by highlighting the pertinent text and then assigning it to one or multiple codes that reflect the thematic relevance.
    c. If initial codes are insufficient, new ones are immediately created to capture new data.
    d. Quirkos allows for ease in visualizing how often certain codes appear across interviews, helping the researcher identify common themes or patterns.
    e. Run cross-tabulations can be run to explore how different codes are associated with one another
4. Exploration and Organization:
    a. Quirkos offers various visualization tools to explore coded data. Coded segments are in a 'bubble' view, where each code is represented by a bubble, or in a 'map' view, which shows connections between different codes.

b. Codes can be organized hierarchically, grouping related codes together to create a structured coding framework.

5. Analysis and Interpretation:
    a. Once all interview data is coded, the researcher can start analyzing and interpreting the findings.
    b. Quirkos is used to identify patterns, relationships, and trends within the data, helping the researcher draw meaningful conclusions and insights.
6. Reporting: Finally, Quirkos allows for the generation of reports and visualizations of findings, which can be used to communicate the research outcomes to others.

Overall Quirkos is a tool to support qualitative analysis, not a replacement for critical thinking and interpretation. It is crucial to combine its functionalities with the researcher's own research expertise and theoretical framework for a comprehensive and meaningful analysis of the research question.

The methodology adopted for this research presents a comprehensive approach to understanding the intricate relationship between aviation and socio-economic development, particularly in landlocked developing countries (LLDCs) like Rwanda. By combining qualitative and quantitative analysis within an interpretivist framework, this study aims to cast light on the challenges and opportunities associated with leveraging aviation for inclusive and sustainable growth. The qualitative component, conducted through interviews with stakeholders across various sectors, allows for the exploration of individual narratives and subjective meanings attached to aviation's impact (Fox, Mathers, & Hunn, 2006). Through careful coding and analysis using Quirkos software, this qualitative data enriches our understanding of the human stories behind aviation's influence on Rwanda's economic landscape. Complementing the qualitative insights, quantitative analysis involves examining concrete data such as aviation statistics and socio-economic indicators (Creswell, 2014). By correlating these datasets, the research seeks to establish empirical evidence of aviation's role in driving economic development and social progress.

This research employs an interpretivist approach seeking to understand the social impact of aviation from the "insider's perspective." This focus on lived experiences, alongside diverse viewpoints, goes beyond statistics to reveal a holistic picture of aviation's

influence. By delving into diverse perspectives and uncovering unexpected insights, this approach offers a holistic understanding of aviation's impact beyond mere statistical correlations (Venkat & Carter, 2018). Addressing potential biases and ensuring methodological rigor are essential aspects of this research. Through meticulous planning, strategic participant selection, and transparent documentation of research decisions, the study aims to mitigate biases and enhance the credibility of its findings (Sarniak, 2015). Overall, this methodology provides a robust framework for investigating the complex dynamics of aviation and socio-economic development in LLDCs. By synthesizing qualitative narratives with quantitative evidence, the research aims to inform effective strategies for harnessing aviation's potential as a driver of sustainable growth and social welfare in Rwanda and beyond.

3.12 Variables under examination

In examining the expansion and development of Rwanda's aviation sector, this study focused on several critical variables. These variables provide a better understanding of the factors influencing the sector and the potential pathways for its future growth. By examining these variables, the study aimed to provide a nuanced understanding of the factors shaping Rwanda's aviation sector and offer strategic recommendations for its enhancement and growth. Regarding government policies, the researcher asked interviewees about their perceptions of the Rwandan government's support for the aviation sector, as well as any challenges that they face in complying with government regulations. The research into Rwanda's aviation sector examined several pivotal variables to provide a comprehensive understanding of its dynamics. One key area of focus was investment in aviation infrastructure. Interviewees shared their views on the influence of the Rwanda Development Board (RDB) and the investments made in Rwanda's airports and other aviation facilities (Rwanda Development Board, 2023)

RDB also discussed challenges faced by local operators, highlighting areas needing further attention and improvement. Competition from neighboring countries was another significant theme. Insights were gathered on how Rwandan airlines perceive the competitive pressures from airlines in the region. This aspect revealed the broader competitive landscape and the specific challenges Rwandan airlines encounter from regional rivals. Economic conditions were explored by discussing the aviation sector's contribution to Rwanda's GDP. Interviewees provided their perspectives on how the industry impacts economic growth and sustainability in the country. Security concerns

also emerged as a crucial topic. Discussions centered on the security risks associated with air transport, including cybersecurity threats. Participants offered suggestions for government measures to enhance both physical and cybersecurity to safeguard the aviation sector. Lastly, the research addressed employment creation within the aviation sector. Interviewees discussed the potential for job opportunities and the importance of skills, training, education, and development programs in preparing a skilled workforce. This exploration underscored the sector's role in providing employment and driving socio-economic development in Rwanda (Rwanda Development Board, 2023).

Ethical Considerations: To ensure compliance with ethical research norms, several key measures were implemented throughout the study. Protecting participant privacy was a priority; only initials were used, and no biodata, photographs, or other personal identifiers were collected. Drafts of the research paper were shared with participants as agreed in the consent form to obtain their assurance and ensure accuracy. The research questions were crafted to be fair and non-leading, allowing participants to express their views freely and without bias. This ethical approach safeguarded the integrity of the research process and ensured that the insights on employment creation, skills development, and the aviation sector's role in Rwanda's socio-economic growth were gathered responsibly and ethically (Flick, 2023).

The purpose and benefit of examining variables under investigation, is to see how the research exploits the various challenges and opportunities in Rwanda's aviation sector. The focus on government policies shows both the support available and the regulatory hurdles local operators face. Infrastructure investment, particularly through RDB, highlights its role in developing airports and other facilities. The study also touches on regional competition, the aviation sector's contribution to Rwanda's GDP, security issues, and job creation, giving a well-rounded view of the sector's future. This analysis lays the groundwork for practical recommendations to boost the sector's growth and resilience (Creswell & Poth, 2023).

Chapter 4 Findings: Emerging Themes and Patterns in the Relationship between and Socio-Economic Development in Rwanda

4.0 Aviation and Socio-economic Development in Rwanda: Key Emerging Themes

Following the data collection process, which included interviews on market access, services, trade, business travel, exports, tourism, essential services, and streamlined procedures, the analysis revealed several key themes. These themes provide valuable insights into the aviation sector's role in Rwanda's socio-economic development, while highlighting underlying factors, challenges, and opportunities. Systematic analysis of these themes offers a deeper understanding of the sector and can inform future research and practical solutions.

The primary themes identified include: Governance, covering policies, regulations, and implementation status, crucial for maintaining a stable aviation environment; Development and Capacity Building, which focuses on the training, education, and skill development needed for workforce readiness; Livelihood, emphasizing job creation and poverty alleviation through aviation; Health Access, which highlights the role of air transport in enhancing access to essential health services; Productivity, examining the sector's impact on GDP and infrastructure development; and Successful Initiatives, showcasing effective strategies and best practices within Rwanda's aviation sector. Together, these themes offer a comprehensive perspective on how aviation contributes to Rwanda’s socio-economic advancement.

4.1 RQ1: How does Aviation Impact Rwanda's Socio-Economic Landscape, Focusing on Key Indicators Such as Trade Volume and Tourism Revenue?

Assessing the socioeconomic impact of aviation: A Quantitative perspective

To quantitatively assess the socio-economic impact of aviation on Rwanda, focusing on key indicators such as trade volume and tourism revenue, and building upon the insights gained from the qualitative interviews, the research now looks at the quantitative data. This shift allows for the probing of the themes, comments and beliefs expressed from the interviews.

These insights underscore the proactive measures taken by Rwanda to leverage trade opportunities and drive economic growth through the aviation sector, as evidenced by the data presented in several graphs: External Trade (Imports, Exports, and Re-Exports),

External Trade Shares by Type, External Trade by Air in Metric Tons and External trade by Air in Quantity by tons.

4.1.1 Air Trade Trends

External Trade (Imports, Exports and Re-Exports) 2014 -2023 [10 Years]

In examining Rwanda's aviation sector through interviews with key stakeholders, it becomes evident that external trade is pivotal in determining the industry's growth path. For instance, interviewee BZ highlighted Rwanda's signing of 106 Bilateral Air Service Agreements, indicating a concerted effort to expand air connectivity and promote international trade. Additionally, interviewee IB emphasized the importance of policies that facilitate the aviation sector, including 26 Bilateral agreements with various countries, demonstrating Rwanda's commitment to fostering global partnerships. Moreover, interviewee NK pointed out the significance of partnerships with countries like Qatar, noting that collaboration has facilitated the innovation of aircraft and airports, thereby enhancing Rwanda's capacity for international trade. These insights underscore the proactive measures taken by Rwanda to leverage trade opportunities and drive economic growth through the aviation sector.

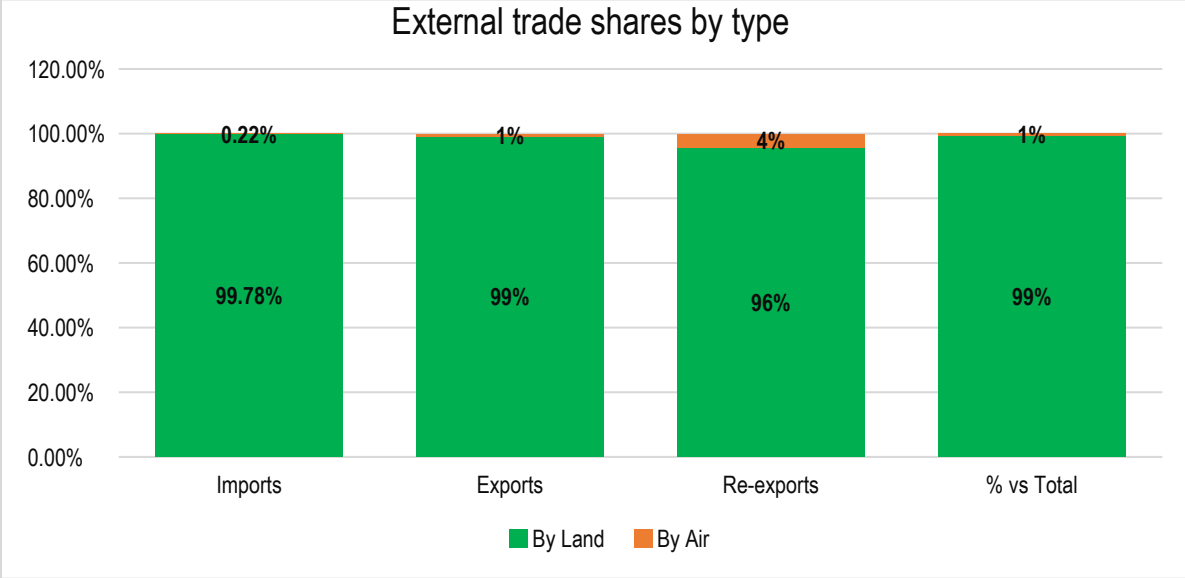
Table 7 Summary in metric tons

Category	By Land	By Air	Total
Imports	32,361,806	69,796	32,431,602
% vs Total	**99.78%**	**0.22%**	**100%**
Exports	4,049,196	37,241	4,086,437
% vs Total	99%	1%	100%
Re-exports	3,517,862	156,948	3,674,810
% vs Total	**96%**	**4%**	**100%**
Grand Total	39,928,864,348	263,984,651	40,192,848,999
% vs Total	**99%**	**1%**	**100%**

Source: Data adapted from data from RAC and RwandAir conducted for research on Rwanda's aviation sector (2024).

Air cargo plays a crucial role within global goods distribution networks. Irrespective of the mode of transportation—whether by road, rail, maritime, or air—shippers universally prioritize timely, damage-free delivery at a reasonable cost (Boeing, 2022). While ground transport (by land) typically dominates domestic and intra-regional markets, express and distribution networks, along with supply chain planners, often integrate air transport into their operations.

Despite accounting for less than 1% of the world's trade tonnage, air cargo represents approximately 35% of the total value of globally shipped goods (Boeing, 2022). In the case of Rwanda, being landlocked necessitates reliance on either road or air transportation for trade. Over the past decade, land transport has constituted 99% of Rwanda's total trade, with air transport contributing a mere 1% (NISR, 2023). This dominance can be attributed to Rwanda's geographic constraints, as the lack of direct sea access renders land transport the preferred option for bulk goods or those where cost considerations are paramount.



Source: Data adapted from data from NISR conducted for research on Rwanda's aviation sector (2024).

Figure 4 External trade by shares

In Rwanda, air cargo accounts for a mere 0.22% of total imports, combining both land and air transport. Similarly, air transport contributes only 1% to the country's total exports, while comprising 4% of total re-exports. This lower contribution of air cargo to overall external trade is primarily attributed to the prevalence of perishable commodities, such as foods, beverages, and flowers, in Rwanda's air trade. Despite its modest share (1% of total

trade), air cargo plays a vital role, particularly in transporting high-value goods like Rwandan coffee and time-sensitive items such as essential medical supplies and electronics (NISR, 2024).

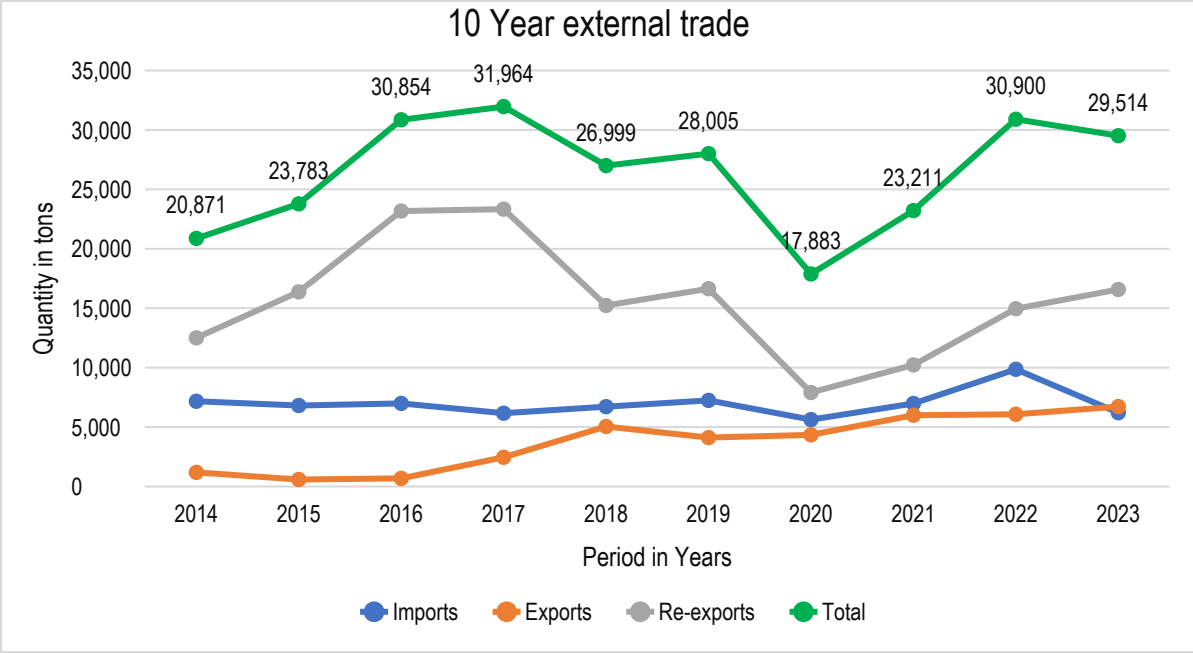
Table 8 External Trade by Air in Metric Tons 2014 -2023 [10 Years]

Category	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Imports	7,172	6,816	6,991	6,168	6,718	7,246	5,629	6,985	9,861	6,210
Exports	1,190	589	687	2,460	5,050	4,119	4,345	5,997	6,078	6,725
Re-exports	12,509	16,378	23,176	23,336	15,231	16,640	7,909	10,229	14,961	16,578
Total	**20,871**	**23,783**	**30,854**	**31,964**	**26,999**	**28,005**	**17,883**	**23,211**	**30,900**	**29,514**

Source: Data adapted from data from NISR conducted for research on Rwanda's aviation sector (2024).

Over the past decade, air freight transportation has consistently demonstrated positive growth. However, in 2018, a significant decrease in re-exports was observed, particularly concerning petroleum oils and oils from bituminous minerals. This decline was linked to the upsurge in crude oil prices (EIA, 2019).

During the period spanning 2019 to 2020, the ramifications of the COVID-19 pandemic on trade demand were substantial. This encompassed a decline in consumption resulting from movement restrictions and diminished income prospects, alongside decreased investment prompted by uncertainty surrounding future profitability. Moreover, disrupted supply chains and border closures led to a reduction in net exports. Concurrently, there was a notable increase in government expenditure due to the implementation of expansionary fiscal policies and heightened health and social spending, all in response to the pandemic's impact on the supply side. These disruptions, inclusive of shutdowns and supply chain interruptions, reverberated across all economic sectors (Bizoza & Sibomana, 2020).



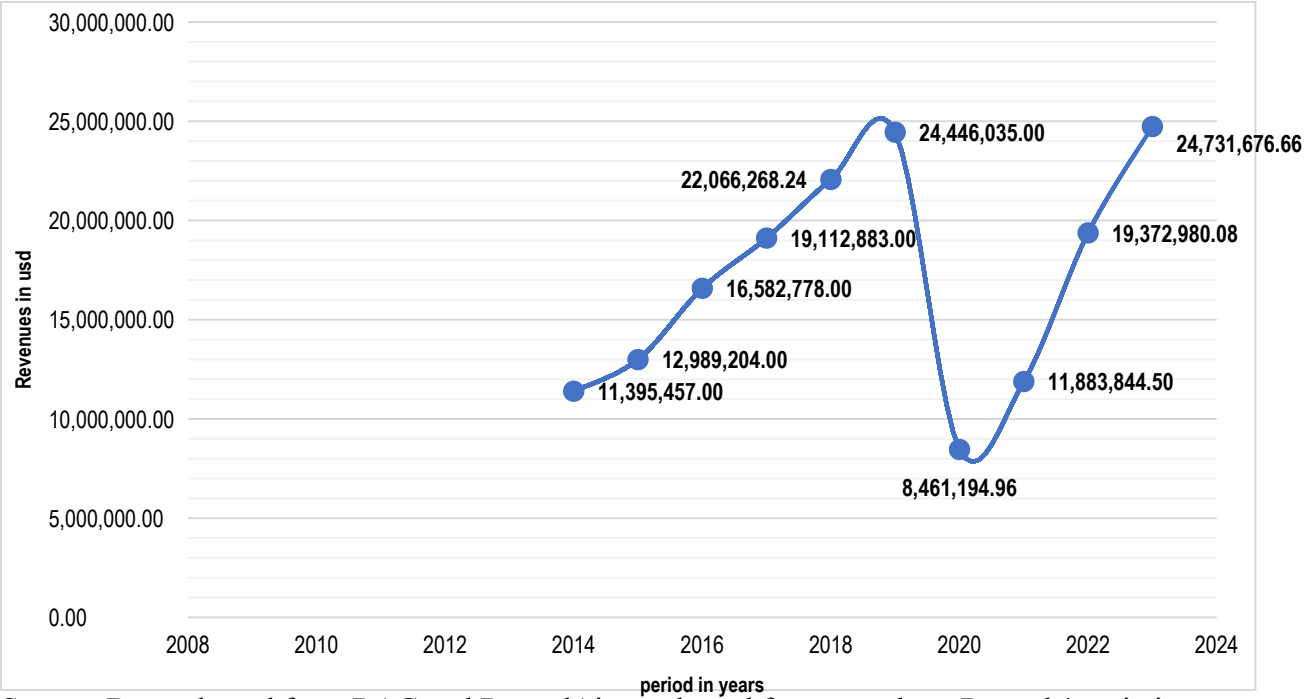
Source: Data adapted from RAC and RwandAir conducted for research on Rwanda's aviation sector (2024).

Figure 5 External trade by Air in Quantity in tons 2014-2023 [10 years]

Rwanda's external trade tonnage has exhibited a generally positive trend over the past decade. As illustrated in the aforementioned graph, a steady increase was observed between 2014 and 2017, with tonnage rising from 20,871 tons in 2014 to 31,964 tons in 2017, representing a significant 53% growth over four years. However, a subsequent decline was noted from 2018 to the COVID-19 period of 2019-2020. Since the pandemic, the industry has begun a gradual recovery and is regaining momentum. Overall, the ten-year period reflects positive growth, with tonnage increasing from 20,871 tons in 2014 to 29,514 tons in 2023. It is important to note a decrease in cargo transportation in 2023 compared to 2022. This decline can be attributed to current, significantly elevated air freight prices. This price surge stems from a confluence of factors largely associated with the COVID-19 pandemic's residual effects, including global sea and air cargo capacity limitations, rising fuel costs, supply chain disruptions caused by COVID-19 restrictions in China and other countries, and the war in Ukraine, which has forced airlines to adopt longer flight paths to avoid Russian and Ukrainian airspace (Rwanda Development Board, 2023).

4.1.2 Tourism and Aviation Revenue

Co-chairing initiatives with other airlines and establishing strategic partnerships, such as the one with Qatar Airways, have significantly expanded RwandAir's reach and attracted investment. The first tourist experience begins at aircraft touchdown and airport facilitation. Thus, the push for reliable and systematic airport infrastructure, including technology and innovation is a critical part of the Rwanda's aviation strategy, as evidenced by the pursuit of certification for infrastructure and a concerted focus on green practices. Investment in infrastructure development, exemplified by the construction of the Bugesera Smart City airport, reflects Rwanda's ambition to expand capacity and consolidate its position as a regional aviation hub. By prioritizing tourism and MICE (Meetings, Incentives, Conferences, and Exhibitions), Rwanda has unlocked new avenues for economic growth and global visibility. Hosting prestigious events and promoting tourism not only stimulates economic activity but also fosters cultural exchange and international cooperation (Republic of Rwanda, 2020). Rwanda's Vision 2050 underscores the government's steadfast commitment to the aviation sector as a flagship for economic development. This commitment is evident through prioritizing safety via stringent standards and building a strong safety record, which has garnered international trust and recognition. In conclusion, the insights provided by the interviewees underscore the strategic initiatives and holistic approach underpinning Rwanda's aviation sector success. This diversification and commitment are expected to sustain the industry's trajectory of growth and development in Rwanda.



Source: Data adapted from RAC and RwandAir conducted for research on Rwanda's aviation sector (2024).

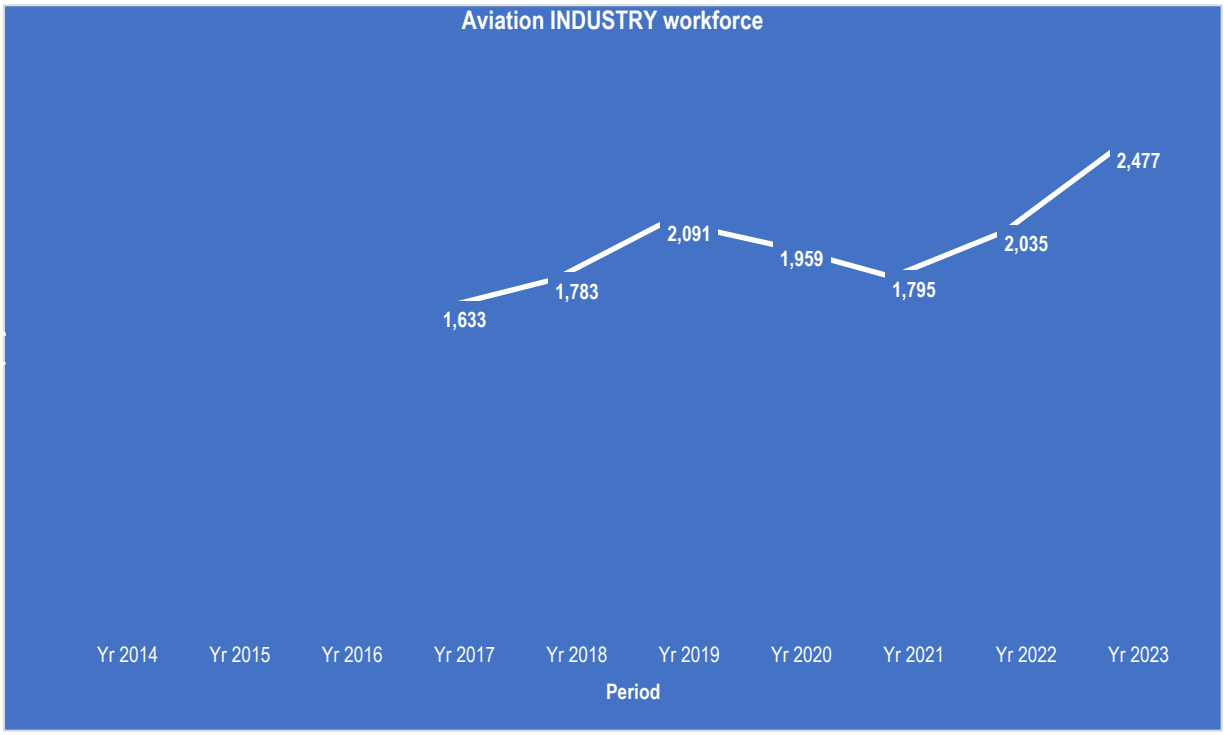
Figure 6 Rwanda Airport Company (RAC) 2014-2023 [10 Years] USD

Rwanda's aviation industry, exemplified by RwandAir, experienced a period of remarkable growth in the years leading up to the COVID-19 pandemic. Revenue for both RwandAir and other passenger airlines enjoyed consistent year-on-year increases, with the aviation industry even doubling its revenue between 2014 and 2019. This upsurge was primarily fueled by a significant rise in air traffic, involving both passengers and aircraft movements. However, the arrival of COVID-19 in 2020 drastically altered the landscape. Stringent global travel restrictions, including border closures and mandatory quarantines, as reported by the International Air Transport Association (IATA) in 2020, significantly dampened demand for air travel worldwide. Lockdowns and movement limitations implemented within Rwanda, as documented by the National Institute of Statistics of Rwanda (NISR) in 2021, further restricted domestic and international travel opportunities. This confluence of factors resulted in a precipitous decline in passenger movements, consequently impacting revenue streams. Despite this setback, the air travel industry exhibited remarkable resilience. With the implementation of global measures to control the pandemic and the subsequent rollout of vaccination programs, a recovery process began. By the end of 2023, air transport revenue had not only bounced back but also surpassed pre-pandemic levels, exceeding its 2019 baseline by an impressive 1%. This signifies a full recovery and positions RwandAir for continued growth in the years to come (NISR, 2024).

4.1.3 Employment, Job Creation and Human Resources

Rwanda's aviation sector has been instrumental in job creation, both directly and indirectly. Through initiatives such as the establishment of aviation schools and the expansion of airport infrastructure, the sector has significantly contributed to employment opportunities. According to TR, the aviation sector has acted as a catalyst for employment, particularly in sectors like agriculture, where increased air connectivity has boosted trade and consequently enhanced job prospects for farmers. Additionally, NK highlighted how the construction of airports and related infrastructure has generated employment opportunities for both skilled and unskilled workers. Investment in human resources development has been a cornerstone of Rwanda's aviation strategy. Interviewees emphasized the value of education, training, and skills development in propelling the sector forward. Training organizations, established or supported by the government, have played a fundamental role in building local capacity by providing training for pilots and other aviation professionals. Furthermore, partnerships with international entities have facilitated managerial training and skill enhancement, as noted by TR.

Despite these advancements, challenges persist, particularly in addressing the human resource gap created by historical events like the "Genocide against the Tutsi*"* in which *"The skilled personnel died. The former regime, after losing power, they ran away*" stated by ET. This is further reiterated by RG, who highlighted the loss of skilled personnel and the flight of resources during past regime changes as significant challenges that continue to affect the sector's growth. Additionally, reliance on external expertise poses limitations, as noted by AN and IB, highlighting the need for concerted efforts to develop indigenous talent and expertise. Policy interventions aimed at promoting employment and human resources development have been evident. Agreements such as bilateral air service agreements and tax incentives have attracted foreign investment and promoted skill development, contributing to job creation and capacity building. Moreover, initiatives like the Visa-on-Arrival policy have enhanced tourism and facilitated travel, indirectly supporting employment across various sectors, as emphasized by BZ and ET.



Source: Data adapted RAC and RCAA conducted for research on Rwanda's aviation sector (2024).

Figure 7 Rwanda air transport industry workforce 2014-2023 [10 Years]

Rwanda's aviation industry has witnessed a sustained rise in employment opportunities, mirroring the overall expansion of the sector. Data from 2017 to 2023 (with some missing points yet to be reported) reveals an increase in the workforce, rising from 1,633 employees in 2017 to 2,477 in 2023. This translates to 52% growth, or an addition of 594 jobs, in seven years.

This positive trend can be attributed to several factors. The first being the expansion of the national carrier, RwandAir. Another attribute is the support for development and sustainability in aviation infrastructure in existing and future airports and air traffic control systems creating fresh employment opportunities. The GoR active promotion of the aviation sector further stimulates job creation. Investment in training and skill development programs also plays a crucial role by ensuring a readily available workforce with the qualifications necessary for aviation careers, and sustainability. Finally, a thriving national economy and a flourishing tourism industry both contribute to a rise in demand for air travel services, which in turn necessitates the employment of more personnel (Rwanda Development Board, 2023).

4.1.4 Capacity Building

Regarding capacity building and training, interviewees highlighted the government's investment in education and skill development. ER, TR, and CN mentioned initiatives like the aviation academy and cadet programs, while NK emphasized the importance of specialized training for various roles in aviation. Employment generation was recognized as a significant benefit of the aviation sector, with TR, ET, AN, and EN highlighting its role in creating jobs directly and indirectly. Poverty reduction was also attributed to aviation, as noted by TR, AN, and EN. The interviewees referenced Akagera Aviation and the Center of Excellence for Aviation Skills Development as significant initiatives contributing to Rwanda's aviation sector development. The Center of Excellence for Aviation for skills development was specifically mentioned by EN as a crucial initiative for skills development in the aviation sector. This center serves as a training hub for aviation-related skills, providing specialized education and training programs to meet the sector's workforce needs. The center represents Rwanda's commitment to investing in human capital and fostering expertise within the aviation industry. These initiatives demonstrate Rwanda's proactive approach to enhancing its aviation infrastructure, workforce capabilities, and overall sectoral development.

4.2 RQ2: What are the Factors that Support and Impede the Development of Rwanda's Aviation Sector?

Rwanda's aviation sector has seen significant growth, positioning itself as a critical player in Africa's aviation industry. However, multiple factors contribute to both the advancement and the challenges faced by this sector. This section of the research examines RQ2 incorporating insights from the interviews to deliver a thorough analysis.

4.2.1 A Thematic Analysis of Interviews

All the interviewees have, to some extent, been involved with the air transport industry for over five years. Although they may not have been directly involved as part of the airport operations, they as stakeholders have the responsibility either as the decision makers or facilitators of the Rwandan aviation industry. All interviewees responded with enthusiasm on the topic and were in support of the impact air transport has for Rwanda.

> *BZ: "really enjoyed working in the aviation industry and I've seen how the aviation industry has transformed lives during my time"*

ET: "I like the field. I believe beyond training, it's a calling. I mean, I'm passionate. I have a passion for the field."

4.2.2 Governance (policies, regulations, policy status)

In this theme interviewees agreed that the government decision to prioritize aligning itself with international standards and guidelines, such as ICAO, IATA Operational Safety Audit (IOSA), IATA Safety Audit for Ground Operations (ISAGO), and Regulated Agents (RA3) certification to meet EU requirements would guarantee safety and security protocols. This guarantees high standards, safeguarding passengers, cargo, and infrastructure, creating a secure environment for all.

ET: "I believe one, the major one is the political will. The government is supportive in the development of the aviation sector in Rwanda. Injecting resources in terms of the budget, the support, the training, and they create the environment for aviation to grow. Two, they have invested in the international career around there, which improves our services. So investing in Rwanda also has helped us to grow the sector very fast. So I think that is generally the major one. Others, as usual, usual things, the spring of the nationals, Rwandans generally are disciplined, but that one is also associated with the government's will, the government policies, the government way of doing things. So people are disciplined, the government completely fights and discourages theft, corruption and others. So generally everything is much related to the government."

BZ: "aviation in Rwanda is considered at the national level which basically supports the development of the aviation sector in Rwanda."

TR: "First of all, our policies and regulations are according to the international recognized standards, especially ICAO, which has favored a lot, not only Rwanda"

AN: "The other point also is the good leadership of [President] Kagame. So, the political will and the good leadership of our president"

ER: "International recognition by international aviation bodies-IATA, ICAO etc."

EN: "You get access to funding and you also get access to technical expertise by being internationally recognized"

AN: "build constructive [and] very, very good quality airports that meet the criteria that is worldwide accepted, up to the standards that are worldwide"

Recognizing the importance of fostering global partnerships and supportive policies through foreign investment, Rwanda has taken a proactive approach by pursuing bilateral agreements and implementing supportive tax policies. The stable tax environment of Rwanda, with predictable policies that underpin business growth, are further bolstered by temporary incentives that target specific sectors and enhance their competitiveness.

BZ: "This is evident as Rwanda civil aviation has signed 106 Bi-latera Air Service Agreements"
IB: "policies that are able to facilitate the aviation sector in general, we do have also 26 Bi-lateral agreements with countries through MINICOFIN"

IB: "So, in our current taxi system, we designed a system allowing to exempt the VAT on spare parts of aircraft"

NK: "innovation of the aircrafts and the airports, and we're fortunate enough to have partnered with Qatar to build our new airport"

Interviewees highlighted the government's visa-on-arrival policy as a major boost to the tourism sector. This, combined with enhanced air connectivity and streamlined visa processes, positions Rwanda as a highly attractive destination for travelers.

AN: "Visa waiving has also been one of the key things that have allowed aviation to allow more people to come in and they can do whatever they want. And at the same time, people can make transit without any problem"

NK: "I think the first 30 days were visa-free."

BZ: "Rwanda is one of the countries that is well known for getting visas on arrival!"

ET: "For example, coming to Rwanda today, you don't need a visa. So, you just come, and we receive you at the airport, we give you a visa on arrival. So that one, I think, also helps the tourists and other travelers to come to Rwanda"

Interviewee RG, an airline Captain and a medical doctor has a unique perspective when it comes to health access for the general public and its relation to the limited regulatory and policy design.

> *RG: "a lot of our government officials are looking [at] it from a paper point of view, but they don't really know what parts are played with air transport or how our health and accessibility will come in.*
>
> *RG: "So the whole logistic aspect of it [government policies] is complicated; quite a lot of logistic issues because we are transporting sick person to go and receive advanced care"*
>
> *RG: "years behind the world. So, yeah, I think the level of regulatory issues that we have at the moment, for just general aviation and commercial aviation is irate".*

4.2.3 Development (training, education, skills)

According to the interviewees, the aviation sector, including its stakeholders, has experienced notable advancement, due to deliberate efforts in blending education, training, and skills. Regarding education and capacity building, there has been a great push for the notion of investing in the future.

> *CK: "the aviation industry contributes because it provides education from different areas, not just in the technical field, but also in the administrative field for persons in the pilot program"*
>
> *TR: "to allow students to come and have that practical part of what they have learnt and put into aviation" and "Aviation has contributed a lot because when we [RwandAir] started horticulture it means huge employment especially from the farm"*
>
> *RG: "we need more exposure. That is education. That is the education that we need. We really need to have that".*
>
> *ER: "The creation of the aviation academy. Sponsorship and scholarship for pilots and engineers, controllers, and other aviation related trades"*

Enhanced access and diverse programs cater to various backgrounds, offering specialized training for aviation careers (including pilots, cabin crew, and maintenance engineers) and national roles (such as military, air traffic control).

CN: "with the cadet program now you have training. When you have training, you have to do training both theoretically and you have to do training both theoretically and practically"

TR: "when we are talking about the ground staff, flight operations, airport operations. So, all those, because being a regulated industry, it requires us to undergo a lot of training" RG: "You crew training is very demanding"

NK: "now we have specialized vets we have to employ. And those vets that come in that are foreigners now are training the vets in Rwanda . And we never had a big vet population per se, just for the husbandry. Now it's extended into wildlife."

AN: "I know Rwanda has grown its pilot pilots the aviation pilots so training them inside the country"

TR: "partnership with Qatar Airways also opened the door, mainly on the management level training, which is where we are able to acquire a lot of managerial skills"

ET:" If I train customer care, the travelers will be well facilitated and they will be attracted to come back."

The importance of well-developed skills is the final ingredient in the blended concept suggested by the interviewees.

NK: "the skills side, that I think that should come in. This is one of my main recommendations"
AN: "then we need to make sure that at least we make sure that we have people graduating, having the skills around aviation, aerospace engineering, and all this."

ET: "to extend your skills to the nationals, yes and as soon as we have the skills, a lot will be done."

EN: "Creation of Center of excellence for aviation skills development"

4.2.4 Livelihood (employment, poverty)

The Rwanda air transport industry created a significant number of jobs, both directly (pilots, ground staff) and indirectly (construction, tourism).

> *TR: Aviation has been a catalyst for farmers of horticulture and floriculture, it's increased the employment rate of the farmers. The farmers are no longer just doing sustenance farming. Yes. Now they get into commercial farming."*

> *ET: "I think it is understandable, it is clear that the more we get airplanes, the more we get passengers, the more we get employment because of the staff who facilitate the passengers."*

> *AN: "People can now drive the buses; they can now build and do construction to get you there. Yes, that's already bringing in employment. You're bringing employment in the sense that all people are working and that they are getting something".*

> *NK: "So you need people to build the airport, you need to do the groundwork. So informal work is getting jobs, but you also need managers and construction engineers. And so in terms of just how the aviation sector has helped employment, I cannot put a number in it, but by just giving you those examples you can imagine"*

> *EN: "The plan to have thousands of jobs that are directly linked to the new Bugesera airport, to aviation. Almost 2,500 employees for ATL right now,"*

Interviewees and by extension, stakeholders in Rwanda's aviation sector highlighted the connection between Rwanda's air transport industry and its impact on poverty reduction. Their insights reveal how this sector acts as a catalyst for poverty reduction.

> *TR: "of fighting poverty, aviation was included in this report, Rwanda's Economic Development and Poverty Reduction Strategy II (EDPRS2) section 6.37, that it has to be emphasized on so that they can be able to reduce poverty. The priority sectors/areas for CB under EDPRS2 mention transport-aviation as part of State policy".*

> *AN: "with the air transport, also reducing poverty in terms of taking on most of these things, even our gold, even our minerals, very quickly onto the outside market. I think that's how we can reduce poverty".*

EN: If the country has more money people are less poor if the government is investing in people.

ET: "You've reduced poverty because now they have health accessibility, they can take that income that would have been used for going to the doctor to pay for something else".

NK: "In the new Bugesera airport area, the appreciated cost of land facilitates expansion transforming individuals who were previously surviving into businessmen within the span of the last 10 years."

In conflict with these supporting factors are certain factors that hamper the faster reduction of poverty and increased employment related to air transport opportunities.

EN: "that, with COVID-19 and the wars and all of that, cost of living has gone way up

ER: "So even the little that people [who] had extra left, now it's not even there"

ET: "the skilled personnel died, and the former regime, after losing power, they ran away from the country with all the resources, including the dollars in the National Bank"

CN: "the challenge of employment has to do with single source aviation".

The interviewees acknowledge that we do have an obvious dependency on external expertise. This dependency in part of the human resource gap created by the Genocide against the Tutsi.

EN: "it's a country where, because of our history, a lot of people left the country."

ET: "What I can tell you, Rwanda was completely down in 1994. The skilled personnel died. The former regime, after losing power, ran away from the country with all the resources, including the dollars in the National Bank".

Relying on foreign skilled labor and technology can lead to emigration of skilled people. This not only limits the transfer of knowledge and expertise to local populations but also creates a dependence on external resources, potentially hindering long-term sustainable development.

ER: "So you're outsourcing everything. Plus you're bringing experts in."

AN: "We still need that a lot and we rely with external experts also hired to make sure that they also complement the existing gap "

IB: "We bring experts in because we don't have them; one of the big challenge is that everything for aviation is just outside the continent."

RG: "People are going outside because you are sick, you are not capable."

ET: "Import with skills, yes. The more you import, the more you take outside the foreign currency, the more the country fails".

It was a general consensus of the interviewees that the impediments do not outweigh the benefits created by the aviation industry when it comes to employment, job creation and reduction in poverty. The GoR and the aviation industry are working together to take a comprehensive approach to aviation development in the country taking into account the above-mentioned impediments. Such measures are essential for fostering inclusive growth and advancing poverty reduction goals in Rwanda's aviation sector. Interviewees highlighted that the growth of the aviation industry can lead to a reduction in poverty levels by creating jobs, boosting tourism, and facilitating trade. These developments can stimulate economic growth, improve infrastructure, and provide new opportunities for local businesses and workers (Hine, Sasidharan, Eskandar, Burrow, & Usman, 2019).

However, it would be remiss not to address how the impacts of aviation can cause a reduction in poverty and may generate an increase in poverty. The expansion of the aviation sector can generate an increase in poverty if the advances are not shared well. Such issues as the displacement of communities for airport construction, rising living costs in areas near airports, and the potential neglect of other sectors, which may adversely affect vulnerable populations. Additionally, if the jobs created are not accessible to the poor or do not provide livable wages, the aviation boom could exacerbate existing inequalities (Hine, Sasidharan, Eskandar, Burrow, & Usman, 2019).

4.2.5 Health access

The interview highlights several ways in which Rwanda's aviation industry supports and improves healthcare access. Several critical points were emphasized. These areas include the transport of vaccines, delivery of medical supplies, and medical tourism.

RG: "We know from COVID, we've seen how critical it was for air transport to get in and out of medicines"

RG: "We have phenomenal exercise and practice for Ebola."

TR: They are building their own, they are saying BioNTech, a vaccine manufacturing facility to be the first vaccine manufacturer to build a facility in Rwanda, now it's going to be direct flight into this African market.

TR: Fast access, better access. Aviation has contributed a lot, including during this COVID-19, where we had a lockdown, entire lockdown, the whole world. So, we contributed a lot by also utilizing our aircraft by loading in the cabin. We used [the aircraft] to bring all the social equipment for the COVID-19 during the vaccination process so that we can meet all the deadlines for immunization. So, people are vaccinated on time and the aircraft are contributing a lot to the vaccines because most of them need to be temperature controlled.

The delivery of medical supplies through drone technology is commendable for Rwanda and serves as a reminder of how Rwanda's topography creates the need for innovation for its citizenry.

NK: "Drone technology has "been able to create how we can get the accessibility of emergency medicine and medicine itself to the rural areas, places" NK (2023 November 30).

NK: "Drone technology has helped in accessibility. It's also helped in skills. We've got people who've developed in skills. It has helped in employment because drone technology has, within not just the creation of the drone, now we have to create an airspace system. So now you've got airspace people involved in there and they have to be specialized".

NK: So that drone thing has done so much for Rwanda. And I guess that's one of the reasons we have become the premier persons when it comes to talking about drones. because it was necessary, and we needed to do it.

A large portion of health care access information was obtained in the interview with RG, noting his background and activity with aviation and aerospace medicine.

RG: "it is essential that this channel of exchange of the patient to the facility exists, because many of the people otherwise would reach or would explore and exhaust all of the healthcare here. And without this exchange of

transportation to advance health care institutions, basically life would be compromised or terminated".

RG: equipment goods and material stuff you need will have to come by air and then definitely exchange of the intellect or exchange of the know-how will be also reduced by the just the fact that you can only come in and out by air, especially in Africa. Now in Rwanda, many other landlocked countries, that's a lot of the materials, when you're talking diagnostic materials, samples; a lot of the findings will have to be exchanged with more developed centers with more advanced diagnostics.

RG: if you're going to do any immunological testing, you're going to do any hormonal testing, anything that requires a bit more sophisticated equipment, we will have to exchange the samples with advanced labs out of the country. That's your first linkage already with air transport and landlocked countries where you basically need to export your samples on a daily basis.

Aviation facilitates medical tourism, allowing patients to travel to institutions with specialized medical expertise that may not be available locally. Medical tourism includes doctors coming into Rwanda to offer specialized treatment to citizens. Additionally, in cases where advanced medical care is needed, aviation plays a critical role in evacuating patients, ensuring they receive the required treatment.

RG: "a lot of the patients will be referred to institutions with high care, with bigger expertise. And again, and not just for Rwanda, but for the whole East and West Africa, very specific destination for medical care is India, which most of it [flights] goes through Rwanda, through Kigali being centrally positioned, so we're going to have all of West Africa gravitating towards India, including this area here of Central and East Africa. So what happens, we have to basically transport and transfer patients, [through air transport] to the areas of the higher medical care, in this instance India is traditional, and then over there they're going to receive the care, they're going to receive treatments, and they're going to be returned back to their home country."

AN: "I think the health sector has been benefiting from such critical areas even flying in the largest doctors that can come and work but at the same

time also patients who can travel quickly like people flying them to Nairobi very quickly or to any other country for medical care"

While the analysis acknowledges the positive impact of aviation on healthcare access, it also delves into a critical examination of the challenges that impede the full potential of this vital service. It is equally crucial to acknowledge and address these impediments. There is a lack of standard operating procedures for medical crises and emergency responses at Rwanda airports exacerbates these challenges.

RG: "Why can't we have a standard operating procedure for medical crisis?"

RG: "We have brought the sick people, emergency response was really very, very rudimentary, extremely slow and I think inefficient. So that's where we need to start. If we could have this firstly sorted here, we would be ten steps ahead.
"There is limited education in mental health in Aerospace Medicine. This poses a barrier to improving health access."

RG: Because the majority of pilots are expats, they live under difficult circumstances, we don't acknowledge this.

RG: And now, also lately, quite strongly working on development of the mental health in aerospace medicine, which we don't, it's also something we are behind in. According to RG, there is a lack of properly equipped laboratories for testing of medical related samples."

RG, "We daily export, I would say, most probably substantial amount of blood samples, tissue samples, for the test that I perform in neighboring Kenya, and [as far as] South Africa, and all the way up to Belgium and Europe"

There is a need for advanced medical evacuation and facilities, and the prohibitive costs of Medevac-Medical evacuation services (Air Ambulance Services) hinder health access.

*RG: "*The *reality of Medevac in the evacuation of medically challenged persons in an acute medical emergency is a challenge, not just here but everywhere." "It is a very complex and expensive thing to run. Medevac really is something that you cannot*

easily count on in developing nations without support of industry, not aviation industry, but general industry and economy"

4.2.6 Productivity (GDP, Infrastructure, Fuel)

This topic of the interview analysis dives into the interviewees' insights that explore the productivity aspects of air transport to achieve economic benefits like government stability, increased trade infrastructure, and the effects of aviation fuel prices.

TR: ", It's because of the political stability now. The government has managed to stabilize the security. This made us more favorable to trade".

Increased air travel and cargo transportation lead to a rise in Gross Domestic Product (GDP) as tourism flourishes, businesses expand their reach, and international trade thrives.

BZ: "Demand for aviation becomes also very high so that's another thing that is also contributed those are the economic activities in the country"

AN: "If we want to increase the GDP, then we've got to consider all of that in air transport. It's also cargo."

For Rwanda, investing in aviation infrastructure such as warehouse refrigeration facilities is crucial for overall growth.

ER: "It will create jobs it will create infrastructure we will upscale so all that for me it's a contribution"

EN: "Improved infrastructure and status of the airport area (Smart airport city concept)"

AN: "Infrastructure available, the capacity of the airport to accommodate them"

RT: The major one is to have the proper warehousing facility. If you want to improve within the warehouse, then service delivery can also increase."

The discussion on the airport city envisions a bustling hub with businesses like hotels, restaurants, and shops surrounding the airport, creating a vibrant commercial ecosystem and generating additional employment opportunities.

ET: "The more the aviation sector grows, the more the neighbors of the airport grow. They put up shops, shops around the airport will work,

restaurants will work, of course hotels and lodges and guest houses will also work"

EN: "We want to say the airport should feed into the city, the city should feed into the airport, and have a whole ecosystem. So that the money, one, is distributed, but you're also using all those synergies".

Some interviewees collectively agreed that balancing economic benefits with environmental responsibility is a key challenge for the Rwanda aviation industry. Sustainable aviation fuel (SAF) derived from renewable sources offers a promising alternative to traditional jet fuel, helping to reduce greenhouse gas emissions.

AN: "Environmental sustainability, then we need to make sure that we reduce our carbon emissions in the air so that at least we keep and also reduce the amount of fossil fuels we use"

ER:" We're looking at sustainable aviation fuel, if it's going to be possible"

IB: "So can I say, the government is keen on ensuring support regarding fuel prices. Yes. It was something that the government said, look, we really have to figure out a way how we're going to manage this situation."

IB: "Normally we are trying to have a smooth increase in the fuel prices because the way you see that it is increasing here in Rwanda is less than how it should be increasing when we didn't lay off that. We are providing a lot of subsidies on fuel"

NK: It's very important for us to have, you know, stability within our neighboring countries. Because with unstable neighboring countries, it could factor as a negative too, that impacts the aviation industry.

ER: If you can have geopolitical issues, for example, that makes it so you can't fly over a certain country and fly faster. Then it takes longer, that's more money. It is harder for one to fly into another. So that limits our growth as a sector, because now we have neighbors for example that might not be willing to work with us.

EN: Because of that country's Protectionism we cannot fly into that country.

NK: "When you mentioned the fuel prices and an external factor like the war in Ukraine, which we cannot control. We can't control those things and so they end up with a negative impact for us". "I think also security-wise, so if your neighbor, there's no stability, they're on the verge of war and that kind of thing. that sort of detracts people coming into your country because of the fear that there is maybe an impending war."

RT: "The higher the fuel prices, the higher the rates. So this also affects the supply of business because being outcompeted with other airlines"

Factors that impede Productivity (GDP, Infrastructure, Fuel) include vulnerability to external factors like global fuel price fluctuations, which affect operational costs and competitiveness. Addressing these challenges requires proactive measures to mitigate external vulnerabilities, invest in infrastructure, and streamline operational processes for sustainable growth in Rwanda's aviation industry.

4.2.7 Successful initiatives

In conclusion, the researcher asked questions related to what they saw as successful initiatives and practices that have propelled the sector to new heights. The interviewees were collectively in agreement that Rwanda, a country known for its ambitious vision and unwavering commitment to progress, has witnessed remarkable strides in its aviation sector.

It was a challenge to get a response on the factors that impede air transport in Rwanda when discussing successful initiatives. This is understandable as the interviewees are Rwandans and have strong conviction about the direction of Rwanda.

TR: Successful initiatives with Rwanda's aviation industry. It has contributed because it has allowed us to have the co-chair with other airlines.

IB: "We do have more collaboration with the main actors in the sector where government has in terms of financing, we do also design policies that also reduce the cost of operations"

EN & ER: "The Vision 2050, the Vision 2020, the NST-1, all those government-related policies, in there you find that the aviation sector is one of the top priorities".

BZ:" Advertising or inviting the entire world to come to Rwanda, especially in the MICE program"

AN: The good quality of the customer service. Meaning how do you handle the clientele? How do you attract them? How do you facilitate them? So that has also favored more people to go through the service. Also, cooperation and security are very key. That allows people now to integrate their travel within the region.

ET: "Marketing. Even marketing social media and whatever so we inform the public the world of what is available in our country".

GR: "We're pretty much trying to all get along with other regimes"

CN: The impact in the industry is from the safety policies. Safety records is high.

CN: "With the cadet program now you have training. When you have training, you have to do training both theoretically and you have to do training both theoretically and practically".

TR: "The introduction of cargo aircraft was driven mainly because the demand [for them] became higher than the supply," This has addressed a pressing need while simultaneously boosting employment opportunities for farmers. These two activities "have pushed the industry".

4.3 Factors Supporting the Development of Rwanda's Aviation Sector

Government Initiatives and Policies

Participants in the interviews stated that the Rwandan government played a pivotal role in supporting the aviation sector through various initiatives and policies such as those mentioned in NST1, Vision 2020, and the safety oversight provided by RCAA, that ensures compliance of international standards and practices within the industry and among its stakeholders. Furthermore, the government's commitment to infrastructure development, such as the construction of the Bugesera International Airport, underscores its dedication to fostering aviation growth.

Strategic Partnerships and Investments

International collaboration is a cornerstone of Rwanda's aviation strategy. Co-chairing initiatives with other airlines and establishing strategic partnerships, such as with Qatar Airways, have significantly expanded RwandAir's reach and attracted investment (Qatar Airways, 2023). Moreover, the sector's diversification into the pharmaceutical industry, particularly as a major transporter for vaccine facilities, enhances Rwanda's position within the African pharmaceutical supply chain and stimulates economic development.

Economic Growth and Tourism

Rwanda's aviation sector has benefited from the expansion of the tourism industry and the economy. Rwanda's reputation as a prime destination for gorilla trekking and its efforts in promoting the "Visit Rwanda" campaign have attracted many tourists, boosting air travel demand (Rwanda Development Board, 2023). Furthermore, the introduction of cargo aircraft, driven by increased demand, has created employment opportunities for farmers, thus propelling industry growth.

Technological Advancements and Sustainability

Technological advancements have enhanced the efficiency and safety of Rwanda's aviation sector. The adoption of modern aviation technologies, such as advanced air traffic management systems and digital ticketing platforms, has streamlined operations and improved the passenger experience (IATA, 2023). Sustainability is ingrained as a cornerstone of Rwanda's aviation strategy, as evidenced by the pursuit of LEED Gold certification for infrastructure and a concerted focus on green practices. Achieving carbon accreditation further underscores Rwanda's leadership in environmentally conscious air transport.

Investment in Infrastructure Development

Investment in infrastructure development, exemplified by the construction of the Bugesera Smart City airport, reflects Rwanda's ambition to expand capacity and consolidate its position as a regional aviation hub. Prioritizing tourism and MICE (Meetings, Incentives, Conferences, and Exhibitions) has unlocked new avenues for economic growth and global visibility. Hosting prestigious events and promoting tourism stimulates economic activity and fosters cultural exchange and international cooperation.

Government Support and Training Programs

The Rwandan government has provided substantial financial backing for education and training programs, ensuring a skilled workforce. Tax exemptions and supportive policies further bolster the sector. Rwanda's proactive response to the COVID-19 pandemic, exemplified by utilizing aircraft to transport medical equipment, underscores its commitment to global health efforts.

4.4 Factors Impeding the Development of Rwanda's Aviation Sector

Financial Constraints

Despite significant progress, financial constraints remain a major impediment to the advancement of Rwanda's aviation segment. The high costs associated with maintaining and upgrading aviation infrastructure, coupled with limited funding, pose challenges to sustained growth. Additionally, the financial burden of operating and expanding RwandAir has strained the national budget, limiting the sector's capacity to invest in critical areas (Ministry of Finance and Economic Planning, 2023).

Regional Competition

Rwanda's aviation sector faces stiff competition from regional players such as Kenya Airways and Ethiopian Airlines. These established carriers benefit from extensive route networks and larger operational capacities, making it challenging for RwandAir to compete effectively (African Airlines Association, 2023). The intense competition within the region necessitates continuous innovation and strategic positioning to stay competitive.

Skilled Workforce Shortage

The shortage of skilled aviation professionals poses a significant challenge to the sector's development. The demand for qualified pilots, engineers, and aviation technicians often exceeds the supply, leading to operational inefficiencies and increased reliance on expatriate staff (Rwanda Civil Aviation Authority, 2023). Addressing this shortage through targeted training programs and capacity-building initiatives is crucial for continued growth in Rwanda's aviation sector.

Regulatory and Operational Challenges

Regulatory and operational challenges also impede the improvement of Rwanda's aviation sector. The complex regulatory environment, coupled with bureaucratic hurdles, can delay the implementation of critical projects and initiatives (International Civil Aviation

Organization, 2023). Streamlining regulatory processes and enhancing coordination among relevant stakeholders are essential to overcoming these challenges and facilitating sectoral growth. This is especially relevant when air transport regulations and health accessibility are considered.

Potential Negative Impacts on Other Industries

While the aviation sector generates jobs across various sectors of the country, either directly as in aviation personnel or indirectly hospitality industry, its rapid growth can trigger creative destruction in other industries. As air travel becomes more efficient and preferred, traditional transportation sectors like buses and other public transport may decline, leading to job losses for drivers, attendants, mechanics, and other staff. Local economies reliant on land-based transportation hubs could suffer if air travel becomes the preferred mode for long-distance travel, potentially forcing business closures and job losses in these areas (ACRP, 2024; Akcigit & Van Reenen, 2023). Workers in older industries might find their skills obsolete, leading to unemployment and necessitating retraining for new occupations (OECD, 2022).

The development of Rwanda's aviation sector is influenced by a combination of supportive and hindering factors. Government initiatives, strategic partnerships, economic growth, technological advancements, and sustainability efforts have significantly contributed to the sector's progress. However, financial constraints, regional competition, skilled workforce shortages, and regulatory challenges continue to impede its full potential. Addressing these impediments through targeted policies, investments, and capacity-building efforts is essential for sustaining and enhancing the growth of Rwanda's aviation sector.

4.5

RQ3: What strategy should be adopted to enhance the economic benefits of Rwanda's aviation sector? ?

A Strategic Framework for Enhancing Rwanda's Aviation Sector

By analyzing both strengths and weaknesses, the research identifies key areas for improvement based on lessons learnt and recommendations from the aviation sector's qualitative and quantitative information, aimed ats enhancing the aviation sector in Rwanda. Several factors position Rwanda's aviation sector for success.

International Best Practices

Integrating both global recognized air transport and aviation industries in Asia-Pacific, Middle East and the United States of America's best practices with tailored local strategies is essential (ACI, 2024). Learning from successful international models such as the IOSA, ISAGO, and IATA provides a strong foundation. Rwanda can adapt these frameworks to its unique context, ensuring compliance with global standards while addressing specific challenges.

Supply Chain Optimization

TR's recommendation is to have a smooth supply chain. "That although we are doing business and we are improving, we still have difficulties in the supply chain that affects the quality of produce" (TR, 2023). Implementing a streamlined supply chain can elevate product quality and reduce costs. Centralized shipment handling fosters efficiency and strengthens Rwanda's position in the global market.

Data-Driven Decision Making

Utilizing data analytics for strategic planning allows for informed decisions on resource allocation and route development. According to EN and ER "We don't have the money to buy these big fancy data collection systems and analysis" (EN, 2023) (ER, 2023). For this reason, Rwanda should incorporate into its policies the required investments and maintenance of a system to address big data for the purpose of data-driven decision making.

Women in Aviation: Promoting female participation fosters a diverse and highly skilled workforce

Although Rwanda is ranked as the 06th country in the world, and the second country in Africa in connecting gender gaps (World Economic Forum, 2022), and despite a constitutional requisite of a minimum quota of at least 30% of women in decision making organs (MIGEPROF, 2024), there is still much to be done based on aviation workforce data. Promoting gender inclusivity is not only social justice but a strategic necessity. By actively encouraging women's participation in the aviation industry through targeted initiatives and supportive policies, Rwanda can tap into a diverse pool of talent, fostering innovation and driving growth.

Collaboration and Integration

Cross-sector collaboration and integration are crucial for sustainable growth.

International Cooperation

Collaboration between nations is essential for integrated aviation systems. Strengthening diplomatic ties and cooperation agreements with neighboring countries facilitates seamless cross-border operations, benefiting both passengers and cargo movements. By aligning regulatory frameworks and sharing best practices, Rwanda can enhance regional connectivity and promote economic integration. For instance, Rwanda Civil Aviation has signed 106 Bilateral Air Service Agreements (BZ, 2023), and 26 bilateral agreements through MINICOFIN (IB, 2023).

Multimodal Integration

Integrating aviation with other transportation modes, like road and rail, is critical for economic development across various sectors. Investing in supporting infrastructure fosters connectivity and accessibility, facilitating the transportation of goods and people across the country and beyond. AZ reminds us that “one of the major hindrances you see, which is critical, is to think not in isolation [about air transport. Regarding multimodal transport planning, this can be called multi-modal transport systems (AN, 2023).

Investment in Knowledge and Skills

Investing in research and human capital development is essential:

Investment in research and development is vital for driving innovation and enhancing competitiveness.

By allocating resources to research projects and forging partnerships with academic institutions and industry experts, Rwanda can stay at the forefront of technological advancements, ensuring safety, customer satisfaction, and market relevance.

Education and Training

Focusing on education and skills development ensures a highly skilled workforce and improves the overall capabilities of the aviation sector. By expanding training programs and collaborating with educational institutions, Rwanda can ensure that its aviation professionals have the necessary skills and knowledge to excel in their roles, driving continuous improvement and innovation. This commitment is also captured in NST1 and Vision 2050.

Marketing and Trade Promotion: Driving Demand and Tourism

Effective marketing and trade promotion strategies are vital for attracting tourists and fostering economic growth. Targeted marketing campaigns and the promotion of trade opportunities not only attract tourists but also generate economic activity and create demand for travel. A prime example is Rwanda's branding of "Visit Rwanda" on three major European football clubs—Arsenal, Paris Saint-Germain, and Bayern Munich—highlighting how strategic partnerships can drive tourism and boost the economy (Sabiiti, 2023). While strengths provide a foundation, challenges must be addressed.

Expanding Access to Aerospace Medicine

Expanding access to international best practices and aerospace medicine education can propel sector development. Rwanda has found a way to address this by partnering with the Germany-based biotech company BioNTech to set up its first modular mRNA vaccine manufacturing plant in Kigali, Rwanda. This initiative aims to support sustainable vaccine production and ensure a complete vaccine supply chain for African Union member countries.. To ensure regulatory compliance across partner countries, the company will collaborate with local authorities and relevant continental/international agencies (WHO, Africa CDC, AMA, AUDA-NEPAD) during the development of the Kigali facility (Pharmaceutical Technology, 2023)

Resource Dependency with Local Expertise

Building local expertise and minimizing reliance on foreign resources fosters long-term sustainability. This is addressed in government policies such as NST1 and Vision 2050, with focus on capacity building in the Aviation Center for Excellence, the Akagera Aviation Training Organization and development and investment of the national carrier RwandAir.

Infrastructure Development

Investing in infrastructure, including medical facilities and technical capabilities, is crucial for growth. Medical facilities within airports promote safety and public health, especially during health crises. (Pereira, Lohmann, & Houghton, 2021) Investing in the continuous training and upskilling of aviation personnel, including pilots, engineers, air traffic controllers, and ground staff, is essential for maintaining a high level of technical proficiency and safety standards.

Stakeholder Coordination

Enhancing collaboration between airlines, airports, and regulatory bodies fosters efficiency and minimizes safety concerns. By using collaborative design, the aviation stakeholders can devise new ways of conducting business, leading to sustainable growth (Rise & Euchner, 2013).

Global Collaboration

Developing investment strategies to address research and development, infrastructure, and marketing needs is critical for overcoming challenges and promoting growth. Collaborative efforts are essential for fostering a culture of innovation and creating shared value within the aviation industry (Pereira, Lohmann, & Houghton, 2021), Securing international support and addressing any criticism from developed nations can further enhance Rwanda's progress in the aviation sector. By capitalizing on its strengths and addressing existing challenges through well-defined strategies, Rwanda can propel its aviation sector towards sustainable growth. This research provides a roadmap for policymakers and stakeholders to navigate this path toward a vibrant and competitive Rwandan aviation industry.

4.6 Reaction Assessment and Insights

The reaction section aims to provide the researcher’s reaction to her experiences on how well her research paper was executed. It gives an overview of the main findings and arguments presented in the research. In doing so, the researcher attempts to critically analyze and

evaluate the significance and implications of her research and the research findings (Creswell, 2019). In the case of this research based on the title, it is her belief the research demonstrates that there are positive relationships with aviation and socioeconomic development in the Republic of Rwanda. In addition, she became cognizant that there are 'side effects' that are to be expected when progress is being made in a country and if not mitigated with care, can be a distraction to the intent of the overall goals of the country. At the beginning of the research, the researcher had to gather her thoughts and decide which direction to proceed for the greatest impact.

Her initial concern was that research can be challenging to grasp and requires meticulous effort to carry out, despite frequent encounters with ambiguous situations, listening to others' perspectives, analyzing diverse sources of information, and participating in dialogs (Tracey, 2019). She approached the literature review with caution and then became quite impressed that information was available from African researchers on LLDC. Through her literature review, the information from Zambia, Ethiopia and Zimbabwe on their experiences with air transport and socioeconomic development reassured her that she had made the right decision in pursuing the topic. The researcher underestimated the skill required to write a Concept Note for a doctoral paper (Tracey, 2019). The purpose of the concept note serves as a concise summary of the researcher's projects objectives, methodology and significance. It outlines the key aspects of the study to provide clarity and perspective.

The notion that the researcher could manipulate her approach was swiftly dispelled by the critiques of the seasoned council members who demonstrated their expertise (Phillips & Pugh, 2005). The initial drafts were time-consuming. The expectation to provide a summary of three years of work in a 5000-word document is overwhelming. While a wealth of information exists on the general economic impact of aviation, identifying resources specifically focused on LLDCs in Africa requires a more refined search strategy. Recalling the structure of thesis papers for review and critique was tasking and required patience and humility often not found in new researchers. The interview phase of the research project exceeded all expectations. Initially, it was anticipated that the selected interviewees would provide insightful references to the work of the Government of Rwanda (GoR) and enthusiastically share the progress of the country in the realm of air transport. However, the established rapport, combined with the respectful and focused atmosphere, allowed for in-depth discussions that surpassed these expectations by not only offering specific references to government policies but also prompting the interviewer to critically analyze the rationale

behind the formulation of these policies and their profound impact on air transport (Trull, 2024). What stood out the most was the interviewees' exceptional degree of humility and openness throughout the entire interview process.

Despite holding influential positions, they engaged in the discussions with a genuine willingness to share insights and perspectives. Their humility was particularly evident when addressing challenges and obstacles encountered in the execution of policies. Rather than shying away from discussing less favorable aspects, they tactfully navigated these topics, providing the researcher with valuable insights while maintaining a constructive and solution-oriented approach (Trull, 2024). This level of engagement and transparency reaffirmed the researcher's confidence in the selection of interview participants. Their depth of knowledge, coupled with their ability to communicate complex concepts in a clear and accessible manner, underscored their suitability for contributing to the research paper (Trull, 2024). The researcher found the traditional coding system, involving a manual system of highlighters, sticky-notes, and bookmarks, to be daunting and far from her initial expectations (Hecker & Kalpokas, 2024). The use of the digital data coding system as the coding system for the research was a great experience.

The main difference: traditional coding is cumbersome, and digital is user-friendly. This digital approach transformed qualitative data analysis, helping identify overlooked patterns and connections. The researcher immediately appreciated the user-friendly interface and emphasis on data security proved invaluable. The data coding system was a game-changer in qualitative data analysis. The researcher needed help identifying patterns and connections that might have been overlooked, and the data coding system provided for this. In summary, the remarkable transparency of the interview participants, as they discussed both the successes and challenges related to policy execution, resonated with the researcher's experience of their collaborative and insightful approach to the interview process. This reaffirms the researcher's belief in the positive relationships between aviation and socioeconomic development in Rwanda, as evidenced by the evidence presented. Nonetheless, the seemingly open and positive nature of the interviews should be viewed with a critical lens, considering potential limitations in self-reported information.

In addition, the researcher acknowledges the presence of potential 'side-effects' that may arise during the progress, which if left unaddressed, could detract from the overarching goals of the country. This highlights the importance of implementing mitigation strategies to ensure that the benefits of aviation development are maximized while minimizing any adverse

impacts on the country's overall objectives. Additionally, the initial reaction to the traditional coding system is acceptable, as highlighted by Hecker and Kalpokas (2024), but discovering and using the data coding system was a relief and proved invaluable in qualitative data analysis. While this section provides valuable insights, it is important to acknowledge its limitations within the context of the thesis. One significant limitation of the project is that it relied primarily on qualitative interviews, which may not capture the full quantitative impact of aviation on Rwanda's socio-economic development. To address this limitation, future research should incorporate quantitative methods to provide a more comprehensive analysis. Additionally, expanding the study to include comparative analyses with other LLDCs could offer broader insights into regional challenges and opportunities. Future studies should also consider longitudinal data to evaluate the long-term effects of aviation development on Rwanda's economic growth and employment trends. By focusing on these areas, future research can build on the current findings and offer a more holistic understanding of the aviation sector's role in socio-economic development.

4.7 Aviation Risk Analysis of Rwanda's Aviation Sector Using the Indicative Method

4.7.1 Assessing Risk in Rwanda's Aviation Sector

Building on the Convergent-Parallel Approach introduced in Chapter 3, this chapter applies the Indicative Method to further integrate quantitative financial assessments with qualitative policy evaluations. This approach strengthens the study's ability to systematically evaluate risk factors, financial viability, and investment sustainability, directly addressing RQ2 (factors supporting and impeding aviation growth) and RQ3 (strategic recommendations for sectoral development). By aligning financial projections with industry dynamics, this method provides a holistic framework for assessing aviation's role in Rwanda's socio-economic development. Analyzing Rwanda's aviation sector using the Indicative Method is essential for establishing a framework that supports Rwanda's goals as outlined in NST1. This Aviation Risk Analysis is critical for determining the sustainability of growth by identifying and mitigating risks tied to economic dependencies, infrastructure limitations, and market volatility (Rwanda Development Board, 2024). A structured, best-practice approach to risk management aligns Rwanda's aviation investments with international standards, enhancing sector resilience. By examining Rwanda's progress and potential gaps, this Risk Assessment offers actionable insights that contribute to the sector's sustainable development and Rwanda's broader economic objectives (Usman & Mikhailova, 2020).

Drawing on structured risk assessment principles as well as recent developments in Rwanda, this section evaluates key risk areas and measures Rwanda's accomplishments through two detailed matrices: the *Risk-Restriction System Formation* and *Comprehensive Aviation Risk Analysis* matrices (Usman & Mikhailova, 2020). These tools not only gauge financial viability through indicators like Net Present Value (NPV), Internal Rate of Return (IRR), and Profitability Index (PI), but they also categorize risks as Acceptable, Boundary, or Unacceptable. This risk management framework directly addresses the primary research objectives by systematically identifying the obstacles and enablers that impact Rwanda's aviation sector as a driver of socio-economic growth. By managing economic dependencies, infrastructure limitations, and potential environmental impacts, Rwanda's aviation sector mitigates critical barriers, aligning with the socio-economic goals identified in this research. Furthermore, Rwanda's proactive measures—like strategic partnerships, infrastructure projects, and workforce development—highlight a commitment to international standards, attracting investment and reinforcing the aviation sector's role in Rwanda's growth agenda (MINIFRA, 2020) . This alignment between risk mitigation and national goals highlights aviation's role as a strategic asset for Rwanda, reinforcing the thesis's argument that aviation serves as a critical enabler of socio-economic development for LLDCs.

4.7.2 Risk-Restriction System Formation Matrix

The Risk-Restriction System Formation Matrix provides a systematic evaluation of investment criteria, defining Acceptable, Boundary, and Unacceptable levels for each key risk indicator. By assessing Net Present Value (NPV), Internal Rate of Return (IRR), Profitability Index (PI), and other essential criteria, this matrix enables decision-makers to classify aviation projects based on risk tolerance and viability. Rwanda's recent achievements, including strategic partnerships and infrastructure investments, demonstrate alignment with acceptable and boundary-level risk criteria, which supports the sector's expansion and resilience (Usman & Mikhailova, 2020) .

4.7.3 Aviation Projected Investment

Rwanda is embarking on a significant expansion of its aviation sector, aiming to solidify its position as a regional aviation hub. A pivotal project in this endeavor is the construction of the New Bugesera International Airport (NBIA) (Aviation: Benefits Beyond Borders, 2019) and the CEAS (Centre of Excellence for Aviation Skills), a $1.3 billion initiative undertaken in partnership with Qatar Airway. Upon its completion in 2026, this state-of-the-art airport is anticipated to accommodate up to 1.7 million passengers and 150,000 tons of cargo annually

(ITA, 2024). In addition, the African Development Bank has pledged over $24 million to establish the CEAS in Kigali. This center is designed to train up to 500 students annually, commencing operations in 2025 (AfDB, 2023)These investments reflect Rwanda's strategic focus on enhancing its aviation infrastructure and human capital to support economic growth and regional connectivity. The Rwandan government has pledged $789 for the development of the aviation sector (Aviation: Benefits Beyond Borders, 2019). Total investment of $1.3 billion and $23 and $789 million equals $2.113 billion.

4.7.4 Methodology for the Risk-Restriction System Formation Matrix

The Risk-Restriction System Formation Matrix evaluates Rwanda's aviation projects for financial viability and core risk indicators, classifying them as *acceptable*, *boundary*, or *unacceptable*. Using metrics such as Net Present Value (NPV), Internal Rate of Return (IRR), and Profitability Index (PI), the matrix ensures alignment with investor expectations and industry benchmarks (Kanashchenkov, Novikov, & Veas Iniesta, 2019). Projects with positive NPV and above-average IRR are deemed financially viable, while boundary or unacceptable classifications prompt further review or mitigation strategies. This systematic approach helps flag projects that may need adjustments to meet financial requirements (NISR, 2023).

4.7.4.1 Risk-Restriction System Formation Matrix Formulas

The investment project is acceptable only if

1

- Initial investment (C_0) = $2.113 billion
- Present Value of Cash inflows (C_t) = $1.843 million annually
- Discount rate ($_r$) = 10%
- Time Frame (t) = 10 years

Since the cash inflows after tax is $1.843Million each year, then the Net Present value is given by

The calculation yields an NPV of approximately $9.208 billion. This result means that, after accounting for the discount rate of 10% over a 10-year period, the projected cash inflows exceed the initial investment of $2.113 billion by $7.095billion. This positive NPV implies

that the project is expected to generate a net gain and is therefore considered financially attractive.

2. Internal Rate of Return (IRR): The IRR is the way we assess the profitability rate of the project. The IRR is calculated as follows:

Where:

C_t=Net cash inflow during the period t

C_0= Total initial investment costs

IRR= Internal rate of return

t= The number of time periods

Therefore then

An IRR above the discount rate of 10% would confirm the project's acceptability.

3. Profitability Index (PI) compares the present value of cash inflows to the initial investment. Based on the calculated present value of cash inflows of approximately $9.208 billion over 10 years.

Calculation:

- Present Value of Cash Inflows = $9.208 billion
- Initial Investment = $2.113 billion

A PI above 1 (approximately 4.3567) confirms that the project will likely generate more value than its cost, indicating profitability, financial viability and attractiveness.

Table 9 Risk-Restriction System Formation Matrix

Indicator	Acceptable Risk	Risk Boundary	Unacceptable Risk	Interpretation Based on Rwanda's Accomplishments
NPV $9.208 billion	NPV > 0	NPV = 0	NPV < 0	Acceptable Risk: Rwanda's investments in infrastructure, such as Bugesera Airport, indicate expectations for positive NPV, with projected growth in tourism and trade supporting returns (Construction Review Online, 2024).
IRR	IRR > Cost of Capital	IRR = Cost of Capital	IRR < Cost of Capital	Acceptable Risk: The strategic partnership with Qatar Airways assuming 60% in NBIA and 49% in RwandAir has bolstered RwandAir, positioning it to achieve industry-leading returns through expanded international and regional routes (MININFRA, 2019)
PI 4.3567	PI >1	PI = 1	PI < 1	Acceptable Risk: Rwanda's focus on becoming a regional hub supports a high PI, with investments in aviation infrastructure expected to yield greater than average profitability (Republic of Rwanda, 2017).
Payback Period	Shorter than investor requirements	Meets investor requirements	Exceeds investor requirements	Acceptable to Boundary Risk: Recent public-private partnerships (PPP), which is the collaboration where government and private entities jointly deliver public projects or services (García-Sánchez, Prado-Román, & García-Sánchez, 2024), PPP in infrastructure projects help achieve shorter payback periods by sharing costs and accelerating project timelines (Republic of Rwanda, 2017).
Funding Adequacy	Fully meets or exceeds required funding	Meets minimum funding requirements	Insufficient funding below requirement	Acceptable Risk: Rwanda has secured significant external funding, notably from international partnerships, to fully fund projects like Bugesera Airport and CEAS (Centre of Excellence) (Rwanda Development Board, 2024)

Liquidity Ratio	Greater than 1.5	Between 1.0 and 1.5	Less than 1.0	Risk Boundary: Rwanda maintains strong liquidity through diversified funding sources, ensuring resilience and steady cash flow for project sustainability (Usman & Mikhailova, 2020)
Debt-to-Equity Ratio	Lower than 1.0	Between 1.0 and 2.0	Greater than 2.0	Risk Boundary: With cautious borrowing practices and equity investments, Rwanda maintains a balanced debt-to-equity ratio, keeping financial risks low (Usman & Mikhailova, 2020).
Technical Efficiency	Above industry average	Meets industry average	Below industry average	Acceptable Risk: Rwanda's investments in technology and infrastructure, including state-of-the-art equipment at Bugesera Airport, support above-average technical efficiency (Republic of Rwanda, 2017).
Market Demand Projection	Exceeds forecasted demand	Meets minimum demand projections	Below forecasted demand	Acceptable Risk: Rwanda's tourism and trade initiatives, backed by its growing airline network, are expected to drive demand beyond initial projections, supporting steady growth (Kalulu, Tushabe, & Chondo, 2020).

This matrix amplifies Rwanda's alignment with Acceptable and Boundary risk criteria, indicating the sector's proactive approach to meeting growth objectives through strong NPV, efficient payback periods, and strategic funding.

4.7.5 Comprehensive Aviation Risk Analysis Matrix

Building on the Risk-restriction criteria, the Comprehensive Aviation Analysis Matrix assesses additional factors, including environmental risks, workforce constraints, and demand projections (Kanashchenkov, Novikov, & Veas Iniesta, 2019). This matrix integrates mitigation strategies and interprets Rwanda's progress, providing a well-rounded view of how recent accomplishments in aviation align with risk management goals.

4.7.6 Methodology for the Comprehensive Aviation Risk Analysis Matrix

The Comprehensive Aviation Risk Analysis Matrix expands the assessment scope by addressing a broader set of risk factors, which are essential in the context of Rwanda's aviation sector and the matrix integrates both quantitative and qualitative indicators, examining each project's alignment with regulatory standards, environmental sustainability, and workforce development goals (Kanashchenkov, Novikov, & Veas Iniesta, 2019). For example, environmental compliance is evaluated against international standards, and workforce stability is measured through retention rates and the adequacy of training programs, such as those at the Centre of Excellence for Aviation Skills (CEAS) (African Development Bank, 2021). This matrix also includes a mitigation strategy for each risk area, providing a clear plan for managing boundary and unacceptable risks.

4.7.6.1 Comprehensive Aviation Risk Analysis Matrix with Rwanda's Aviation Investment Figures

1. Value at Risk (VaR) measures potential loss in value due to market volatility over a specified period.

- Standard deviation of returns (σ) = 5% (hypothetical)
- Z-score for 95% confidence level = 1.65
- Time period (t) = 1 year

$$VaR = 0.05 \times 1.65 \times \sqrt{1} = 0.0825 = 8.25\%$$

This suggests that in a worst-case scenario, the project could face an 8.25% reduction in returns at a 95% confidence level.

2. Sensitivity Analysis Coefficient Sensitivity analysis identifies how changes in variables impact NPV.

Calculation:

- Assume a 10% increase in operational costs decreases NPV by 15%.
- Sensitivity Coefficient = $\frac{15\%}{10} = 1.5$

Table 10 Comprehensive Aviation Value at Risk Analysis

Risk Area	Indicator	Acceptable Level	Boundary Level	Unacceptable Level	Current Status (Rwanda's Achievements)	Mitigation Strategy	Interpretation
Economic Dependency	Trade Partnerships	Broad and diversified partnerships	Moderate dependency	High dependency on a few countries	Rwanda has 106 Bilateral Air Service Agreements, including a strong partnership with Qatar Airways, expanding trade and connectivity (RDB, 2023).	Continue expanding partnerships with new regions to reduce reliance on a few countries (Dmitriev & Novikov, 2019).	Expanding partnerships and trade agreements increase resilience to economic shifts, aligning with Rwanda's goal to be a regional aviation hub.
	Market Demand Projection	Exceeds forecasted demand	Meets minimum demand projections	Below forecasted demand	Strategic tourism promotion and trade support have increased demand for RwandAir's services, particularly on regional routes (Financial Times, 2023).	Strengthen domestic demand through tourism initiatives and partnerships (Novikov, 2019)	Proactive initiatives to boost tourism and trade support demand projections, achieving acceptable risk levels and ensuring aviation sector growth**.**
Infrastructure Constraints	Payback Period	Shorter than investor requirements	Meets investor requirements	Exceeds investor requirements	Bugesera Airport and other projects use PPPs, supporting shorter payback periods and	Implement phased infrastructure projects and continue using PPPs to share financial risks	Leveraging PPPs ensures financial sustainability and reduces repayment time, supporting Rwanda's infrastructure

					meeting investment timelines (Construction Review Online, 2023).	and shorten payback (Usman & Bochkareva, 2015).	expansion goals.
	Technical Efficiency	Above industry average	Meets industry average	Below industry average	Rwanda's investment in Bugesera Airport technology and CEAS aims to enhance sector efficiency and meet future demands (RDB, 2023).	Invest in advanced technologies and training programs to improve efficiency and maintain competitiveness (Kanashchenko v et al., 2019).	High technical efficiency through advanced infrastructure helps Rwanda achieve regional leadership, supporting acceptable risk levels.
Pandemic/Environmental Risks	Environmental Compliance	Full compliance with international standards	Minor non-compliance	Significant non-compliance	Rwanda promotes green practices, with Bugesera Airport aiming to be eco-friendly and compliant with environmental standards (RDB, 2023).	Strengthen environmental protocols and adopt insurance for climate-related risks (Novikov, 2019).	Compliance with environmental standards mitigates risks associated with climate regulations, ensuring sector sustainability.
	Market Risk (Value at Risk - VaR)	Less than 0.5 VaR loss ratio	0.5 VaR loss ratio	Above 0.5 VaR loss ratio	Diversification in tourism and trade has helped reduce Rwanda's exposure to market volatility	Further diversify revenue streams and consider hedging strategies to mitigate market (Dmitriev & Novikov, 2019)	Rwanda's diversification initiatives in tourism and trade reduce vulnerability to economic volatility, aligning with

					(Financial Times, 2023).	risks .	acceptable risk levels
Human Resource Limitations	Staff Retention and Training	High retention; strong training programs	Moderate retention	High turnover	CEAS provides local training, addressing skills shortages and decreasing reliance on foreign expertise, thus fostering a skilled workforce (RDB, 2023).	Increase investment in aviation training programs and offer retention incentives (Usman & Bochkareva, 2015).	Local training and workforce development strengthen Rwanda's aviation workforce, reducing turnover and meeting acceptable risk levels
	Personnel Turnover Rate	Below 10%	Between 10-20%	Above 20%	Initiatives at CEAS focus on job stability and skill building, aiming to keep turnover rates low (RDB, 2023).	Provide competitive salaries, career growth opportunities, and strong benefits to retain talent (Novikov, 2019).	Low turnover, supported by local training, ensures workforce stability, which is essential for achieving Rwanda's aviation growth objectives

This table indicates how Rwanda's focus on trade diversification, environmental compliance, and workforce development supports the aviation sector's alignment with acceptable risk criteria

Interpretation of Results of the formulas

Applying these figures, the analysis shows Rwanda's aviation projects, particularly the Bugesera International Airport, are financially sound with a positive NPV and a PI above 1, indicating profitability. Sensitivity analysis underscores the need to manage operational costs closely. The VaR calculation suggests a manageable level of market risk, allowing Rwanda to strategically position itself for growth in the African aviation sector.

4.7.6.2 Overall Risk Level

The overall risk level for Rwanda's aviation sector falls within acceptable or boundary-level risk criteria, suggesting that while there are inherent challenges, they are manageable and aligned with the country's strategic goals. This positioning signifies that Rwanda's aviation investments are on track to support sustainable development and enhance economic resilience, in its immediate vicinity, as in, the East African Community (EAC), the African Continent and other international countries. Here's what this means in terms of implications and strategic alignment:

1. Investor Confidence and Financial Viability: With the acceptable risk level, Rwanda demonstrates a structured approach to financial risk management, enhancing investor confidence. Meeting criteria such as favorable payback periods, adequate funding through PPPs, and liquidity levels suggests that projects in the sector are financially viable and align with international investment standards. This minimizes financial strain on government resources and encourages further investment, both foreign and domestic (Commonwealth Governance, n.d.).

2. Alignment with International Standards: Rwanda's commitment to environmental standards and green practices, along with its compliance with international aviation norms, positions it as a credible player in the EAC a global aviation market. This alignment not only reduces regulatory risks but also opens doors to partnerships within EAC, but also with international aviation bodies and other countries, contributing to Rwanda's broader economic objectives and creating opportunities for expanded trade and tourism (Federal Aviation Administration (FAA), 2022).

3. Operational Resilience: The proactive mitigation of infrastructure and human resource risks supports operational resilience. Rwanda's investment in projects

like Bugesera International Airport and the Centre of Excellence for Aviation Skills (CEAS) enhances capacity and technical efficiency, ensuring the sector can handle growth in demand and adapt to changes. This resilience is critical in minimizing disruptions, and potential pandemics (AfDB, 2023).

4. Strategic Advantage in East Africa: The acceptable risk level provides Rwanda with a competitive edge in the East African aviation market. By addressing key risks through diversification of trade partnerships and local workforce development, Rwanda is not only enhancing its aviation sector but also reinforcing its position as a strategic aviation hub in the region. This competitive positioning could increase Rwanda's influence in East African air travel and logistics, supporting its socio-economic growth (Kalulu, Tushabe, & Chondo, 2020).

5. Pathway to Long-Term Socio-Economic Growth: By maintaining risks within manageable limits, Rwanda is positioning its aviation sector as a cornerstone of national development. The risk management strategies in place allow Rwanda to leverage aviation as a driver for economic growth, facilitating trade, tourism, and job creation. As the sector grows, it stands to make significant contributions to Additionally, achieving full environmental compliance and managing climate-related risks require substantial investment (Dmitriev & Novikov, 2019). Rwanda's GDP, employment rates, and infrastructure development (Katabarwa & Mulyungi, 2018)

4.7.7 Challenges and Limitations in Rwanda's Aviation Accomplishments

Despite Rwanda's progress, certain challenges remain that could impact the sustainability of its aviation sector. Economic dependency on key partners, such as Qatar Airways, introduces vulnerability if partnerships shift (Usman & Mikhailova, 2020). Infrastructure projects like Bugesera International Airport, while significant, also bring financial risks, especially if returns do not meet projections (Kanashchenkov, Novikov, & Veas Iniesta, 2019). Additionally, achieving full environmental compliance and managing climate-related risks require substantial investment (Dmitriev & Novikov, 2019). Workforce limitations persist as well, with a reliance on foreign expertise and retention challenges, despite efforts at the CEAS (African Development Bank, 2021). Some other challenges and limitations worth mentioning would be Generalizability, and Methodological Trade-offs.

While Rwanda serves as an instructive case study for landlocked developing countries (LLDCs), the unique political, infrastructural, and geopolitical context of Rwanda may limit the broader application of these findings. Variations in governance, infrastructure quality, and regional stability across other LLDCs in Africa and Asia could affect the transferability of Rwanda's strategies. For instance, Uganda and Nepal face similar geographic constraints but differ significantly in their regulatory environments and economic policies (IATA, 2021). For future direction a comparative study involving multiple LLDCs should be undertaken to identify commonalities and differences. This would allow the development of a more universally adaptable framework for aviation policy reforms across diverse contexts.

This thesis employs a Convergent Parallel Mixed Methods Design to provide a comprehensive analysis of Rwanda's aviation sector. However, this methodology may not fully capture longitudinal trends or the industry's dynamic evolution over time. While it offers a broad snapshot of current conditions, it may overlook how key variables interact and shift in the long run. Additionally, challenges such as time constraints and data integration complexities can limit its effectiveness in tracking gradual changes (Creswell & Clark, 2018). To address this, future research should incorporate longitudinal study designs that monitor aviation sector developments over extended periods, ensuring a deeper understanding of industry trends. This trade-off between depth and breadth exemplifies the concept of Methodological Trade-offs, which refers to the decisions researchers make when selecting specific methods, acknowledging that each choice involves both advantages and limitations where researchers must balance comprehensiveness with adaptability in study design. (Breure, et al., 2024).

Finally, maintaining technical and operational efficiency in a growing market demands ongoing upgrades and investments (Kalulu, Tushabe, & Chondo, 2020). Addressing these areas is essential to fortify Rwanda's aviation sector and meet its socio-economic development goals.

4.7.8 Comparative Analysis of Value at Risk (VaR) in Rwanda's Aviation Investments: Rwanda Airport Company (RAC) and Rwanda Civil Aviation Authority (RCAA)

Comparing the Value at Risk (VaR) of Rwanda's aviation industry investments in Rwanda Airports Company (RAC) and Rwanda Civil Aviation Authority (RCAA) provides a comprehensive contextualization of associated risks. This analysis offers a benchmark for understanding whether the risk exposure for these key aviation stakeholders aligns with industry norms and strategic objectives. Without such comparative benchmarking, it is

challenging to determine if identified risks are typical for the sector or an anomaly (Dmitriev & Novikov, 2019). The comparative analysis of VaR helps asses risk appropriateness for RAC and RCAA investments by evaluating whether their risk levels align with industry expectations and Rwanda's strategic aviation objectives. Investments with disproportionately high VaR may require additional risk mitigation strategies to ensure their sustainability. This comparison also highlights whether RAC and RCAA's operations face more or less risk compared to broader aviation initiatives in the country (Kanashchenkov, Novikov, & Veas Iniesta, 2019).

Additionally, such analysis emphasizes the importance of diversification within the aviation sector's investment portfolio. If the VaR of RAC or RCAA is substantially higher than anticipated, it could signal over-concentration of risk within specific operations, underscoring the need for risk redistribution. By comparing RAC and RCAA, it is possible to evaluate how their risk management practices contribute to Rwanda's aviation industry resilience and economic growth (Usman & Mikhailova, 2020). The comparison also serves as a foundation for strategic decision-making, offering policymakers actionable insights. By understanding how RAC and RCAA manage risks, stakeholders can identify opportunities for improvement and ensure alignment with national socio-economic objectives. This analysis reinforces academic rigor by incorporating robust comparative methodologies that enhance the reliability and practical applicability of the findings. The focus on RAC and RCAA underscores their critical roles in achieving Rwanda's broader aviation goals (Dmitriev & Novikov, 2019) .

4.7.9 Rwanda Airport Company (RAC) and Rwanda Civil Aviation Authority (RCAA)

The Rwanda Airports Company (RAC) and the Rwanda Civil Aviation Authority (RCAA) are central to the country's aviation sector. RAC oversees the management and development of airport infrastructure, ensuring operational efficiency and quality services for passengers and cargo (RAC, 2022). Meanwhile, RCAA regulates and governs aviation operations, upholding international safety and compliance standards (RCAA, 2023).

Social Economic Impact of Aviation Industry in Rwanda Standard VaR of the Aviation Industry Investment

Table 11 Aviation industry in Rwanda investment

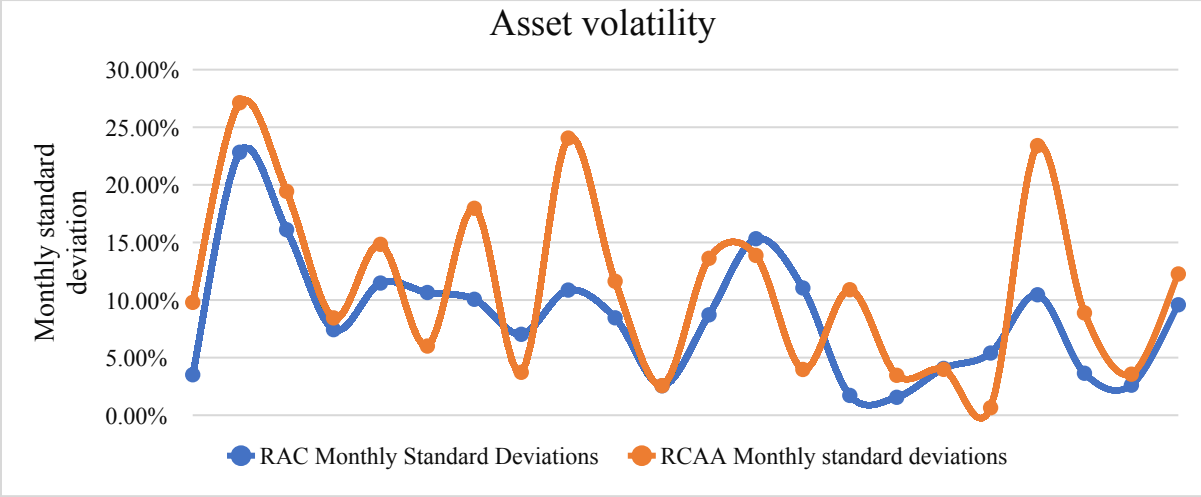
Year	Month	RAC investments	RCAA Investment
2018	Jan	1,107,450	166,118
	Feb	1,411,222	180,105
	Mar	1,711,152	224,295

	Apr	1,502,381	190,313
	May	1,656,553	212,565
	Jun	1,644,373	210,675
	Jul	1,919,855	257,543
	Aug	1,928,000	289,200
	Sep	1,679,300	251,895
	Oct	1,615,450	208,140
	Nov	1,812,148	241,695
	Dec	1,803,672	238,088
2019	Jan	1,731,448	226,170
	Feb	1,880,172	260,498
	Mar	1,643,900	246,585
	Apr	1,680,344	220,665
	May	1,759,888	230,370
	Jun	1,884,224	252,585
	Jul	2,136,658	292,980
	Aug	2,244,800	336,720
	Sep	2,034,184	277,928
	Oct	1,940,802	260,100
	Nov	1,921,273	255,998
	Dec	2,178,127	299,678
	TOTAL	**42,827,375**	**5,830,905**

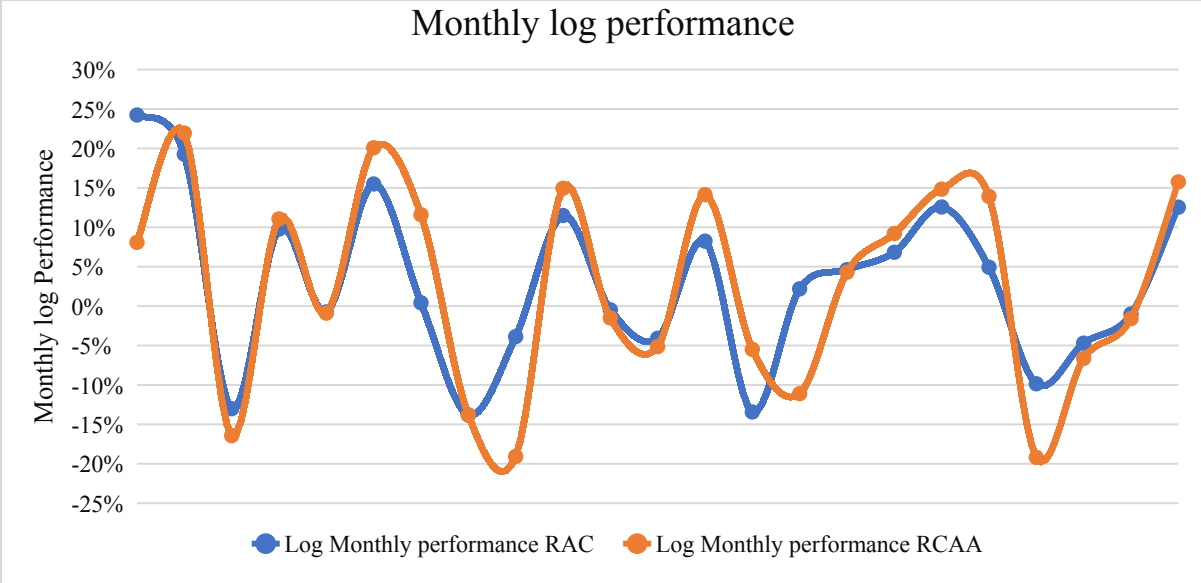
Table 12 Average monthly standard deviation

Year	**Log Monthly performance RAC plus non-aero**	**Log Monthly performance RCAA**	**RAC**	**RCAA**	**Annual standard deviation RAC**
			Monthly Standard deviation		
Jan-18	Average monthly standard deviation		**8.41%**	**11.10%**	12.26%
Feb-18	24%	8%	RAC	RCAA	
Mar-18	19%	22%	3.51%	9.80%	
Apr-18	-13%	-16%	22.83%	27.13%	
May-18	10%	11%	16.11%	19.44%	
Jun-18	-1%	-1%	7.43%	8.45%	
Jul-18	15%	20%	11.47%	14.84%	
Aug-18	0%	12%	10.65%	6.01%	
Sep-18	-14%	-14%	10.06%	17.96%	
Oct-18	-4%	-19%	7.02%	3.73%	
Nov-18	11%	15%	10.87%	24.06%	
Dec-18	0%	-2%	8.46%	11.63%	
Jan-19	-4%	-5%	2.56%	2.57%	8.36%
Feb-19	8%	14%	8.72%	13.62%	

Mar-19	-13%	-5%	15.32%	13.87%	
Apr-19	2%	-11%	11.05%	3.97%	
May-19	5%	4%	1.72%	10.90%	
Jun-19	7%	9%	1.56%	3.47%	
Jul-19	13%	15%	4.06%	3.98%	
Aug-19	5%	14%	5.40%	0.65%	
Sep-19	-10%	-19%	10.46%	23.41%	
Oct-19	-5%	-7%	3.64%	8.88%	
Nov-19	-1%	-2%	2.61%	3.56%	
Dec-19	13%	16%	9.59%	12.26%	



In this case a parametric VAR will be calculated, that means Variance-Covariance Method. We are assuming that the assets return follow a normal distribution. The monthly standard deviations represent the asset volatility for both RCAA and RAC respectively.



The monthly log performance helps us to be more mathematically convenient and statistically robust way to calculate returns.

	RAC	RCAA	Comments
Monthly Variance	0.28%	0.58%	RAC investment varies at 0.28% month by month, while RCAA investment varies at 0.58|%
Annual working months	12	12	Each Investment is evaluated within 12 months.
Annual Variance	0.033593899	0.069445996	Nil
Annual standard deviation	18%	26%	
Mean	8.41%	11.10%	Nil

Rwanda Airport company is confident by 95% that do not incur a loss more than 7,849,674.73 USD in one year. Consequently, there is 5% chance of incurring a loss more than such amount. Same RCAA is 95% confident that it will not lose more than $ 1,536,595.55 in one year, and 5% likelihood to lose more that such amount.

Organization	Standard Deviation	Investment	VAR Individual	VaR in %
RAC	18%	$ 42,827,375	$ 7,849,674.73	18%
RCAA	26%	$ 5,830,905	$ 1,536,595.55	26%

Confidence interval	Normal distribution (RAC)	Normal distribution (RCAA)

95%	1.0000000000	1.0000000000

4.7.10 Investment Performance of RAC and RCAA

The Rwanda Airports Company (RAC) and Rwanda Civil Aviation Authority (RCAA) have demonstrated strong financial and operational performance during 2018 and 2019. RAC's total revenue increased from $42.83 million in 2018 to $46.83 million in 2019 Rwanda Airports Company, 2022), reflecting a growth rate of 13.4%. Similarly, RCAA's annual revenue reached $5.83 million in 2019, underscoring its critical role in ensuring compliance with international aviation standards and fostering development (RCAA, 2023).

The combined performance of RAC and RCAA highlights the aviation sector's pivotal role in Rwanda's socio-economic development. The benefits, including economic growth, enhanced connectivity, and improved operational efficiency, outweigh the risks when supported by effective mitigation strategies. Revenue diversification, infrastructure modernization, and regulatory alignment are key to sustaining growth and competitiveness in the aviation industry. These measures align with Rwanda's Vision 2050, solidifying the aviation sector as a cornerstone of economic transformation and regional integration.

4.7.11 Turning Challenges into Opportunities: Rwanda's Aviation Outlook

Rwanda's aviation sector faces challenges in scale and global competitiveness, with RwandAir's financial constraints and regional focus limiting its broader global impact. However, these hurdles are counterbalanced by Rwanda's strong advancements in sustainability, workforce development, and regional integration (Rwanda Development Board, 2023). With innovative approaches and a commitment to sustainability, Rwanda is well-positioned to address these challenges and transform them into opportunities, establishing itself as a vital aviation hub in East Africa and driving socio-economic progress for landlocked nations (Republic of Rwanda, 2017).

Using the Risk-Restriction System Formation and Comprehensive Aviation Risk Analysis matrices provides a structured and data-driven framework for assessing and mitigating risks in Rwanda's aviation sector. These matrices ensure that projects meet industry and investor standards while helping Rwanda identify specific areas where further investment and strategic focus are necessary. Rwanda's current accomplishments, including diversified trade partnerships, advanced infrastructure projects, and localized workforce development,

highlight its progress in managing risks effectively and positioning the aviation sector as a cornerstone of economic development.

4.7.12 Objectives of the thesis and the Research Questions

These risk analyses align with the objectives of the thesis and the research questions outlined identifying enablers, obstacles, and actionable strategies, addressing the research questions in the following manner:

- RQ1:How does aviation impact Rwanda's socio-economic landscape?

  The risk analysis highlighted aviation's role as a socio-economic driver, with projects like the Bugesera International Airport demonstrating financial viability through a positive Net Present Value (NPV) and Profitability Index (PI) above 1. Investments in aviation infrastructure have boosted trade and tourism, enhancing Rwanda's position as a regional hub and supporting broader socio-economic growth.

- RQ2: What factors support and impede the development of Rwanda's aviation sector?

  The Risk-Restriction System Formation Matrix identified key enablers, such as strategic partnerships (e.g., with Qatar Airways), sufficient funding for infrastructure, and compliance with international standards. Simultaneously, boundary risks, including market dependency, workforce limitations, and financial exposure, were noted (Dmitriev & Novikov, 2019) findings underscore the dual role of risks as both barriers and areas for strategic intervention.

- RQ3: What strategy should be adopted to enhance the economic benefits of Rwanda's aviation sector?

  Strategic Pathways for Mitigating Risks and Enhancing Rwanda's Aviation Sector Growth: Recommendations from the risk analysis include expanding trade partnerships to reduce economic dependency, strengthening workforce training programs to address skill gaps, and implementing phased infrastructure upgrades to manage financial risks effectively. These recommendations are critical not only for mitigating immediate risks but

also for aligning the aviation sector with Rwanda's broader socio-economic goals, such as enhancing trade, tourism, and workforce development. Recommendations from the risk analysis include expanding trade partnerships to reduce economic dependency, strengthening workforce training programs to address skill gaps, and implementing phased infrastructure upgrades to manage financial risks effectively (AfDB, 2023). These recommendations are critical not only for mitigating immediate risks but also for aligning the aviation sector with Rwanda's broader socio-economic goals, such as enhancing trade, tourism, and workforce development (Kanashchenkov, Novikov, & Veas Iniesta, 2019). These strategies directly address identified risks and align with national socio-economic goals.

4.7.13 Achievement of Objectives and Limitations

The application of the Indicative Method and tools such as the Risk-Restriction System Formation Matrix and Comprehensive Aviation Risk Analysis Matrix provided a structured framework to evaluate and mitigate risks. This approach ensured that the research objectives of identifying enablers, obstacles, and actionable recommendations were met. The findings demonstrate that Rwanda's aviation sector operates within manageable risk levels, supported by innovative practices, ethical governance, and strategic investments (Richardson, Denney, & Chaves, 2024). However, the recurring limitations observed across various sections, such as dependency on external partnerships, limited local capacity, and challenges in data accessibility, are consistent with findings in similar research on aviation sectors in developing economies. This consistency aligns with the findings of this research, reinforcing its reliability and demonstrating that the challenges identified are representative of broader trends faced by landlocked developing countries leveraging aviation for socio-economic development (Richardson, Denney, & Chaves, 2024).

While the aviation sector benefits from strategic advancements, limitations remain. Overreliance on external partnerships, such as with Qatar Airways, exposes the aviation sector to vulnerabilities if these relationships deteriorate or global economic conditions shift unfavorably (Kalulu, Tushabe, & Chondo, 2020). Similarly, workforce retention and skill gaps persist despite efforts like the Centre of Excellence for Aviation Skills, making it difficult to reduce reliance on foreign expertise. These issues highlight the need for enhanced local capacity-building initiatives to strengthen the domestic workforce and ensure resilience.

Market volatility and financial exposure also pose significant risks. External factors, including fluctuating fuel prices and economic disruptions, can significantly impact large-scale projects like the Bugesera International Airport, creating financial pressures that may hinder sustained growth (Kanashchenkov, Novikov, & Veas Iniesta, 2019). Additionally, the reliance on current data limited the study's ability to anticipate and mitigate emerging risks, such as rapid advancements in aviation technology and stricter environmental compliance standards. Limited access to granular data, particularly from private aviation stakeholders in the East African region, further constrained the study's ability to perform comprehensive statistical and longitudinal analyses (Galarraga, Abadie, Standfuss, Ruiz de Gauna, & Goicoechea, 2023).

This consistency in limitations across the thesis indicates that the findings are robust and systematically rooted in the dynamics of Rwanda's aviation sector. Also consistent in the thesis are measures to address these limitations, such as future research enhancing the sector's alignment with Rwanda's socio-economic goals, focusing on diversifying trade partnerships, reducing dependency on key stakeholders, strengthening local workforce development programs, and incorporating broader datasets for longitudinal analyses. Additionally, developing proactive strategies to address technological advancements and environmental sustainability will be essential in ensuring the sector's resilience and continued growth. By addressing these gaps, Rwanda's aviation sector can serve as a model for other African nations navigating similar challenges (Hong, Liu, & Saade, 2023)

The conclusion underscores that addressing vulnerabilities and leveraging identified opportunities positions the sector to drive sustainable socio-economic growth, achieving alignment with the overarching goals of this thesis.

Chapter 5: Conclusions: Reflective Writing on Innovation, Global Competition, and Business Values in the Context of Aviation's Role in Socio-Economic Development in Rwanda

5.0 Reflective Writing on Innovation, Global Competition, and Business Values in the Context of Aviation's Role in Socio-Economic Development in Rwanda

This reflective section begins by restating the research objectives and questions, with a focus on understanding how the aviation sector impacts socio-economic development in landlocked developing countries (LLDCs) like Rwanda. The primary aim was to explore the interplay between innovation, competition, and ethics within the aviation sector, informed by theoretical frameworks from business ethics, strategic management, and innovation studies (Carroll & Buchholtz, 2018). The research revealed several key findings: governance, capacity building, improved livelihoods, health access, productivity, and successful initiatives are central to driving Rwanda's socio-economic progress. These findings contribute to existing knowledge by emphasizing the dynamic role of aviation in addressing the unique challenges faced by LLDCs. Specifically, the study demonstrates that innovation and strategic management in aviation foster sustainable development, offering insights that can inform future research and policy development in similar contexts (Yan, Wang, Boud, & Lao, 2023).

Reflecting on my research journey, I recognize the critical role of professional values, including diversity and inclusion, in shaping outcomes, which underscores the importance of aviation in Rwanda's development. The country's aviation sector, as the study shows, can serve as a model for other LLDCs (Mann, Mamede, & Schmidt, 2008). In response to Research Question 1 (RQ1), which investigates how aviation impacts Rwanda's socio-economic landscape, the research highlighted the role of aviation-driven innovation in economic development. Advancements in aviation technology, particularly the use of drones, have had a transformative effect by boosting trade and tourism and improving logistics and access (Yan, Wang, Boud, & Lao, 2023). Additionally, innovations in aviation have enhanced healthcare delivery and agricultural productivity, both of which are vital to Rwanda's broader economic and social progress (Mann, Mamede, & Schmidt, 2008).

For Research Question 2 (RQ2), which seeks to identify factors that support or challenge aviation development, the study found that ethical conduct and transparency are critical to

ensuring sustainable growth in the sector. Integrating ethical principles into business practices not only builds trust but also ensures the long-term viability of the aviation industry (Carroll & Buchholtz, 2018). The study also recognized the potential challenges posed by global competition, but it emphasized that Rwanda's strong commitment to ethical governance can help mitigate risks while enabling greater international collaboration.

Lastly, addressing Research Question 3 (RQ3), the research provided strategic recommendations for future development, stressing the importance of ethics and innovation in shaping aviation policies and practices. By focusing on these elements, the chapter remains aligned with the research objectives, offering actionable insights for enhancing the aviation sector's impact on Rwanda's socio-economic development. The findings underline the critical role that aviation plays in fostering trade, tourism, and capacity building, particularly in the context of Rwanda's status as an LLDC. This chapter provides a reflective analysis of the findings, connecting the intersections between innovation, global competition, and business values. It illustrates how these factors collectively influence aviation's contribution to Rwanda's socio-economic development. As Rwanda continues to strive for economic resilience, the aviation sector remains central to achieving this goal, offering pathways to expand trade and tourism while building national capacity (Republic of Rwanda, 2017). Reflecting on both the empirical results and the researcher's journey, it becomes clear that Rwanda's unique position as an LLDC influences its development strategies, with aviation being a key driver of progress.

5.1 Innovation in Aviation: A Catalyst for Rwanda's Growth

Innovation in aviation has been an important part of Rwanda's broader socio-economic development plan. With aviation being both a driver and beneficiary of technological advancements, the integration of emerging technologies is transforming traditional industries and improving service delivery. Rwanda's deployment of drones for healthcare supply chains and precision agriculture is an exemplary case, showing the potential for aviation to act as a catalyst for economic development and technological leapfrogging (Wedig, 2023). Reflecting on the study's findings, the ability of innovation to address infrastructure gaps was apparent. Rwanda's investment in digital airspace management and its vision to establish itself as an African hub for unmanned aerial systems are key innovations that could serve as models for other LLDCs. These upgrades illustrate how innovation in aviation can go beyond simple transportation to becoming a component to economic resilience, national security, and social

welfare. The role of these innovations in connecting remote and unjust regions further underscores their metamorphic power in addressing geographic barriers (Wedig, 2023).

The personal reflection on the research process also brought to light the limitations and enablers of innovation in the Rwandan context. Rwanda's relatively small size and its government's strong policy framework allow for rapid adoption and scaling of technological innovations. However, these innovations are often contingent on partnerships with foreign firms, presenting both opportunities and vulnerabilities. This realization reaffirms the need for local capacity-building to ensure that Rwanda can sustain its innovative trajectory and retain greater control over the associated technologies.

This section corresponds to RQ1 in that this section explores how innovations in aviation have positively impacted Rwanda's socio-economic landscape, specifically by connecting remote regions, enhancing trade, and providing essential services like healthcare via drone technologies. By integrating these innovations, Rwanda has fostered growth in trade and tourism, which directly answers RQ1 by demonstrating how aviation plays a role in increasing socio-economic opportunities.

5.2 Global Competition: Balancing Opportunity and Risk

As I reflect on Rwanda's aviation sector, it's clear to me that it faces the push and pull of globalization—there's a lot of potential for growth, but the global competition is intense. Rwanda isn't just competing with regional players but also with established and up-and-coming aviation hubs around the world. What really gives Rwanda an edge is its strategic location, the business-friendly regulations in place, and the country's stability and transparency (Alby, David, & Wedig, 2023). However, staying competitive means Rwanda must constantly improve its infrastructure, services, and regulations to keep attracting international airlines, cargo, and investment. Throughout this research, I've noticed how Rwanda has strategically responded to this competition by forging partnerships with major global players (Bryman et al., 2021). These kinds of partnerships don't just bring in technology and knowledge—they're helping Rwanda make a name for itself in the global aviation scene. But I've also come to realize that global competition comes with its own set of risks. Rwanda is vulnerable to things like economic downturns, rising fuel prices, and disruptions in the global supply chain.

The research really drove home the point that building up local expertise and infrastructure is crucial for reducing reliance on foreign entities. Additionally, Rwanda is carving out unique opportunities by positioning itself as a hub for aviation training and aerospace medicine in Africa, which could offer some protection from the volatility of global competition. Finding the right balance between these opportunities and risks will be key for Rwanda's aviation sector to achieve sustainable growth (Alby, David, & Wedig, 2023). Here, the discussion focuses on global competition as both a supportive and impeding factor in Rwanda's aviation development. The partnership with Qatar and other international collaborations are supportive factors, while the risks associated with global and within the region of the EAC, competition, such as economic vulnerability, represent obstacles (Alby, David, & Wedig, 2023). This aligns with RQ2 by addressing both enablers and barriers to Rwanda's aviation growth.

In addition are the financial challenges and risks faced by Rwanda's aviation sector, such as revenue volatility and significant financial exposure, underscore the broader implications of operating in a competitive and interconnected global market (RAC, 2022). These financial vulnerabilities not only highlight the sector's sensitivity to operational and market uncertainties but also set the stage for understanding how Rwanda navigates the intense pressures of global competition—balancing opportunities for growth against the risks inherent in a rapidly evolving aviation landscape (RCAA, 2023). As a researcher analyzing the challenges and risks in Rwanda's aviation sector, I find the financial metrics surrounding revenue volatility and financial exposure particularly striking. The annual standard deviations of 18% for RAC and 26% for the RCAA underscore the inherent instability these entities face due to operational and market uncertainties. The Value at Risk (VaR) analysis further highlights financial vulnerability, showing a 95% confidence level that RAC's losses could reach up to $7.85 million annually, while RCAA may face losses of up to $1.54 million under similar conditions.

5.3 Business Values: Governance, Ethics, and Sustainable Development

Rwanda's aviation sector has really thrived, and I believe a big part of that success comes from its strong focus on governance and ethical business practices. My research highlighted how transparent governance plays a crucial role in boosting investor confidence, encouraging ethical behavior, and ensuring that Rwanda meets international aviation standards (Creswell & Poth, 2018). Looking back, it became clear to me how closely the country's business

values are aligned with its national development goals, which has been a central part of its aviation strategy. Impressive was Rwanda's dedication to sustainable development—balancing economic, social, and environmental priorities. For example, Rwanda's efforts to reduce carbon emissions while promoting green energy in airport projects, all in line with International Civil Aviation Organization (ICAO) guidelines, show a forward-thinking business ethic. These initiatives reflect Rwanda's commitment to global sustainability goals, like the Paris Agreement and the UN's Sustainable Development Goals (SDGs). Reflecting on this,

It can be said that Rwanda's approach to aviation governance promotes the importance of ethical leadership and transparency for long-term growth (United Nations, 2023). The most important findings from the study were how frameworks like those from RCAA ensure that aviation isn't just an economic tool—it is paramount to improving the well-being of society. It creates jobs, supports local industries, and maintains high standards of safety and environmental protection.

This section continues to explore RQ2 by focusing on governance and business ethics as crucial factors that either support or hinder aviation development in Rwanda. Ethical governance and sustainability initiatives, particularly in alignment with international standards like ICAO, act as enablers, while challenges arise in balancing national and international interests. These governance elements are critical to understanding the broader factors influencing Rwanda's aviation sector.

5.4 Reflective Insights on the Research Process

The research process itself was deeply reflective, revealing key lessons about methodological choices, challenges in data collection, and the broader implications of the findings. One of the challenges encountered was obtaining access to granular data, particularly from private sector aviation operators. This was partly mitigated by incorporating qualitative data from interviews with key stakeholders, which provided invaluable insights into the human and institutional dynamics influencing the aviation sector (Flick, 2020). However, the lack of available quantitative data, particularly on financial contributions and private investments in the sector, posed significant limitations.

Reflecting on the methods employed in this study, it was clear that qualitative interviews added depth to the analysis. From a personal standpoint, adapting the research methodology

to focus on key drivers of aviation's socio-economic impact—such as innovation, competition, and governance—allowed for a more targeted and coherent exploration of the study's core research questions. This adaptability was crucial in addressing the dynamic nature of the aviation sector and its interplay with Rwanda's development agenda (Flick, 2020).

This section ties all three research questions together. It reflects on how methodological approaches helped address the socio-economic impacts of aviation (RQ1), the factors supporting and hindering sector growth (RQ2), and the recommendations for future growth (RQ3). The research process reflections provide a meta-level analysis of how the research questions were explored and answered through data collection and analysis (Alby, David, & Wedig, 2023).

5.5 Personal Reflections: Broader Implications for Landlocked Developing Countries

The broader implications of this study extend beyond Rwanda's borders to other landlocked developing countries (LLDCs) that face similar challenges in terms of geographic isolation, limited infrastructure, and access to global markets. Rwanda's experience illustrates how aviation can serve as a pivotal sector in overcoming these challenges, providing valuable lessons for other LLDCs (Creswell & Plano Clark, 2017). By investing in innovative aviation solutions, maintaining ethical governance, and competing strategically in the global marketplace, LLDCs can mitigate their geographic disadvantages and spur socio-economic growth.

Reflecting on this broader context, I was struck by how Rwanda's approach to aviation could serve as a model for other LLDCs seeking to leverage aviation for development. My research findings suggested aviation can act as both an enabler of growth and a tool for regions coming together. Rwanda's success in planning to be a regional hub illuminates the significance of strategic planning, infrastructure investment, and international collaboration. I found these insights to be particularly relevant for LLDCs that rely on aviation to access regional and global trade routes, promote tourism, and enhance economic resilience.

The insights in this section provide broader strategic recommendations based on Rwanda's experience. These insights align with RQ3 by offering practical recommendations not only for Rwanda but for other LLDCs facing similar challenges. The discussion emphasizes strategic planning, investment in infrastructure, and collaboration, all of which are essential

for enhancing the economic benefits of aviation in Rwanda. In this chapter, I reflected on how innovation, global competition, and ethical business values have influenced aviation's role in Rwanda's socio-economic growth. I recognized how innovation helped overcome the country's geographic challenges, while global competition offered both risks and opportunities. Ethical governance emerged as a crucial driver of sustainable development. Conducting this research in a developing context provided important lessons, reinforcing the need for adaptability and mixed-method approaches. For Rwanda and similar LLDCs, the key lies in balancing investment, ethical leadership, and international partnerships for aviation-driven progress.

In conclusion, this reflective chapter provided a thorough alignment with the research questions, ensuring that each was addressed with depth and clarity. RQ1 was explored through discussions on how aviation contributes to trade, tourism, and socio-economic development. RQ2 examined both the supportive factors and obstacles impacting Rwanda's aviation growth, while RQ3 provided strategic recommendations for fostering long-term economic benefits. These insights collectively enhance the study's contribution to aviation and development literature, offering both practical and academic value appropriate for a doctoral-level dissertation.

5.6 Expanding Theoretical Contributions

While this thesis focuses on strategy, it also considers the decision-making processes of political actors and the interplay of various factors in shaping effective plans of action. Beyond analyzing Rwanda's aviation strategies in practice, an expanded exploration of key theoretical frameworks can offer further appreciation of aviation's role in socio-economic transformation. This section considers relevant theories—including Endogenous Growth, Network, Disruptive Innovation, Competitive Advantage, and Institutional Theory—to frame Rwanda's aviation progress within a broader academic context. This discussion strengthens the link between theory and real-world application, offering insights that can inform aviation strategies in similar economies.

The theoretical contributions in the thesis is embedded within multiple sections of this chapter. Aviation's contribution to economic expansion can be analyzed through the lens of Endogenous Growth Theory, as extended by Akcigit, Hanley, and Serrano-Velarde (2021), who emphasize the role of research spillovers and innovation policies in fostering sustained economic growth (Akcigit, Hanley, & Serrano-Velarde, 2021). The thesis aligns with their

findings, demonstrating how Rwanda's investments in aviation infrastructure and technology create knowledge diffusion, enhance productivity, and foster long-term economic resilience. Network Theory, as further developed by Granstrand and Holgersson (2020), provides insights into how aviation functions as part of a broader innovation ecosystem, where strategic air service agreements and international partnerships enhance regional connectivity and market access, reinforcing economic integration (Grandstrand & Holgersson, 2020).

Innovation remains central to Rwanda's aviation development, aligning with the modern applications of Disruptive Innovation Theory. The country's adoption of drone technology for medical supply chains and airspace management exemplifies how emerging technologies can reshape traditional industries and address infrastructure limitations in LLDCs

(Christensen, Raynor, & McDonald, 2015). Similarly, Porter's Competitive Advantage Theory highlights Rwanda's strategic positioning as an aviation hub through partnerships like its collaboration with Qatar Airways, leveraging differentiation and cost leadership strategies to enhance competitiveness (Porter, 2008). The broader implications are intended to extend beyond Rwanda, offering a model for other LLDCs. Policy Transfer Theory suggests that Rwanda's regulatory frameworks, investment strategies, and governance models provide valuable lessons for other landlocked nations striving to overcome geographic and economic constraints (Stone, 2012).

Finally, the study addresses the implications of protectionism and localism in global aviation, arguing through the lens of Network Theory and Risk Management that maintaining international connectivity remains vital for sustaining aviation-driven economic growth. By synthesizing these contemporary theoretical perspectives, this research provides a comprehensive framework for understanding aviation's transformative role in LLDCs, offering valuable insights for policymakers, investors, and scholars examining the intersection of aviation and economic development.

5.7 The Imperative of Ethical Conduct and Transparency in the business of Aviation Integrating Ethics into Business Models in Aviation

In reflecting on the integration of ethics into business models, particularly within the aviation industry of LLDCs like Rwanda, it becomes evident that embedding ethical conduct is crucial for fostering long-term sustainability and credibility. Business ethics in aviation encompass a broad spectrum of moral principles guiding industry practices. These principles extend to safety, environmental stewardship, consumer protection, fair competition, and corporate

social responsibility (Carroll & Buchholtz, 2018). The significance of ethics lies in its capability to foster trust, build reputation, and ensure long-term sustainability. Ethical practices cultivate positive relationships with customers, employees, investors, and communities while mitigating risks such as legal issues and financial losses (Ferrell & Fraedrich, 2016). The implementation of ethical behavior can be approached through top-down and bottom-up frameworks, each offering distinct advantages and challenges.

5.7.1 Top-Down Framework

The top-down framework involves senior management establishing and enforcing ethical standards and policies throughout the organization. Leadership sets the tone for ethical behavior, creating a structure where ethical practices are mandated and monitored (Wyman, 2024). This approach ensures that ethical guidelines are clearly communicated and uniformly applied across the organization. In high-stakes industries like aviation, where safety and regulatory compliance are paramount, this method provides a clear and authoritative basis for ethical conduct.

The top-down framework, while providing clear leadership and streamlined decision-making, has several notable drawbacks. First, it can lead to reduced employee engagement, as employees may feel excluded from the decision-making process, resulting in lower morale and motivation. Second, this approach often results in inflexibility. The centralized decision-making process can be slow and bureaucratic, making it difficult for the organization to adapt quickly to changes or new challenges. Third, there is a risk of potential misalignment with operational realities (Robinson, 2024). Decisions made at the top may not fully account for on-the-ground conditions or practical constraints, leading to ineffective or unrealistic policies.

To address these issues, organizations need to balance centralized decision-making with mechanisms for employee involvement and feedback, fostering a more inclusive and adaptive culture that leverages insights from all levels of the organization (Robinson, 2024).

5.7.1.1 Bottom-Up Framework

Conversely, the bottom-up framework emphasizes the role of employees at all levels in shaping and upholding ethical standards. This approach encourages grassroots involvement and integrates ethical behavior into everyday operations through active participation and feedback from staff (Republic of Rwanda, 2017). In the context of LLDCs, such as Rwanda, the bottom-up approach offers significant advantages. It allows for a more inclusive and

adaptable framework where ethical practices are not just imposed from above but are actively developed and embraced by those who are directly engaged in day-to-day operations (Robinson, 2024).

While a bottom-up approach empowers employees and fosters a culture of ethical behavior, it can also lead to inconsistencies and a lack of strategic direction. Without clear guidelines or oversight, ethical standards may vary across departments, potentially compromising the organization's reputation. Additionally, a sole reliance on employee input might prioritize short-term concerns over long-term objectives. To mitigate these challenges, organizations can implement mechanisms to ensure alignment with overall business goals which includes providing ethical training, implementing transparent and efficient communication channels, and creating opportunities for employees to share their insights and concerns (Robinson, 2024).

5.7.1.2 Bottom-Up Approach: The Better Choice

Reflecting on my research and interviews with aviation industry stakeholders, the importance of a bottom-up approach becomes clear. In environments where resources may be limited and regulatory oversight is evolving, fostering a culture of ethics through employee involvement can enhance transparency and trust. For instance, RwandAir’s commitment to sustainable aviation fuels (SAF) and its participation in the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) are reflective of an organizational culture that integrates ethical practices into its core operations (ICAO, 2023). These initiatives demonstrate how ethical behavior can be woven into the fabric of everyday business through collective effort and shared values. The bottom-up approach is particularly effective in LLDCs because it empowers local staff to contribute to and uphold ethical standards.

This not only ensures that ethical practices are relevant to local contexts but also enhances the credibility of ethical initiatives. Employees who are actively involved in shaping ethical policies are more likely to adhere to and advocate for these standards, fostering a sustainable and responsible business culture. In summary, integrating ethics into business models in aviation, especially in LLDCs, benefits greatly from a bottom-up approach. This method ensures that ethical practices are not only mandated from above but are also deeply ingrained in the operational and cultural aspects of the organization. By valuing input from all levels of the organization, LLDCs can build a robust framework for ethical conduct that supports long-

term sustainability and aligns with broader socio-economic development goals (Park & Lee, 2021).

5.7.1.3 Implementing a Bottom-Up Framework

Implementing a bottom-up framework is essential for effectively fostering diversity within organizations. While top-down directives from leadership provide necessary guidance, a bottom-up approach actively engages employees at all levels to contribute to and support diversity initiatives. This can include forming diversity committees, conducting regular diversity and inclusion training, and promoting open dialogue about diversity issues throughout the organization. By involving employees in these efforts, organizations can ensure that diversity practices are not only relevant and inclusive but also widely accepted and implemented. Additionally, in the broader economic context of rising protectionism and localism, businesses face the challenge of deciding whether to focus solely on domestic markets or to continue pursuing global opportunities. This shift prompts a reevaluation of how ethical conduct and transparency are managed within both local and international operations (EASME, 2014)

5.8 The Rise of Protectionism and Localism: A Response

In my research, I find it crucial to consider whether the aviation industry in Rwanda should restrict its operations to regional markets or continue seeking global opportunities, particularly in light of rising protectionism and localism. The aviation sector is inherently global, facilitating international trade, tourism, and economic development. Therefore, confining aviation operations to domestic markets in response to protectionist trends would undermine the sector's fundamental role and its benefits for developing countries like Rwanda (OliverWyman, 2024). Protectionism has indeed affected aviation. Trade wars, tariffs, and restrictive policies can hinder international air traffic and investment. Despite global protectionist trends, Rwanda has strategically invested in its aviation infrastructure, including the Kigali International Airport, and has formed partnerships with international airlines (minifra, 2020). This proactive approach suggests that Rwanda is not merely reacting to global protectionist measures but is instead actively pursuing global opportunities.

In my view, Rwanda is likely to be an outlier in the protectionist trend. The country’s Vision 2050 underscores the importance of global integration and leveraging international partnerships. Rwanda's strategy in aviation—focused on attracting foreign investment, boosting tourism, and enhancing trade—aligns with this vision (Republic of Rwanda, 2020).

Therefore, I believe that Rwanda will continue to seek global opportunities rather than retreat into protectionism. As OliverWyman (2024) argues, businesses should not confine their operations to domestic markets despite rising protectionism and localism, as global expansion can drive innovation, foster competitive advantages, and enhance overall economic resilience (OliverWyman, 2024). From my perspective and looking at the scholarly articles, it seems we are observing a decline in protectionism and localism as dominant political ideologies based on claims by Daria Taglioni. Global trade has significantly improved incomes and reduced poverty, with over 1 billion people benefiting since 1990 (World Bank Group, 2023).

Protectionism, as evidenced by the US-China trade war, often backfires by expanding trade opportunities for other countries and demonstrating the inefficiencies of decoupling from global supply chains. Maintaining global integration and international cooperation is essential for sustaining economic growth and addressing contemporary challenges more effectively than protectionism or localism (World Bank Group, 2023). Historically, protectionism has often led to economic inefficiencies and trade conflicts, which undermine long-term economic stability and growth. The global economy has increasingly shifted towards liberalization and interconnectedness, where trade and investment flows across borders drive prosperity. While some scholars report a rise in protectionism and by extension localism, citing that some countries have increasingly imposed unilateral restrictions on cross-border trade and investment (Irwin-Hunt, 2023). Despite the potential for short-term benefits from protectionist policies to specific industries, the long-term engine of economic growth and development remains globalization (Al Rasch & Shrimali, 2024). The need for collaborative solutions to global challenges, such as economic development, reinforces the case for a more interconnected global economy.

5.9 Responsibility of Businesses to Encourage Diversity in Their Workforce: Generational and Gender Diversity

As social problems become more prominent on the global news agenda, businesses have a significant responsibility to promote diversity in their workforce. This responsibility extends across various dimensions of diversity, including generational diversity, gender diversity, sexual orientation, disabilities, and language (Auger-Dominguez, 2019). Each of these aspects contributes to creating a more comprehensive and dynamic work environment, which can, in turn, drive innovation and enhance organizational performance.

5.9.1 Generational Diversity

Generational diversity involves integrating employees from different age groups, ranging from millennials to baby boomers. This blend brings together a wide array of perspectives and experiences, fostering a rich environment for creativity and problem-solving. In the aviation industry, generational diversity can significantly influence organizational dynamics, operational efficiency, and innovation capabilities. Reflecting on Rwanda's aviation sector, it becomes evident that generational diversity presents unique challenges, deeply influenced by the country's history (World Economic Forum, 2022). One of the primary challenges observed is the skill and experience gap. The 1994 genocide in Rwanda resulted in a significant loss of skilled and experienced professionals, creating a gap in the transfer of knowledge and expertise from older to younger generations. The aviation sector, which heavily relies on experience and technical skills, has felt this impact acutely. Additionally, many younger Rwandans have received their education and training abroad, leading to a potential cultural disconnect between them and the older generation who remained in Rwanda during and after the genocide. This can result in differing work cultures, communication styles, and expectations within the workplace (Nyseth Nzitatira, 2023).

5.9.2 Solutions to Address Generational Diversity Challenges

To address these challenges, industries like the Rwanda Civil Aviation Authority (RCAA) have developed strategies that create a supportive and cohesive work environment by implementing structured mentorship programs that pair younger employees with experienced professionals facilitating the transfer of knowledge and skills, and fostered mutual understanding (Rwanda CAA, 2024). These programs facilitate knowledge transfer and foster mutual understanding, which can be crucial for addressing generational gaps in the workforce. Cultural competence training is also essential. This has been incorporated, not only in the RCAA, but across the country (RDB, 2024). In Rwanda, implementing similar mentorship strategies within the aviation sector could help mitigate generational diversity challenges. By promoting skill development and integrating diverse perspectives, these programs can enhance workforce cohesion and support the broader social and economic development goals of the country (OliverWyman, 2024).

I believe Rwanda's aviation sector has made sound decisions in working to overcome the challenges of generational diversity, leveraging the strengths of both older and younger generations to drive growth, innovation, and sustainability in the industry.

5.9.3 Solutions to addressing Gender Diversity

I realized that diversity and inclusion are not just ethical imperatives but also strategic advantages in the global aviation industry. In my interviews, I engaged with a diverse spectrum of stakeholders, including government officials and industry experts Diversity and inclusion, particularly gender equality, are paramount for the sustainable development and expansion of the aviation sector. While Rwanda has made commendable strides in bridging gender gaps, as referenced in the Reaction section of my research, the aviation industry specifically still presents opportunities for improvement. I highlighted the political symbolism in political leadership which champion gender equality and sets ambitious goals. However, the broader economy should also be identified. The broader economy, including aviation, may not always reflect political symbolism in practice. In aviation, industry-specific challenges, cultural norms, and biases can impede gender equality. Targeted interventions are needed to address these barriers and align the industry with the government's broader gender equality goals (OliverWyman, 2024).

Sectors like aviation lag due to challenges such as obstacles in integrating STEM education, limited interest among girls, coupled with a shortage of qualified teachers, hinders progress. Insufficient textbooks, lab equipment, and technology further constrain the learning environment (REB, 2024). Bridging this gap requires strategic efforts within the industry to promote gender equality (MIGEPROF, 2024). By actively encouraging women's participation in the aviation industry, Rwanda can tap into a vast reservoir of talent, fostering innovation and driving growth. To fully understand the enablers and challenges for women in the Rwandan aviation industry, further research is needed to identify specific barriers. This includes examining recruitment practices, mentorship programs, and workplace culture to foster a more conducive environment for women (World Economic Forum, 2022). By addressing these issues, Rwanda can move closer to achieving gender parity in the aviation sector and unlocking the full potential of its workforce.

5.9.4 Disabilities

Inclusive practices should also extend to individuals with disabilities. This involves ensuring accessible workplaces, providing necessary accommodations, and promoting a culture of understanding and support. Businesses should focus on the abilities and strengths of individuals with disabilities, recognizing that a diverse workforce is a stronger workforce. I believe inclusive practices for individuals with disabilities are crucial for creating equitable and accessible work environments. In Rwanda's aviation sector, addressing disability inclusion is particularly significant as it aligns with global standards and enhances the overall

customer experience. One of the key challenges I observed in Rwanda's current aviation infrastructure is the lack of jet-ways at the existing airport. This infrastructure challenge is not just unique to Kigali International Airport, but of many airports in Africa (BIZCommunity, 2024). Jet-ways, or passenger boarding bridges, are essential for providing accessible and comfortable boarding experiences for passengers with disabilities.

The absence of jet-ways limits the ability of individuals with mobility impairments to access aircraft easily, often requiring them to navigate stairs or use manual wheelchairs in challenging conditions (International Air Transport Association, 2023). Additionally, the current airport's infrastructure presents issues related to ambulance access. Limited access and inadequate organization of emergency services can compromise the safety and well-being of passengers with disabilities in case of medical emergencies. Ensuring that emergency vehicles can quickly and efficiently reach different parts of the airport is vital for providing timely medical assistance (International Air Transport Association, 2023).

To address these challenges, there are several solutions that can be implemented:

Upgrade Infrastructure: Investing in the installation of jet-ways at airports is essential. These facilities would significantly improve accessibility for passengers with disabilities, providing a more dignified and comfortable boarding process. Modernizing airport infrastructure to include accessible pathways, ramps, and elevators can also enhance overall accessibility (International Air Transport Association, 2023).

Improve Ambulance Access: Enhancing the organization and access for ambulances is critical. This involves designing clear and efficient routes for emergency vehicles within airport premises and ensuring that emergency response teams are well-coordinated. Regular drills and training for staff on handling medical emergencies can also improve response times and effectiveness (International Air Transport Association, 2023).

Implement Comprehensive Accessibility Policies: Airports should develop and enforce comprehensive accessibility policies that include provisions for the needs of passengers with disabilities. This can involve training staff on disability awareness and providing resources to assist passengers throughout their journey, from check-in to boarding (International Air Transport Association, 2023).

Engage with Disability Advocacy Groups: Collaborating with organizations that advocate for individuals with disabilities can provide valuable insights and recommendations for

improving accessibility. These groups can offer feedback on current practices and help design solutions that better meet the needs of passengers with disabilities (International Air Transport Association, 2023).

I refer to Kigali International Airport, currently in use, as the New Bugesera International Airport was still under construction at the time of my research. Despite the clear benefits of enhancing accessibility at Kigali International Airport, several obstacles hinder the implementation of these reforms. High costs and funding constraints, logistical challenges, regulatory hurdles, lack of awareness, and economic pressures all play a role. Airports in a developing country like Rwanda may struggle with budget limitations and the disruption that infrastructure upgrades can cause, with the last upgrade costing over $30 Million (minifra, 2020).

Developing and implementation of policies requires navigating bureaucratic processes and obtaining necessary approvals can be time-consuming, while internal resistance and insufficient advocacy can delay progress. Additionally, airport authorities might hesitate to prioritize accessibility improvements due to concerns about immediate financial returns (IATA, 2024). Rwanda's aviation sector can make significant strides toward inclusivity, aligning with global standards and ensuring that all passengers, in regard to their abilities, have a safe and accessible travel experience.

5.9.5 Strategic Frameworks and Real-World Impact: Lessons from Rwanda in Aviation Development

Organizations must adopt a strategic approach to navigate the complexities of real-world impacts. The aviation industry faces a critical decision: to proactively shape industry trends or to reactively adapt to external changes. Both strategies present unique challenges and opportunities, requiring careful consideration and execution. This section explores how industry leaders can effectively balance these approaches to achieve long-term success (Rego, Jayantilal, Ferreira, & Carayannis, 2021). My research findings indicate that proactive strategies, such as those adopted by Rwanda, have led to significant advancements in infrastructure and capacity building, directly contributing to socio-economic development. By examining the Rwandan aviation industry, we can identify best practices and lessons learned for other developing countries. Rwanda's focus on infrastructure development, capacity building, and ethical governance provides a valuable case study for policymakers and industry leaders. By replicating and adapting these strategies, other nations can accelerate

their aviation sectors and contribute to broader socio-economic development. This research aims to offer insights into strategic frameworks.

Rwanda's achievements, and discuss the implications for other LLDCs, ultimately contributing to the broader discourse on the role of aviation in sustainable development (Nweke, 2024). Rwanda's development of air cargo infrastructure and the integration of drone technology in healthcare have been pivotal in improving logistics and access to essential services. Specifically, the expansion of the Rwandan air cargo sector has facilitated the transport of goods and medical supplies, significantly reducing delivery times. For example, the introduction of the medical drone service has reduced the time to deliver blood and essential medical supplies from hours to as little as 30 minutes in some areas, which is crucial for healthcare in remote regions. This efficiency not only enhances healthcare access but also demonstrates the broader potential for similar innovations in other developing nations. In today's rapidly evolving global environment, the aviation industry must navigate a continuously changing world, making it essential for organizations to adopt a strategic approach to address these complexities effectively (Nisingizwe, et al., 2019).

Organizations must adopt a strategic approach to navigate these complexities. The aviation industry faces a critical decision: to proactively shape industry trends or to reactively adapt to external changes. Both strategies present unique challenges and opportunities, requiring careful consideration and execution. Understanding how industry leaders can effectively balance innovation, competition, and ethics is crucial for achieving long-term success. By examining how organizations navigate these challenges and opportunities, this research intends to contribute to the development of effective strategies for managing the intricacies of the worldwide aviation industry and fostering a sustainable future.

Furthermore, this research not only highlights Rwanda's significant progress but also identifies best practices that can be adapted by other developing nations. This is not the only impact, rather, it highlights Rwanda's significant progress and identifies best practices that can be adapted by other developing nations. The research also identifies areas for further advancement within the Rwandan aviation sector. For example, the establishment of the RwandAir fleet and its routes has significantly enhanced regional connectivity, boosted tourism and improving trade efficiency (RwandAir, 2023)

This expansion in air transport has contributed to economic growth by stimulating local businesses and creating job opportunities in the hospitality and transport sectors. By

examining how such developments influence economic progress, the study provides valuable insights for other developing nations looking to harness aviation's potential for sustainable development (IATA, 2023). Additionally, by examining the successes and ongoing challenges in Rwanda, the research evaluates what has worked and what can be improved. This allows for a clearer assessment of the enablers and obstacles in the sector, providing a comprehensive understanding of the strengths and weaknesses of the current approach, which directly addresses the research question.. Beyond showcasing current best practices, the study also outlines future development areas to promote sustained growth in Rwanda's aviation sector. This forward-looking perspective is crucial for shaping the future trajectory of aviation's role in socio-economic development, ensuring that lessons learned are applied to enhance ongoing and future efforts in the sector (IATA, 2023).

This section reaffirms Rwanda's focus on infrastructure development, capacity building, and ethical governance, making it a valuable case study for policymakers and industry leaders. By replicating and adapting these strategies, other nations can accelerate their aviation sectors and contribute to broader socio-economic development. Ultimately, this research contributes to the global discourse on the role of aviation in sustainable development, offering a model for other LLDCs to follow (Nweke, 2024). For instance, Rwanda's development of air cargo infrastructure and the integration of drone technology in healthcare have been pivotal in improving logistics and access to essential services, highlighting the potential for similar innovations in other developing nations.

5.10 My Research Journey

This introspection has revealed the challenges and triumphs encountered throughout the study, particularly in relation to my research title, "Enablers and Obstacles of Aviation's Role in Socio-Economic Development in Land-Locked Developing Countries: Evidence from the Republic of Rwanda." Reflecting on my research questions, it is clear that innovation and strategic planning are pivotal in addressing both enablers and obstacles within the aviation sector. For example, one research question explored how aviation can drive economic growth in land-locked developing countries like Rwanda. My findings illustrate that the integration of technologies such as drones has significantly improved healthcare delivery and agricultural efficiency, thereby addressing critical socio-economic needs. Evidence from the interviews highlighted the transformational role drones have had in health and horticulture based on the interviewees' insights.

In the health sector, the introduction of drone technology has significantly enhanced the delivery of emergency medicines and medical supplies, especially to remote areas. This advancement has proven crucial during crises like COVID-19, showcasing the role of drones in improving healthcare delivery and supporting public health initiatives (Yan et al., 2023). Drones have not only increased the efficiency and accessibility of medical supplies but have also stimulated job creation and skills development, as seen in the expansion of specialized roles in airspace management and drone operations (NK). Similarly, in agriculture, drones have facilitated the transition from subsistence to commercial farming in Rwanda. This shift has led to job creation and stimulated activity in sectors like horticulture and floriculture, contributing to the country’s socio-economic development (NK). The use of drones has therefore had a broad impact, enhanced health services and agricultural productivity while creating economic opportunities.

The research also highlights the importance of international partnerships and investments in overcoming barriers to aviation development. Collaborations with global aviation firms and stakeholders are vital for infrastructure development and capacity building, aligning with the goal of using aviation to drive sustainable economic growth. Moreover, the emphasis on professional values, such as diversity and inclusion, is crucial for fostering a more inclusive and effective aviation industry. Addressing gender gaps and ensuring equitable practices within the sector are essential for achieving long-term socio-economic benefits and credibility (ER & EN; AN). Overall, while the research demonstrates the positive impacts of

drone technology and international collaboration, it is essential to summarize these insights succinctly in the conclusion, using brief quotations where necessary to support key points.

These findings demonstrate that ethical conduct and transparency are not merely aspirational but foundational for achieving socio-economic benefits and credibility in the aviation sector.

Overall, this reflection enhances my perspective on how aviation, supported by innovative practices and strong ethical standards, can play a transformative role in socio-economic development. It provides a model for other land-locked developing countries to follow, illustrating that strategic integration of technology and ethical practices can drive significant progress and address pressing socio-economic challenges.

Chapter 6: Recommendations

6.0 Aviation Business Strategies

6.1 The Analytical Toolkit for Aviation Business Strategy

The PESTEL model, Porter's Five Forces, and SWOT Analysis were not previously discussed in the research findings. These have been frameworks introduced to provide a structured approach for analyzing the strategic factors influencing the aviation sector in Rwanda. Their inclusion aims to offer additional depth and insight into the external and competitive pressures faced by the sector. While these tools were not initially mentioned, they are intended to enhance the understanding of strategic decisions and support the development of actionable recommendations based on the study's findings (MindTools, n.d.).

In the context of the research findings, the PESTEL model, Porter's Five Forces, and SWOT Analysis have been identified as valuable tools that can assist aviation businesses in making strategic decisions. These models emerged from the research as effective methods for understanding both the external and internal factors affecting the aviation sector. These frameworks, derived from the research findings, are instrumental for aviation businesses in making informed strategic decisions and addressing both current and future industry dynamics.

Integrating the PESTEL model, Porter's Five Forces, or SWOT analysis can help develop a global vision for the aviation market, leveraging Rwanda's experiences as a framework for broader insights. These models offer comprehensive tools to understand the external environment, competitive landscape, and internal capabilities, providing a holistic perspective essential for strategic planning and decision-making.

6.1.1 PESTEL Model

The PESTEL model, which examines Political, Economic, Social, Technological, Environmental, and Legal factors, can provide a comprehensive understanding of the external environment affecting the aviation sector in Rwanda and similar contexts (CIPD, 2024). By dissecting Rwanda's journey, we can gain valuable insights into how political stability, economic policies, social trends, technological advancements, environmental regulations, and legal frameworks influence aviation as a stimulus for socio-economic development. For instance, the introduction of additional barriers such as debt, infrastructure challenges, and innovation requirements highlights the ethical obligation of industry players to address

systemic deterrents to accessibility and affordability (AFRAA, 2023). An area that has seen real-world impact is the Rwanda Civil Aviation Authority (RCAA) strategic plan.

The RCAA has utilized the PESTEL framework to understand the various external factors influencing the aviation industry, including political stability, economic policies, social trends, technological advancements, environmental regulations, and legal frameworks. This comprehensive analysis has been incorporated into the strategic plan, guiding sustainable practices within the industry (RCAA, 2020). My research emphasizes the vital role of political stability and sound economic policies in creating a supportive environment for aviation growth. In Rwanda, political stability has been a foundational element in the successful development of its aviation sector. This stability not only fosters investment but also enhances operational continuity, allowing for the effective implementation of policies that drive progress in aviation. As a result, Rwanda has positioned itself as a key player in the aviation industry, leveraging its stable political landscape to attract investments and facilitate growth.

Specific examples from my research that illustrate this include:
RwandAir Expansion: The growth of RwandAir, Rwanda's national carrier, can be directly linked to the country's stable political environment. Political stability has fostered foreign investment and international partnerships, enabling RwandAir to expand its fleet and routes across Africa and globally (RwandAir, 2023). This expansion reflects the government's commitment to improving aviation infrastructure, which has been sustained by consistent policies.
Interview Insight: According to interviewee TR, "it's because of the political stability now. The government has managed to stabilize the security. This made us more favorable. This statement underscores the importance of political stability in creating a favorable environment for growth and expansion. Additionally, bilateral agreements have played a role. As noted by interviewee IB**,** “So that bilateral argument helped the aviation is a residence is where they pay taxes. So that's one is avoiding such kind of double taxation. We have so far around 26 countries that we have yet signed it”

Kigali International Airport Upgrades

The Rwandan government’s significant investments in upgrading Kigali International Airport, including the construction of a new terminal and the expansion of runways, illustrate how political stability supports infrastructural development. Stable government policies have

enabled these consistent investments, transforming Kigali International Airport into a regional hub (Republic of Rwanda, 2017).

Interview Insight: Interviewee IB highlighted the importance of stable tax policies, stating, "Tax policy has to be stable, not changing every time. So we try to preserve that condition, or if I can say, property or law." This emphasizes the link between stable government policies and the successful implementation of large-scale projects like airport upgrades.

Strategic Partnerships

Rwanda's political stability has facilitated the formation of strategic partnerships with global aviation giants such as Boeing and Airbus. These partnerships have brought advanced technology and expertise to Rwanda, positioning the country as a competitive player in the global aviation market (Rwanda Development Board, 2023).

Interview Insight: According to interviewee BZ, "the political will of this country...definitely goes along with the leadership; and bilateral agreements", This highlights the role of political and stability from leadership in fostering strategic international partnerships that benefit the aviation sector.

Tourism and Business Travel

The stable political environment has played a crucial role in boosting tourism and business travel, which has played a substantial role in the expansion of the aviation sector. Government policies promoting tourism and business investments have led to increased passenger traffic at Rwandan airports, driving the demand for robust aviation services (Rwanda Tourism Board, 2024).

Interview Insight: Interviewee AN noted, "the political will and the good leadership of our president has attracted us... people feel that once in Rwanda, you are in Africa, you are at home" (AN, personal communication, 2024). This statement underscores how political stability and leadership have enhanced Rwanda's attractiveness as a destination, benefiting the aviation industry.

This analysis informs policymakers, industry leaders, and international development agencies about the ecosystem in which air transport operates, helping them to align their strategies with the broader socio-economic objectives outlined in Rwanda's NST1 and Vision 2050 (Republic of Rwanda, 2017; Republic of Rwanda, 2020). However, the challenge with implementing the PESTEL model lies in the dynamic nature of these factors. Changes in

political regimes, economic instability, rapid technological advancements, and fluctuating environmental policies can make it difficult to maintain a consistent and accurate analysis. Additionally, the risk of capturing too much data may lead to ‘paralysis by analyses’ and the data used may be based on assumptions that later prove to be unfounded (CIPD, 2024).

6.1.2 Porter's Five Forces

Porter's Five Forces framework can be used to evaluate the competitive dynamics within the aviation industry in Rwanda and similar regions. This incorporates analyzing the negotiating power of suppliers and buyers, the risk of new entrants and substitutes, and the level of competitive rivalry. By understanding these influences, stakeholders can recognize opportunities for market entry, competitive advantages, and potential threats (Pangarkar & Prabhudesai, 2024). For example, Rwanda's focus on developing efficient air cargo infrastructure and incorporating drone technology in sectors like health and agriculture can serve as a model for optimizing supply chains and maintaining high ethical standards in labor practices and corporate governance (International Labour Office, 2019; Amukele, 2022).

This strategic analysis helps in crafting policies and investment decisions that not only foster business growth but also contribute to social welfare and sustainable development. However, a challenge with implementing Porter's Five Forces lies in its static nature, and recent studies state Porter’s Five Phase is less applicable to subject matter experts, fast-evolving markets, competition driven by ecosystems, and industries experiencing rapid technological advancements or requiring long-term value generation (Pangarkar & Prabhudesai, 2024). The aviation industry is highly dynamic, with rapid changes in competitive forces. Thus, this model may not fully capture the fast-paced shifts in market conditions, technological advancements, and regulatory changes, making it difficult to rely on for long-term strategic planning.

6.1.3 SWOT Analysis

SWOT analysis, which assesses Strengths, Weaknesses, Opportunities, and Threats, can be instrumental in identifying key areas where Rwanda's aviation sector excels and where it faces challenges. Strengths such as a well-defined development agenda (NST1 and Vision 2050) and a robust statistical framework provided by the National Institute for Statistics Rwanda (NISR) can be leveraged to promote socio-economic growth (NISR, 2024).

However, weaknesses like infrastructure gaps and regulatory challenges need to be addressed to enhance the sector's performance. Opportunities in leveraging air transport for socio-economic benefits, such as improving healthcare delivery and precision agriculture, can be explored, while threats from external factors like economic downturns or political instability must be mitigated (van der Merwe, Burchfield, Witt, Price, & Sharda, 2020). Additionally, this research highlights that Rwanda's comprehensive statistical framework has been crucial in identifying and addressing weaknesses, such as infrastructure gaps, enabling targeted interventions that have bolstered the sector's performance.

6.1.3.1 Implementation

An example of the real-life implementation of SWOT analysis in the Rwandan air transport sub-sector is the development of the Kigali International Airport expansion project. The SWOT analysis identified the airport’s existing strengths, such as its strategic location and alignment with national development goals, which supported the decision to invest in expanding the airport's capacity. This expansion addresses the identified weakness of infrastructure constraints and positions the sector to take advantage of opportunities for increased passenger and cargo traffic (AfDB, 2013). This holistic view allows for the development of targeted strategies that align with global trends and local needs, fostering sustainable growth and social equity. However, the challenge with implementing SWOT analysis lies in its subjective nature. The identification and interpretation of strengths, weaknesses, opportunities, and threats can vary significantly among different stakeholders, leading to potential biases and inconsistencies in the analysis. In addition, broad categories of strengths, weaknesses, opportunities, and threats often lack the specificity needed to inform effective decision-making. Additionally, the SWOT framework may oversimplify complex organizational dynamics and fail to capture the nuances of the external environment (Palazzo, 2024).

When evaluating the optimal model for analyzing the aviation industry in a particular context, it is crucial to take stock of the specific environmental conditions and strategic needs of the country. The choice of modelshould be guided by factors such as the country’s economic stability, political climate, industry maturity, and competitive dynamics. Decisions to consider include the current state of infrastructure, regulatory environment, market competitiveness, and the presence of external influences like technological advancements or geopolitical factors. By thoroughly assessing these elements, policymakers and industry leaders can select the most appropriate model to gain meaningful insights and drive effective

strategies for socio-economic development in the aviation sector (Johnson & Whittington, 2008). In Rwanda's case, the PESTEL model emerges as particularly relevant. Unlike Porter's Five Forces, and the other models, which primarily addresses internal industry competition (Gillespie, 2019), PESTEL captures the broader macro-environmental forces that drive or hinder industry development in a regulated and investment-dependent sector like aviation (Grant, 2021). PESTEL proves advantageous here, as it examines both supportive and restrictive external factors shaping industry conditions.

A prominent theme in interviews underscored Rwanda's political stability and economic growth as key enablers of aviation infrastructure investment. Interviewees highlighted how the government's commitment to economic development and stable governance has cultivated an environment conducive to aviation growth, drawing foreign partnerships that fuel further expansion. This political and economic foundation not only supports current investments but also reinforces Rwanda's potential as an emerging aviation hub in Africa. PESTEL's inclusive approach allows policymakers and industry stakeholders to craft strategies that address both opportunities and constraints unique to Rwanda's socio-economic landscape, ensuring a balanced approach for sustainable growth (Grant, 2021).

6.2 Managing Organizational Change in the Aviation Industry of Rwanda

The aviation industry in Rwanda has undergone substantial transformation over the past decade. Previously, Rwanda's aviation sector was characterized by limited infrastructure and a nascent regulatory environment. The industry faced several challenges, including outdated facilities, limited flight connectivity, and a small fleet of aircraft, primarily focused on domestic routes with minimal international outreach. RwandAir, the country's flagship airline, had a limited presence on the global stage, and the country's airports were not fully equipped to handle increased passenger and cargo volumes. This situation mirrored the broader constraints faced by many landlocked developing countries (LLDCs), where geographic isolation and infrastructural deficits hinder economic integration and growth (AFRAA, 2023). My research findings confirm that these initial challenges were significantly mitigated through strategic investments and regulatory reforms, positioning Rwanda as a regional aviation hub.

The research findings show that the initial challenges were mitigated through strategic investments and regulatory reforms, with investments in modernizing airport infrastructure,

expanding flight routes, and enhancing regulatory frameworks transforming Rwanda's aviation sector. For example, the investment in New Bugesera International Airport infrastructure and developed routes improve connectivity and boosted Rwanda's position as a regional aviation hub. These advancements demonstrate how targeted strategies can overcome the typical constraints faced by LLDCs, highlighting Rwanda's progress and offering insights for similar contexts.

Rwanda's transformation of its aviation sector is a testament to the power of strategic planning and investment. By aligning with the country's Vision 2050 and NST1, Rwanda embarked on a comprehensive overhaul of its aviation infrastructure, fleet, and regulatory framework. Significant investments in airport expansion, fleet modernization, and regulatory reforms have enhanced the country's connectivity and competitiveness (AFRAA, 2023). The adoption of technology and capacity-building initiatives has further strengthened the aviation sector. These efforts have positioned Rwanda as a potential regional aviation hub and a model for other developing countries seeking to leverage air transport for economic growth and development (Uwase, 2024).

The aviation sector in Rwanda has made considerable strides, but managing organizational change is an ongoing process. Key areas for continued focus include:

Sustainability and Environmental Impact

As the industry grows, addressing the environmental impact of aviation operations remains crucial. Implementing sustainable practices and investing in green technologies will be essential for minimizing carbon footprints and aligning with global environmental standards (AFRAA, 2023). My findings highlight the importance of integrating sustainability into business strategies, as demonstrated by Rwanda's efforts to reduce aviation's environmental footprint through green technologies.

Adapting to Global Trends

The aviation sector must remain agile in responding to global trends such as digital transformation, emerging technologies (e.g., drones), and shifts in passenger preferences. Continuous investment in innovation and technology is vital for maintaining competitiveness (NISR, 2024).

Policy and Regulatory Adaptation

Ongoing adjustments to RCAA regulatory frameworks will be necessary to address new challenges and opportunities in the aviation industry. Engaging with international partners and stakeholders can help ensure that Rwanda's policies remain relevant and effective (Republic of Rwanda, 2020).

Economic and Social Integration

The aviation sector should continue to play a role in Rwanda’s broader socio-economic development, including enhancing connectivity with regional and international markets, supporting tourism, and contributing to job creation and economic growth.

Feedback and Continuous Improvement

Regular assessment of industry performance and stakeholder feedback will help identify areas for improvement and ensure that the sector’s development aligns with both national goals and global best practices (NISR, 2024).

To develop a robust business plan for the aviation industry in LLDCs, it is essential to recognize the importance of a dynamic approach to managing organizational change. In Rwanda’s aviation sector, balancing growth with sustainability, innovation with regulation, and local needs with global standards has proven crucial for continued progress. By

incorporating these principles into the business plan, LLDCs can effectively strengthen their aviation sectors and harness them as engines for broader socio-economic development.

6.3 Developing a Business Plan for the Aviation Industry in LLDCs

Based on my research findings, developing a business plan for the aviation industry in LLDCs requires addressing several key components. These include enhancing infrastructure, implementing regulatory reforms, expanding market reach, building capacity, fostering strategic partnerships, and understanding the socio-economic impacts of aviation. These elements are crucial for creating a robust and effective business strategy that aligns with the unique challenges and opportunities faced by LLDCs in their aviation sectors.

To create a robust business plan for the aviation industry in LLDCs, several key components need to be addressed:

Target Market

Identifying the target market involves understanding the needs and preferences of potential customers. For LLDCs like Rwanda, this includes both domestic and international travelers, cargo operators, and tourism-related businesses. Analyzing demographic data and travel trends from the NISR can help pinpoint high-demand areas and tailor services accordingly (Sengur, Aldemir, & Akimet, 2022). For example, targeting regions with growing tourism or trade opportunities can drive business growth.

Evaluating and Analyzing Competitors

A thorough competitor analysis is essential for understanding the strengths and weaknesses of existing and potential rivals. This analysis assesses competitors' market shares, service offerings, pricing strategies, and levels of customer satisfaction levels. In LLDCs, where aviation infrastructure and services may be less developed, identifying gaps and opportunities in the market can provide a competitive advantage. Tools like Porter's Five Forces can be useful for evaluating competitive dynamics and market entry barriers (Sengur, Aldemir, & Akimet, 2022).

Team Composition

A successful business plan requires a well-rounded team with expertise in various areas. This includes aviation industry experts, financial analysts, marketing professionals, and operational managers. In LLDCs, assembling a team with local knowledge and international

experience can be particularly advantageous. Collaborating with experts who understand the specific challenges and opportunities in LLDCs can enhance strategic planning and implementation (Sengur, Aldemir, & Akimet, 2022).

Financial Forecast

Developing a financial forecast involves projecting revenues, expenses, and profitability over time. For the aviation industry in LLDCs, this includes estimating costs related to infrastructure development, operational expenses, and potential revenue streams from passenger fares, cargo services, and ancillary services. Financial projections should account for initial investment requirements, expected returns, and risk factors. This forecasting helps in securing funding, managing resources, and ensuring long-term financial sustainability (Sengur, Aldemir, & Akimet, 2022).

By addressing these components, the aviation industry can develop comprehensive plans that align with Rwanda's and similar LLDCs' national strategies and leverage the unique opportunities within their aviation sectors.

6.4 Critical Perspective on Rwanda's Aviation Development

6.4.1 Debt Impact on Infrastructure Development

Rwanda's ambitious aviation projects, such as the construction of Bugesera International Airport, have been largely funded through external loans and investments. While these projects are essential for economic growth and regional connectivity, the increasing debt burden raises concerns about the country's ability to manage and repay these loans. A report by the International Monetary Fund (IMF) highlights that Rwanda's public debt is projected to rise, potentially reaching 80% of GDP by 2025, posing significant risks to fiscal sustainability if the expected economic returns are not realized (IMF, 2023).

Moreover, the AfDB emphasizes that such high levels of debt can strain public finances and limit the government's ability to invest in other critical sectors (AfDB, 2022). Additionally, the African Union (AU) highlights the importance of prudent fiscal management and suggests that countries should diversify funding sources to mitigate the risks associated with excessive borrowing (African Union, 2023). These perspectives suggest a need for Rwanda to adopt a more diversified funding strategy that includes public-private partnerships and regional cooperation to reduce dependency on external loans.

6.4.2 Sustainability of Drone Technology in Healthcare

Rwanda's integration of drone technology in healthcare delivery, particularly for the transportation of medical supplies, has been lauded as a pioneering effort. However, the long-term sustainability of this initiative requires careful consideration. The operational costs associated with maintaining and expanding drone networks are significant, and there is a potential risk of over-reliance on foreign technology and expertise. A study by the World Bank raises concerns about the sustainability of such technologies, especially in low-income countries where technological infrastructure and local expertise may not be sufficiently developed to support continuous operations (Thierry, 2021).

Furthermore, the East African Community (EAC) has expressed the need for regional collaboration to enhance local capabilities. Their framework emphasizes building local expertise and fostering innovation within the region to ensure that such technological advancements can be sustained without excessive dependence on foreign entities (EAC, 2020). This approach aligns with broader initiatives aimed at enhancing regional resilience and capacity in the Great Lakes region, where countries face similar developmental challenges. The consistent theme emerging from interviews with stakeholders in the aviation sector highlights the necessity for Rwanda to focus on building local capacity and expertise. Interviewees noted that while drone technology has revolutionized healthcare delivery, fostering home-grown technological solutions and partnerships would be critical for ensuring the sustainability and scalability of these innovations.

6.4.3 Resolve and Way Forward

To mitigate these challenges, Rwanda and other countries could adopt a phased approach with potential timelines as follows:

1. **Enhanced Fiscal Planning and Debt Management (2-3 years)** (African Union, 2023)
    - **Immediate Actions (Year 1):** Implement stricter fiscal policies and seek concessional financing options. Develop a debt management framework with specific targets for reducing debt-to-GDP ratio.
    - **Medium-Term (Years 2-3):** Monitor and evaluate the effectiveness of fiscal policies, making adjustments as necessary. Establish partnerships with international financial institutions to access concessional loans and grants.
2. **Local Capacity Building and Technology Transfer (3-5 years)** (EAC, 2020)

- **Immediate Actions (Year 1):** Identify key areas where local capacity building is needed and establish partnerships with educational institutions and international organizations.
- **Medium-Term (Years 2-5):** Implement training programs and technology transfer agreements. Develop a local talent pool with expertise in drone technology and other advanced sectors. Begin transitioning operational responsibilities from foreign experts to locally trained professionals.

3. **Diversification of Revenue Streams (3-7 years)** (IMF, 2023)
    - **Immediate Actions (Year 1):** Conduct a feasibility study to identify potential revenue streams in the aviation sector beyond traditional services.
    - **Medium-Term (Years 2-3):** Develop infrastructure and regulatory frameworks to support new revenue streams, such as maintenance, repair, and overhaul (MRO) facilities.
    - **Long-Term (Years 4-7):** Promote Rwanda as a regional hub for aviation-related training and research. Expand and market ancillary services to attract international clients.

4. **Environmental and Regulatory Considerations (1-3 years)** (IMF, 2023)
    - **Immediate Actions (Year 1):** Develop and implement environmental and regulatory frameworks to manage the impact of drone technology, including guidelines on airspace management, noise pollution, and data privacy.
    - **Medium-Term (Years 2-3):** Monitor compliance and refining regulations based on emerging challenges and opportunities. Engage with stakeholders to ensure the sustainability of drone operations.

By addressing these challenges through a comprehensive and forward-looking strategy, Rwanda can ensure that its aviation sector not only continues to drive economic growth but does so in a sustainable and resilient manner.

6.5 Global Integration and Market Access: Importance & Contextual References

According to my findings, having robust policy and regulatory frameworks is crucial for advancing the aviation industry in LLDCs. The research underscores that well-designed regulations are vital for attracting investment, ensuring safety, and optimizing operations. Such frameworks are essential for overcoming the specific challenges faced by LLDCs and enabling their aviation sectors to contribute effectively to socio-economic growth.

Importance

For LLDCs, establishing strong connections with global markets is essential to overcome geographical disadvantages and access international trade opportunities. Aviation serves as a critical link that facilitates faster, more efficient transport of goods and people, thus integrating these countries into the global economy.

Contextual Reference

Rwanda's journey in leveraging aviation for socio-economic development highlights the potential of aviation to bridge market access gaps (Nweke, 2024). By adopting a business strategy that promotes global connectivity, LLDCs can significantly enhance their economic prospects and reduce the isolation that hinders their development

6.5.1 Economic Growth and Diversification

Importance

A robust aviation sector can stimulate economic growth by attracting foreign direct investment (FDI), boosting tourism, and creating jobs. Additionally, it encourages the diversification of the economy by supporting complementary industries such as tourism, agriculture, and manufacturing

Contextual Reference

NST1 and Vision 2050 outline Rwanda's strategic focus on aviation infrastructure and capacity building as key drivers of economic diversification and growth (Republic of Rwanda, 2020). A targeted business approach that aligns with these goals can maximize the socio-economic benefits of the aviation sector.

6.5.2 Technological and Infrastructure Development

Importance

Implementing a business strategy that emphasizes technological innovation and infrastructure development is crucial for the aviation sector in LLDCs. This includes adopting new technologies such as drones for healthcare and agriculture, and developing state-of-the-art airport facilities (Nyumba & Willis, 2022).

Contextual Reference

Rwanda's use of drone technology for healthcare delivery and precision agriculture demonstrates how innovative solutions can address local challenges and enhance the efficiency of air transport (Amukele, 2022) Strategic investments in these areas can position LLDCs as pioneers in adopting cutting-edge technologies (van der Merwe, Burchfield, Witt, Price, & Sharda, 2020).

6.5.3 Sustainable and Ethical Practices

Importance

Sustainable development and ethical governance are fundamental for long-term success and stability. By adopting strategies that prioritize environmental sustainability, ethical labor practices, and sound governance, the aviation sector can contribute positively to societal well-being.

Contextual Reference

The emphasis on ethical governance and sustainability in Rwanda's Vision 2050 reflects the critical importance of integrating these principles into business strategies (Republic of Rwanda, 2020). Maintaining high ethical standards and focusing on sustainable methods can enhance the sector's standing and operational efficiency (Homann, 2023).

6.5.4 Policy and Regulatory Frameworks

Importance

Effective policy and regulatory frameworks are essential for the growth and development of the aviation sector. A business strategy that partners with policymakers to create favorable regulations can ensure a stable and predictable environment for investment and operations.

Contextual Reference

NST1 and Vision 2050 serve as foundational blueprints for policy formulation and investment prioritization in Rwanda's aviation sector (Republic of Rwanda, 2017; 2020). Engaging with these frameworks can help businesses align their strategies with national development goals, fostering a conducive regulatory environment.

Incorporating a comprehensive business strategy that addresses these key areas can help the aviation industry and LLDCs develop a global vision for the market. This approach not only enhances economic prospects but also promotes sustainable and inclusive growth, positioning these countries as viable players in the global aviation landscape.

6.6 Relevance of Findings to Stakeholders

By understanding how Rwanda has successfully navigated challenges and leveraged opportunities in the aviation sector, stakeholders can replicate and adapt best practices to their own contexts. Specifically, policymakers can draw lessons from Rwanda's strategic focus on infrastructure development, capacity building, and ethical governance to formulate policies that promote socio-economic growth (Nweke, 2024). Industry leaders can use these findings to shape investment strategies, enhance competitive advantages, and foster innovation (Homann, 2023) . Additionally, international development agencies can align their support with proven frameworks that contribute to sustainable development.

6.6.1 Dissemination and Knowledge Transfer

As a researcher-practitioner, I will disseminate this research through multiple channels to ensure it reaches a broad audience of stakeholders. This includes publishing articles in academic journals and industry publications such as ICAO and IATA, in the Caribbean with the Caribbean Development Bank and Caribbean Tourism Organization, and on the African continent with the African Aviation Journal, African Civil Aviation Commission, and the African Union. Additionally, I will present findings at international conferences and engage with policy forums and aviation industry summits (Meetinghand, 2023). Collaborating with educational institutions to incorporate these insights into curricula will ensure that future industry professionals are well-versed in the successful strategies employed by Rwanda. Moreover, I will leverage digital platforms such as webinars and social media to share findings and facilitate discussions among stakeholders (Homann, 2023).

6.6.2 Potential Challenges and Obstacles to Overcome

Disseminating this research and ensuring its practical application may encounter several challenges. One major obstacle is the variability in political, economic, and social contexts across different LLDCs, which may limit the direct applicability of Rwanda's strategies (Rego et al., 2021). Additionally, resistance to change and institutional inertia within organizations can hinder the adoption of new practices (Homann, 2023). There may also be challenges related to data availability and quality in other countries, making it difficult to replicate Rwanda's data-driven approach (Nweke, 2024). To overcome these obstacles, it will be essential to customize recommendations to fit local contexts, actively engage stakeholders in the implementation process, and promote a culture of continuous learning and adaptation (Meetinghand, 2023).

6.7 Insights and Recommendations: Gleaning from Rwanda's Experience

Understanding current trends and performance within the aviation sector is essential for informed decision-making. Data collected by the NISR is instrumental in this regard. Specifically, NISR's data encompasses passenger traffic, cargo volumes, infrastructure development, tourism, and economic activity, which are critical for informed decision-making. This data helps aviation stakeholders gain insights into demand, growth opportunities, and resource allocation (NISR, 2024). For example, airlines can optimize routes and schedules, while cargo services can enhance logistics and efficiency. By analyzing

NISR data, airlines, airports, and policymakers can gain a comprehensive overview of the aviation sector's performance and identify areas requiring strategic interventions. Additionally, NISR's surveys on passenger preferences and travel behavior enable industry players to tailor their services and marketing strategies for greater effectiveness (NISR, 2024).

6.8 Building a Sustainable Future

Rwanda's leadership in the aviation sector serves as a compelling case study for other African nations and LLDCs. By prioritizing ethical governance, sustainable development, and human capital investment, Rwanda has transformed its aviation industry into a catalyst for economic growth and social progress. The country's commitment to infrastructure development, regulatory reform, and capacity building has laid the foundation for a thriving aviation sector. This approach, characterized by strong leadership and strategic vision, offers valuable lessons for other nations seeking to unlock the potential of air transport. By integrating ethical practices into aviation development, Rwanda has demonstrated how to build trust, enhance its reputation, and contribute to broader societal goals. This approach can be replicated by other countries to create a more sustainable and inclusive aviation industry.

6.9 External Validity of the Thesis: Applicability Beyond Rwanda

The external validity of the findings in this thesis is strong within certain contexts yet may require adaptation outside of Rwanda due to regional differences. This thesis provides a structured framework, primarily through the PESTEL model, which is particularly suited to LLDCs facing unique developmental barriers such as limited access to seaports, often compounded by infrastructure deficits, geographic challenges, and political constraints (UNCRD, 2018). While the insights gathered from Rwanda's context provide valuable guidance, the direct applicability varies based on specific national conditions. For example, in Africa, LLDCs such as Uganda or Zambia share infrastructural and economic challenges similar to Rwanda's, which makes the study's findings especially relevant. In these cases, the emphasis on government-led infrastructure investments, political stability, and strategic partnerships in aviation may apply similarly, underscoring the potential of aviation to boost socio-economic development through improved regional connectivity (African Union, 2023). However, when we look to landlocked developing countries outside of Africa, such as Nepal, differences emerge. Nepal, situated in South Asia, has a relatively mature aviation sector focused on supporting high-volume tourism. Here, factors like mountainous terrain and high

demand for air services due to limited road networks create unique market pressures and infrastructure demands that shape aviation strategies differently from Rwanda's approach (CAAN, 2020). Unlike Rwanda, which relies heavily on government-led stability and public investment, Nepal's aviation sector is strongly market-driven, shaped by private and competitive airline dynamics, especially within the tourism industry (CAAN, 2020).

Consequently, while the thesis's frameworks are adaptable, they must be customized to address region-specific factors. For instance, the PESTEL model's focus on political stability and governmental support is integral to Rwanda's approach but may play a less prominent role in countries with entrenched private aviation industries. Therefore, any application outside of Rwanda, particularly in regions with different competitive and regulatory environments, would need to address these distinctions.

Global Interest in the Thesis

This thesis holds broad appeal outside of Rwanda because it addresses universal themes in LLDC aviation development: how aviation can stimulate socio-economic growth, improve accessibility, and enable integration into regional and global markets. For policymakers, aviation industry leaders, and international development organizations, the thesis provides a replicable framework to analyze aviation's socio-economic role. Its applicability extends to global development initiatives, such as the United Nations' Sustainable Development Goals, which emphasize connectivity and infrastructure development as critical enablers for economic growth in LLDCs (UNCTAD, 2024).

In conclusion, Rwanda's experience demonstrates the profound impact aviation can have on socio-economic development when grounded in effective leadership, strategic planning, and a commitment to ethical practices. For other nations, particularly landlocked developing countries, Rwanda's approach offers valuable insights into leveraging air transport as a means of connecting communities and fostering economic resilience. While the findings in this thesis are particularly relevant to nations with similar challenges, the analytical models used are adaptable, providing a framework for examining diverse socio-economic environments. This study thus contributes to a wider body of knowledge, guiding aviation strategies in developing regions and underscoring aviation's potential as a driver of sustainable development for communities worldwide.

Appendix 7-0 Clarification of key terms

Aviation: Aviation is generally the flying or operating of aircraft; or flying an aircraft like an airplane. For this paper, we refer to civil aviation-which is all non-military, which are both private and commercial used for personal and business purposes, such as [air] transporting goods or passengers (Cambridge University Press & Assessment, n.d.)

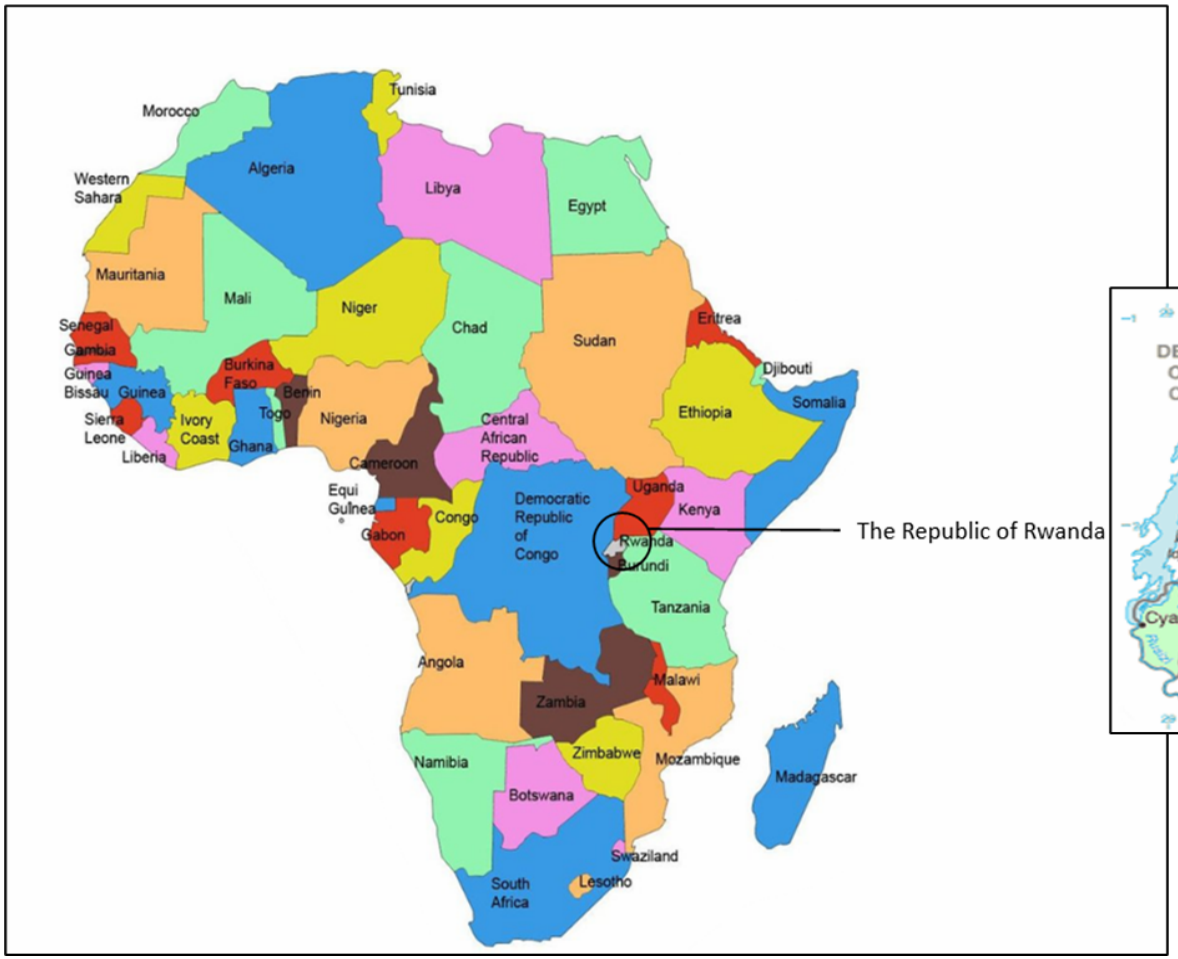
Socio- economic development: Socio Economics development is broken into separate elements. Socioeconomics is a term widely used and can have a multitude of divergent understanding about what it refers to in a given society. For the intent of this paper, the term Socio Economics is defined as "Relating to or concerned with the interaction of social and economic factors" (Oxford Languages, 2017) (especially the way in which money, industry, and trade are organized in a society). Development is a process that creates growth, progress, positive change or the addition of physical, economic, environmental, social, and demographic components.

Landlocked countries (LLDC): are countries that are surrounded by other land or other countries, not located on a coast, and have a low per capita income. Landlocked countries do not have direct access to the ocean or seas. These do not include bodies of water in the form of lakes or rivers. The main characteristics of LLDC's are that they face challenges such as limited Access to International Markets, transportation & connectivity, trade facilitation and limited access to international aid and assistance (Cazeau, 2021).

Republic of Rwanda: The Republic of Rwanda, commonly called Rwanda, is situated in Central Africa. Rwanda is a democratic, sovereign state led by the President of the Republic of Rwanda. The capital of Rwanda is Kigali.

Appendix 7-0 The Continent of Africa and the Republic of Rwanda

THE CONTINENT OF AFRICA



THE REPUBLIC OF RWANDA

The Republic of Rwanda lies seventy-five miles south of the equator in the Tropic of Capricorn, 880 miles west of the Indian Ocean and 1, 250 miles east of the Atlantic, considered in the Heart of Africa.

Rwanda has a total land mass of 26,338 Km², with an estimated population of 13.2 million reported in 2022 (Government of Rwanda, 2022). In 1994, Rwanda experienced one of the worst atrocities in history; 100 days during the 1994 Genocide Against the Tutsi. The 1994 Genocide Against the Tutsi was prepared and implemented by the genocidal regime which trained Interahamwe militia and extremist Hutus to kill Tutsis and Hutus opposed to the killing using machetes, clubs, spears and other traditional weapons, with the full support of government security forces. Rwandans commemorate the 1994 Genocide Against the Tutsi on April 7 which was also adopted by the United Nations as the International Day of Reflection on the Genocide Against the Tutsi (Government of Rwanda, 2022).

Appendix 7-1: The Interview questions

RQ1: How does aviation impact Rwanda's socio-economic landscape, focusing on key indicators such as trade volume and tourism revenue?

GDP Growth:

1. How has the aviation sector contributed to Rwanda's GDP growth, and can you provide examples to illustrate this impact?
2. Have there been any noteworthy increases in economic activity in sectors directly linked to aviation, such as hospitality and tourism?

Employment:

3. Can you elaborate on the employment opportunities created by the aviation sector and how they have affected employment rates in Rwanda?
4. Are there specific job categories or sectors that have seen significant growth due to the aviation industry?

Poverty Levels:

5. Have the socio-economic impacts of aviation led to a reduction in poverty levels in Rwanda, and if so, can you describe the mechanisms through which this has occurred?
6. Are there targeted poverty alleviation programs or initiatives linked to aviation's contributions?

Education Attainment:

7. How has the aviation sector contributed to improvements in education attainment, particularly in terms of access to educational resources and opportunities?
8. Are there any educational programs or scholarships supported by the aviation industry that have positively impacted education in Rwanda?

Healthcare Access:

9. In what ways has the aviation sector improved healthcare access in Rwanda, and are there specific healthcare initiatives or programs associated with the sector?
10. Can you share insights on how reduced healthcare costs, if applicable, have resulted from aviation-related factors?

RQ2: What are the factors that support and impede the development of Rwanda's aviation sector?

Factors Supporting Development:

11. Can you identify the key factors that have contributed to the growth and development of Rwanda's aviation sector?
12. How do Rwanda's aviation policies and regulations support the sector's development, and what impact have they had?
13. Could you elaborate on any successful initiatives or practices within Rwanda's aviation industry that have facilitated its growth?

Factors Impeding Development**:**

14. What are the primary obstacles or challenges that have hindered the progress of Rwanda's aviation sector?
15. Are there any specific regulatory or infrastructure limitations that need to be addressed to support sector development?
16. Have there been instances where external factors have negatively impacted the development of the aviation sector in Rwanda?

For RQ3 - To recommend strategies for enhancing the aviation sector in Rwanda:

Strengthening Infrastructure:

17. What strategies can be recommended to further develop aviation infrastructure in Rwanda, and how will this contribute to sector enhancement?
18. Are there specific projects or investments in infrastructure that you believe are crucial for the sector's growth?

Promoting Sustainability:

19. How can Rwanda promote sustainability within its aviation sector, including eco-friendly practices and energy efficiency?
20. Are there international best practices or successful case studies from other countries that Rwanda can learn from when formulating strategies for aviation sector enhancement.

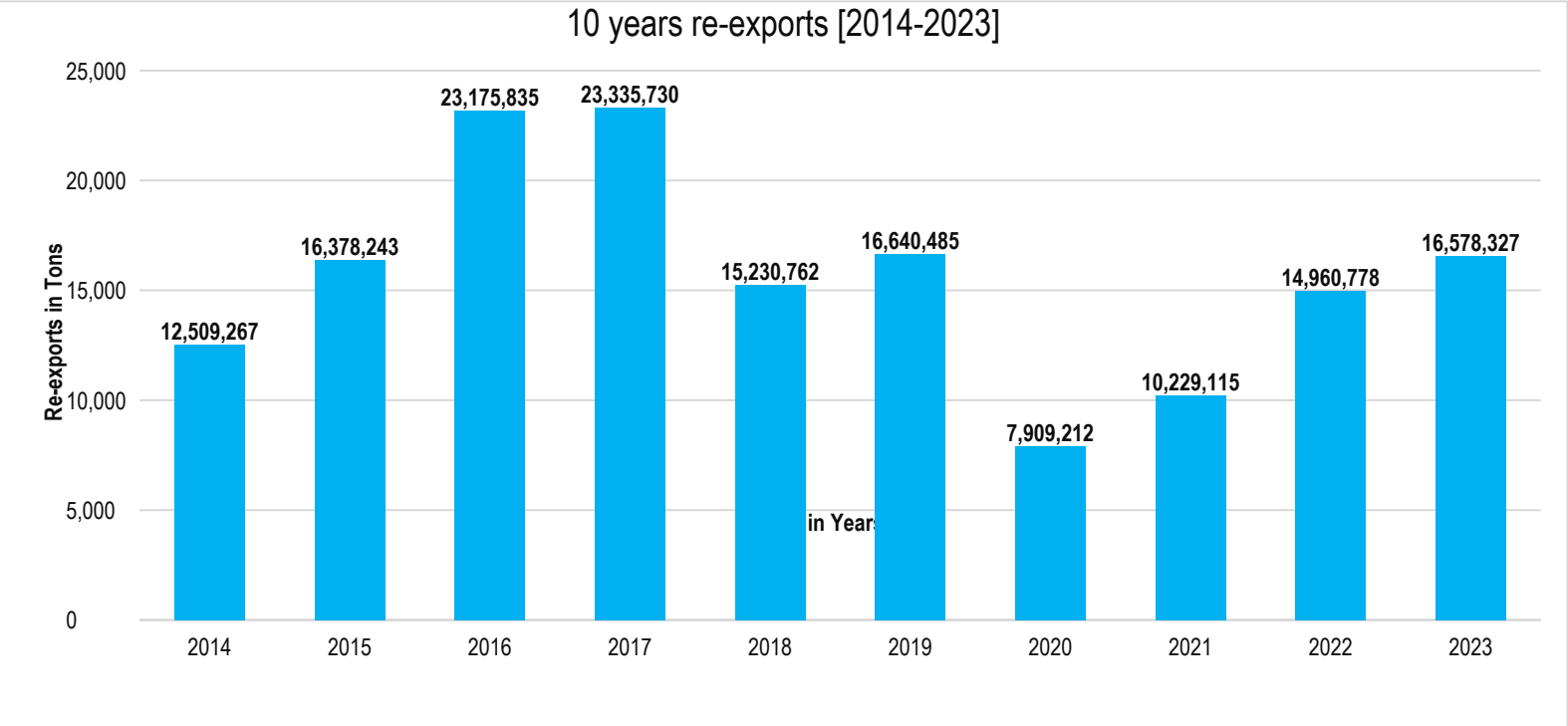
Appendix 7-2 External Trade [10 years] in Metric Tons

Period	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Total
Imports by:											
Land	2,017,591	2,350,904	2,486,788	2,945,367	3,130,624	3,168,966	3,397,293	3,368,697	4,291,475	5,204,101	32,361,806
Air	7,172	6,816	6,991	6,168	6,718	7,246	5,629	6,985	9,861	6,210	69,796
Total	2,024,762	2,357,720	2,493,779	2,951,536	3,137,342	3,176,212	3,402,922	3,375,681	4,301,336	5,210,311	32,431,602
Exports by:											
Land	206,346	216,564	228,816	323,299	363,278	393,390	355,259	511,539	680,924	769,781	4,049,196
Air	1,190	589	687	2,460	5,050	4,119	4,345	5,997	6,078	6,725	37,241
Total	207,537	217,154	229,503	325,759	368,328	397,509	359,604	517,537	687,002	776,506	4,086,437
Re-export by:											
Land	91,030	164,148	199,960	276,120	335,494	395,467	387,146	496,610	541,080	630,807	3,517,862
Air	12,509	16,378	23,176	23,336	15,231	16,640	7,909	10,229	14,961	16,578	156,948
Total	103,539	180,526	223,136	299,456	350,725	412,108	395,055	506,839	556,041	647,386	3,674,810

Total Trade by:											
Land	**2,314,967**	**2,731,617**	**2,915,564**	**3,544,786**	**3,829,396**	**3,957,823**	**4,139,698**	**4,376,846**	**5,513,478**	**6,604,689**	**39,928,864**
Air	**20,871**	**23,783**	**30,854**	**31,964**	**26,999**	**28,005**	**17,883**	**23,211**	**30,900**	**29,514**	**263,985**
Total	**2,335,838**	**2,755,400**	**2,946,417**	**3,576,750**	**3,856,395**	**3,985,828**	**4,157,581**	**4,400,057**	**5,544,379**	**6,634,203**	**40,192,849**

Source: Data adapted from data from NISR conducted for research on Rwanda's aviation sector (2024).

Appendix 7-3 Re-Exports [2014-2023] In Metric Tons



Source: Data adapted from data from NISR conducted for research on Rwanda's aviation sector (2024).

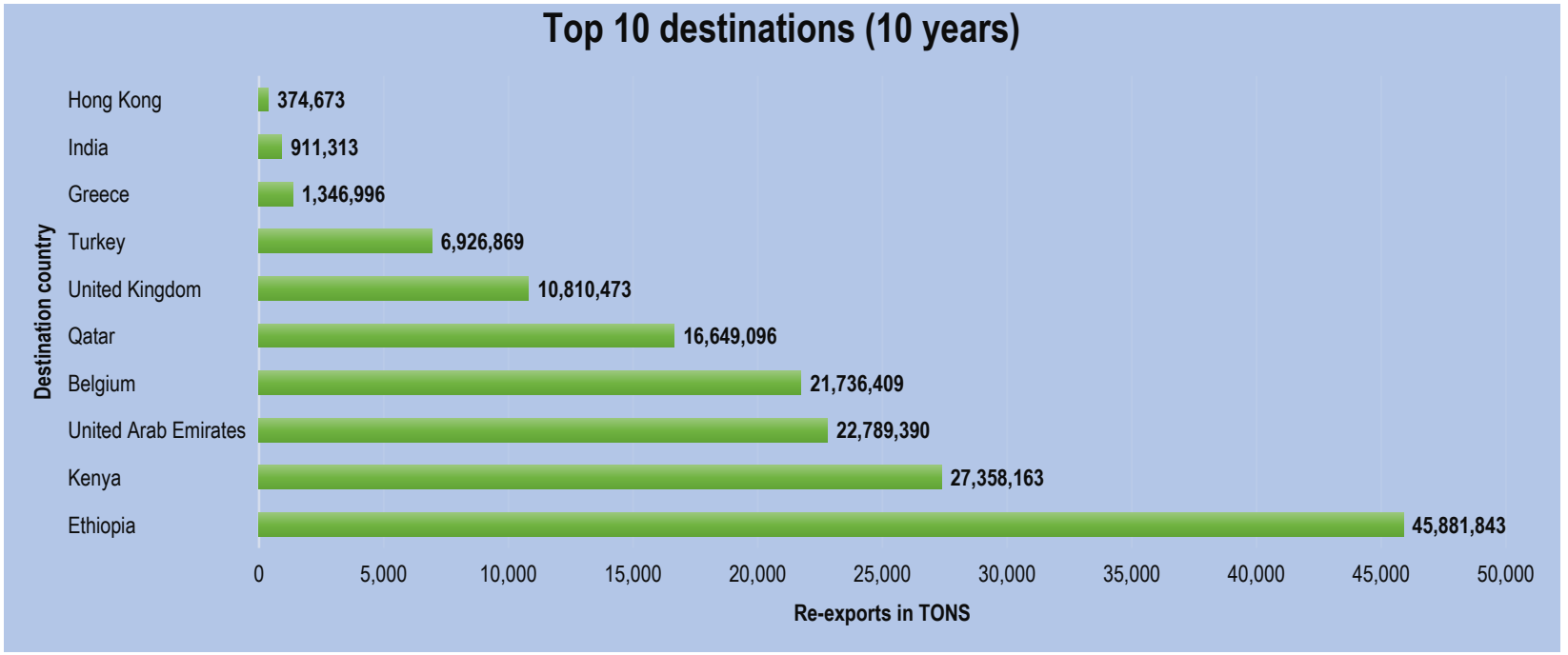
Appendix 7-4 Top ten re-exported commodities in tons

No	Commodity	Top destination	Quantity in tons	Share vs total	Top Destination Share vs total re-exported commodity
1	Petroleum oils and oils from bituminous minerals	Ethiopia	156,284	99.58%	29.36%
2	Wine; sparkling	France	127	0.081%	7.78%
3	Chocolate and other food preparations containing cocoa;	Germany	114	0.073%	53%
4	Vehicles; with only compression-ignition internal combustion piston engine (diesel or semi-diesel), cylinder capacity over 2500cc	Nigeria	69	0.044%	51%
5	Liqueurs and cordials	United States	49	0.031%	51%
6	Perfumes and toilet waters	United States	42	0.027%	48%
7	Telephones for cellular networks or for other wireless networks	Congo, The Democratic Republic Of	18	0.011%	63%
8	Vermouth and other wine of fresh grapes	United Arab Emirates	13	0.009%	71%
9	Cigarettes; containing tobacco	United Arab Emirates	9	0.006%	81%
10	Cigars, cigarillos and cheroots	Belgium	8	0.005%	69%

Source: Data adapted from data from NISR conducted for research on Rwanda's aviation sector (2024).

In ten years, Rwanda re-exports were considerably dominated by Petroleum oils and oils from bituminous minerals with 156,284 tons equivalent to 99.6% of the total re-exports for the period of ten years from 2014 to 2023. This commodity was mainly re-exported to Ethiopia.

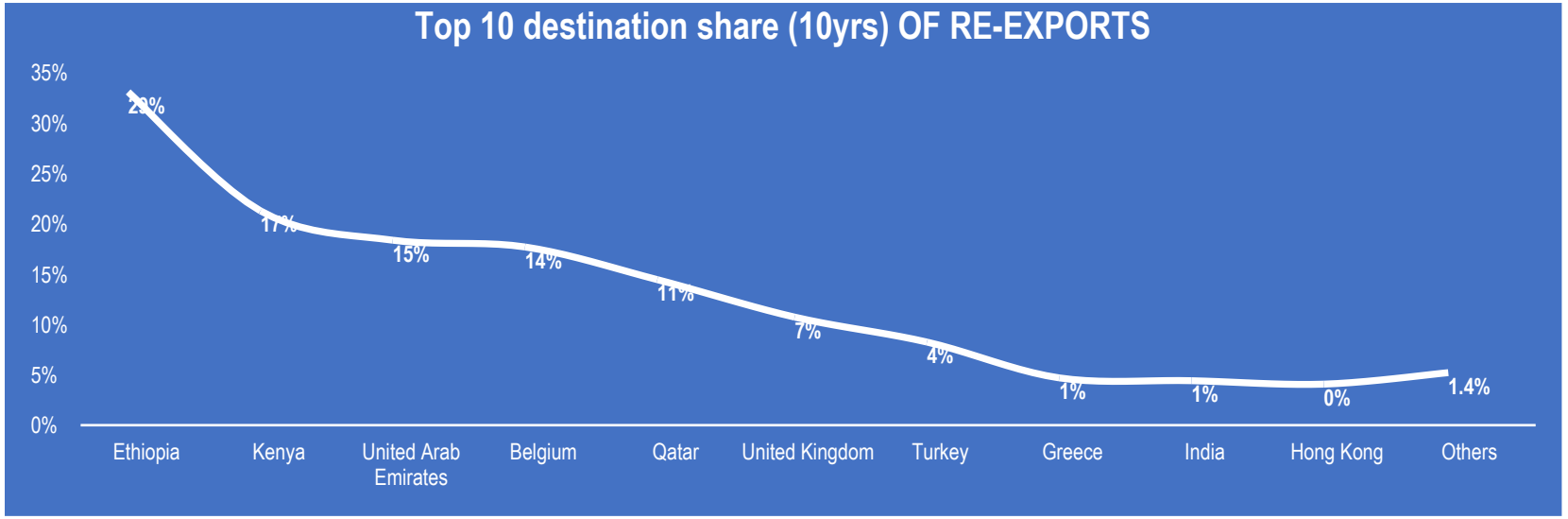
Appendix 7-4-1: Top Ten Destinations of Re-exports



Source: Data adapted from data from NISR conducted for research on Rwanda's aviation sector (2024).

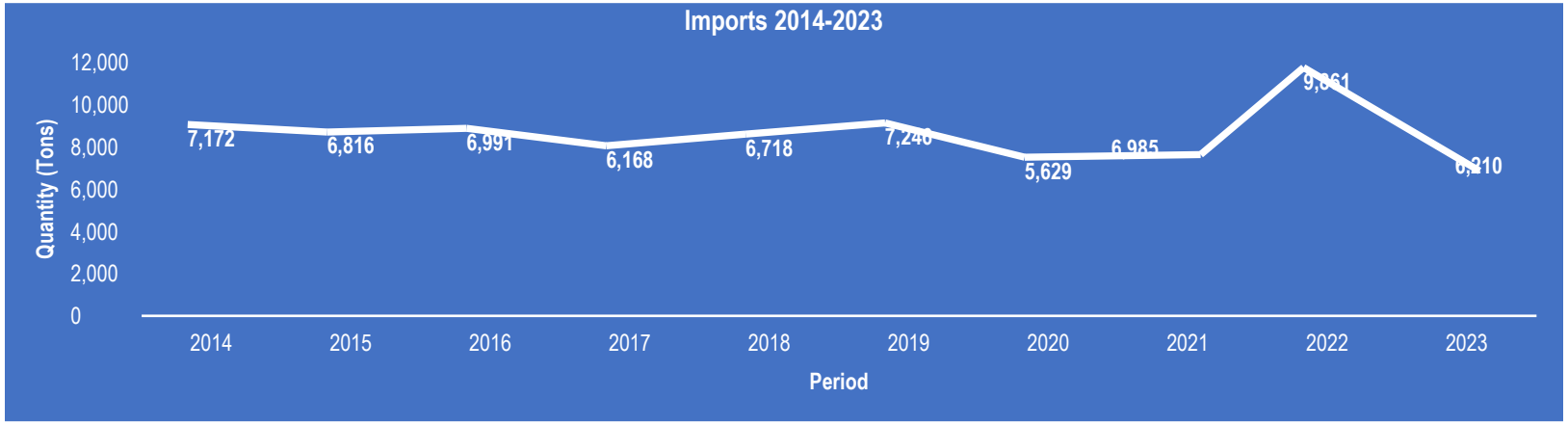
Re-exports destinations are very crucial, as they indicate where focus should be made. In the last ten years, top 5 Rwanda re-exports destinations are Ethiopia with29%, followed by Kenya with 17%, then UAE with 15%, Belgium with 14% and Qatar with 11%.

Appendix 7-4-2 Top 10 Destination Share of Re-exports



Source: Data adapted from data from RwandAir conducted for research on Rwanda's aviation sector (2024).

Appendix 7-4-3 Year Imports [2014-2023] in Metric Tons



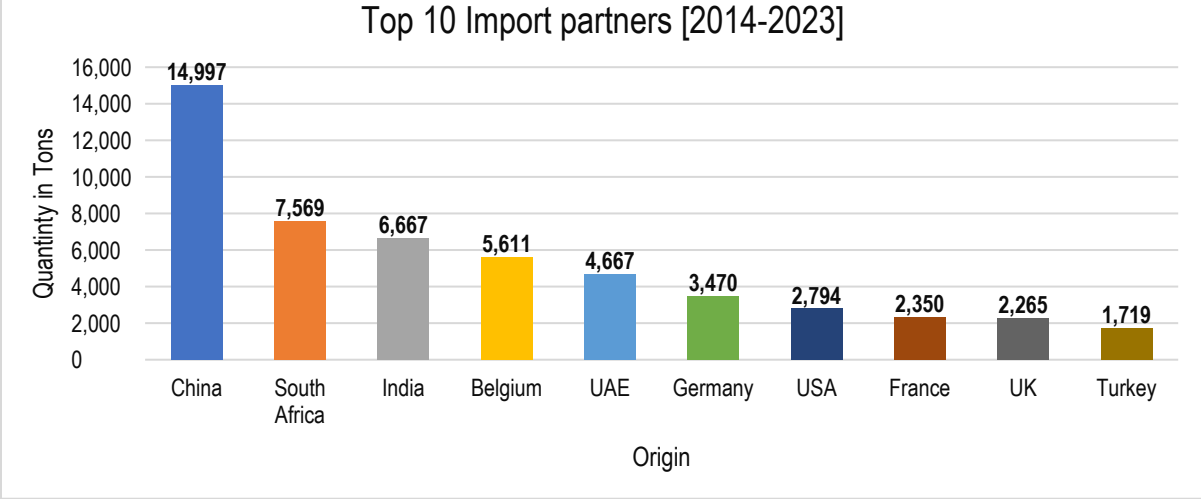
Source: Data adapted from data from NISR conducted for research on Rwanda's aviation sector (2024).

Appendix 7-5 Top 10 Imports Partners [2014-2023]

No	Partner (Origin)	Quantity in tons	% vs Total
1	China	14,997	21%
2	South Africa	7,569	11%
3	India	6,667	10%
4	Belgium	5,611	8%
5	UAE	4,667	7%
6	Germany	3,470	5%
7	USA	2,794	4%
8	France	2,350	3%
9	UK	2,265	3%
10	Turkey	1,719	2%
11	Others	17,685	25%
Total		**69,796**	**100%**

Source: Data adapted from data from NISR conducted for research on Rwanda's aviation sector (2024).

Appendix 7-6 Top 10 Import partners [2014-2023]



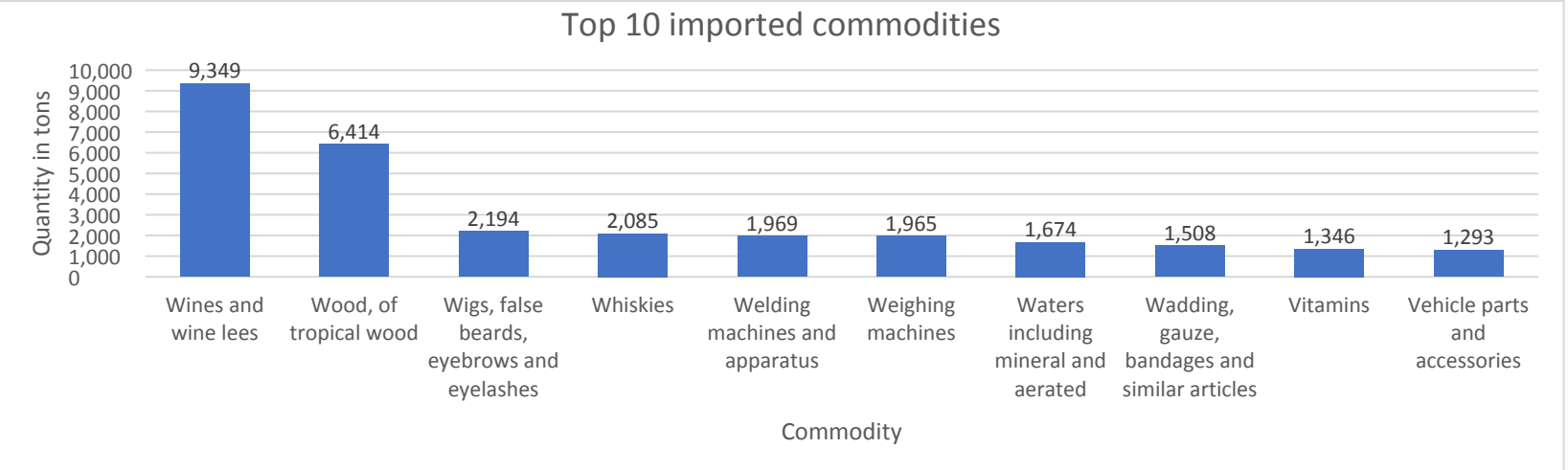
Source: Data adapted from data from NISR conducted for research on Rwanda's aviation sector (2024).

Appendix 7-7-Top ten Imported Commodities [2014-2024] in Metric Tons

#	Commodity	Quantity	%Share
1	Wines and wine lees	9,349	13%
2	Wood, of tropical wood	6,414	9%
3	Wigs, false beards, eyebrows and eyelashes	2,194	3%
4	Whiskies	2,085	3%
5	Welding machines and apparatus	1,969	3%
6	Weighing machines	1,965	3%
7	Waters; including mineral and aerated, containing added sugar or other sweetening matter or flavored	1,674	2%
8	Wadding, gauze, bandages and similar articles	1,508	2%
9	Vitamins	1,346	2%
10	Vehicle parts and accessories	1,293	2%
11	Others	41,292	59%
Total		69,796	100%

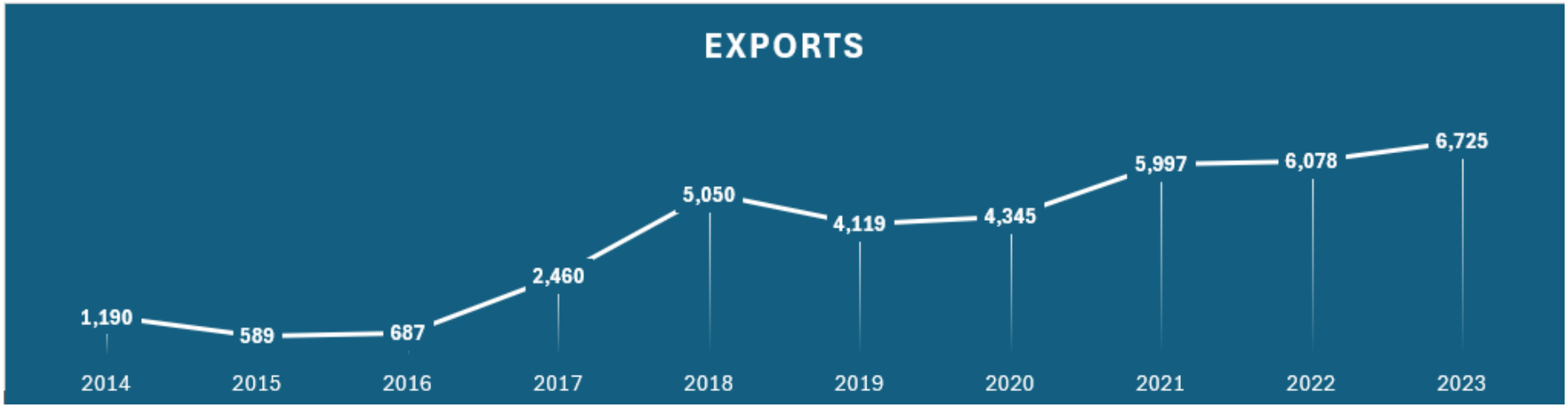
Source: Data adapted from data from NISR conducted for research on Rwanda's aviation sector (2024).

Appendix 7-8 Top 10 Imported Commodities



Source: Data adapted from data from NISR conducted for research on Rwanda's aviation sector (2024).

Appendix 7-8 10 Year Exports [2014-2023] In Metric Tons



*S*ource: Data adapted from data from NISR conducted for research on Rwanda's aviation sector (2024).

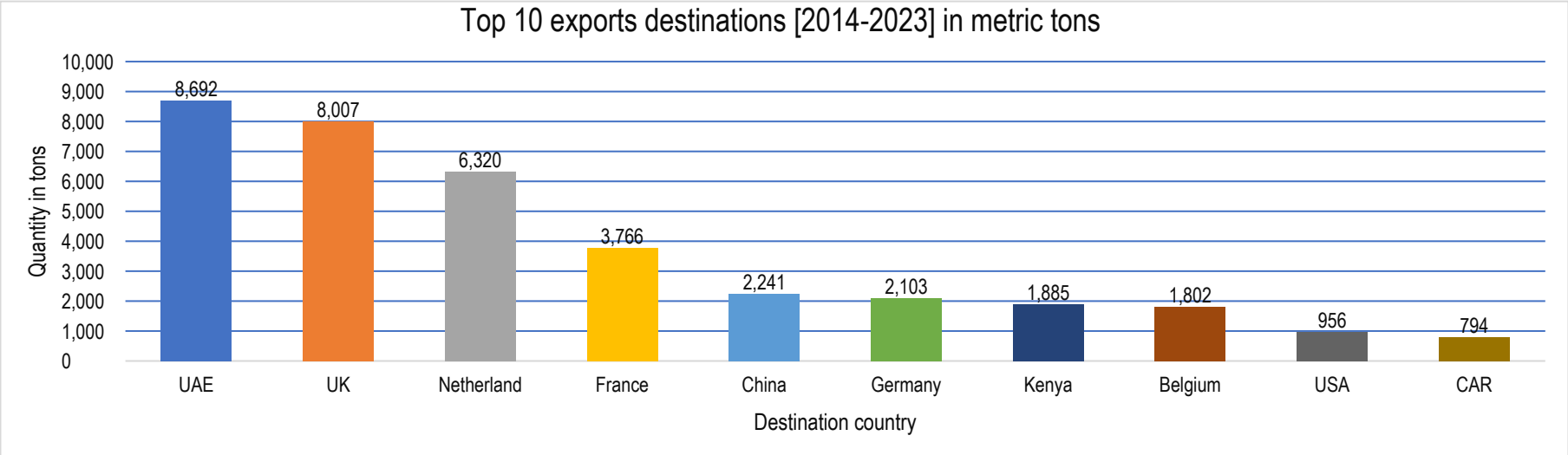
Appendix 7-8-2 Top 10 Exports Partners [2014-2023] In Metric Tons

No	Partner (Origin)	Quantity in tons	% vs Total
1	UAE	8,692	12%
2	UK	8,007	11%
3	Netherland	6,320	9%
4	France	3,766	5%
5	China	2,241	3%
6	Germany	2,103	3%
7	Kenya	1,885	3%
8	Belgium	1,802	3%
9	USA	956	1%
10	CAR	794	1%
11	Others	33,230	48%
	TOTAL	**69,796**	**100%**

Source: Data adapted from data from NISR conducted for research on Rwanda's aviation sector (2024).

Rwanda's key destination markets of exports during the ten years [2014-2023] were the United Arab Emirates (12% share), the United Kingdom (11% share), Netherland (9%share), France (5% share) and China (3% share). These five countries represent 40% share of total quantity exports.

Appendix 7-8-3 Top 10 Exports Partners [2014-2023] in Metric Tons by Destination



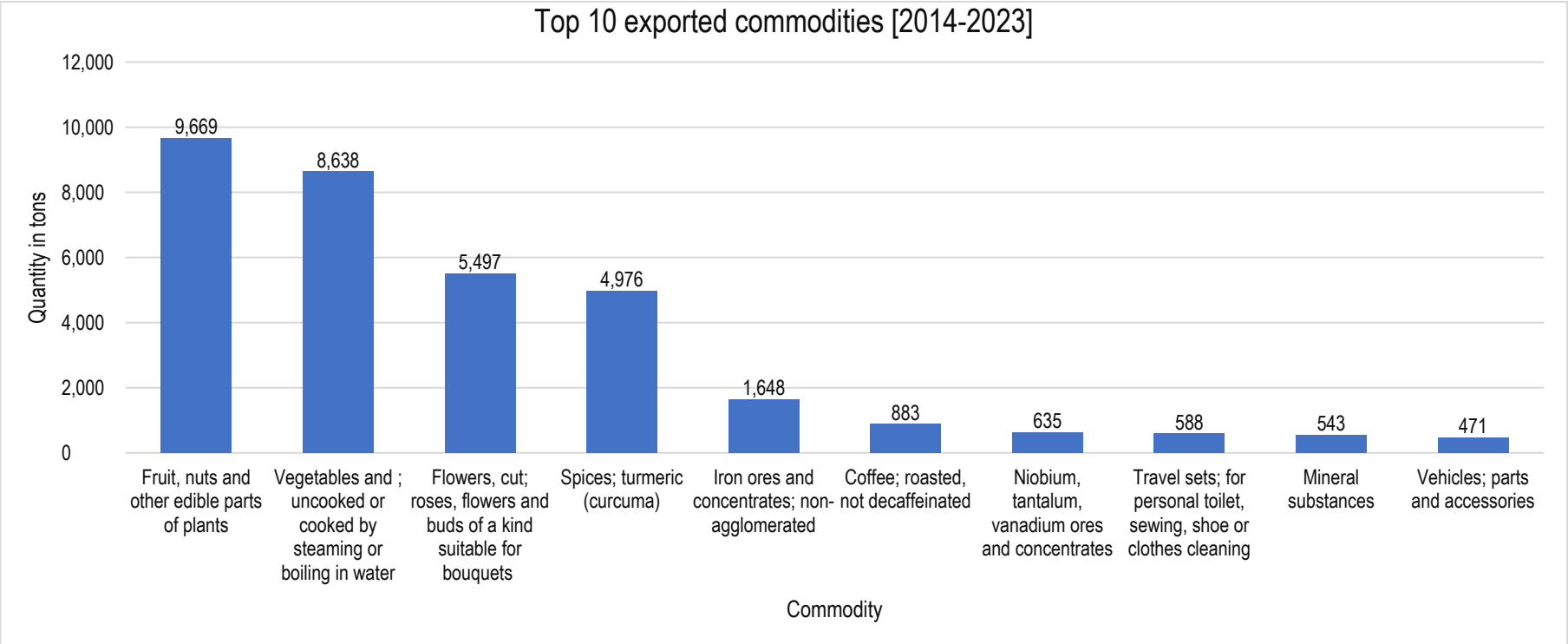
Source: Data adapted from data from NISR conducted for research on Rwanda's aviation sector (2024).

Appendix 7-8-4 Top 10 Exported Commodities [2014-2023] in Metric Tons by Item

#	Commodity	Quantity (tons)	% Share vs Total exports
1	Fruit, nuts and other edible parts of plants	9,669	26%
2	Vegetables and; uncooked or cooked by steaming or boiling in water	8,638	23%
3	Flowers, cut; roses, flowers and buds of a kind suitable for bouquets	5,497	15%
4	Spices; turmeric (curcuma)	4,976	13%
5	Iron ores and concentrates; non-agglomerated	1,648	4%
6	Coffee; roasted, not decaffeinated	883	2%
7	Niobium, tantalum, vanadium ores and concentrates	635	2%
8	Travel sets; for personal toilet, sewing, shoe or clothes cleaning	588	2%
9	Mineral substances	543	1%
10	Vehicles; parts and accessories	471	1%
11	Others	3,694	10%
Total		**37,241**	**100%**

Source: Data adapted from data from NISR conducted for research on Rwanda's aviation sector (2024).

Appendix 7-8-5 Top 10 Exported Commodities [2014-2023] in Metric Tons and Items



S*ource: Data adapted from data from NISR conducted for research on Rwanda's aviation sector (2024).*

In terms of commodity groups, the top exported products were “Fruit, nuts and other edible parts of plants (with 26% share)”, “Vegetables and; uncooked or cooked by steaming or boiling in water ” (23% share), “Flowers, cut; roses, flowers and buds of a kind suitable for bouquets” (15% share), “Spices; turmeric (curcuma)”(13% share) and Iron ores and concentrates with 4% share. The top five exported commodities account for 81% of the total exports for the ten years.

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