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**What is the Impact of Airline Alliances? A Case Study of Qatar Airways Investment in Rwanda**

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**Submitted in partial fulfilment of the requirements for the Degree of  
Bachelor of Business Science in Financial Economics at Strathmore University**

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**Nairobi, Kenya**

**February 2021**


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## **DEDICATION**

I dedicate this to my family who gave me invaluable moral support throughout the period. They have been instrumental and inspirational to my starting and conclusion of my undergraduate degree program. I will forever cherish them for being there for me and to appreciate the irreplaceable support that gave me the incentive to soldier on.

## ABSTRACT

The study aimed to establish the impact of airline alliances with a case study of Qatar Airways investment in Rwanda. In precision, was to determine the impact of Qatar airways venture in Rwanda on passenger traffic through Bugesera international airport and the impact of Qatar airways venture in Rwanda on passenger traffic through Jomo Kenyatta International Airport and Addis Ababa Bole International Airport. The study was guided by the event study methodology, dummy variable approach, in its analysis. The data in consideration is air passenger numbers for four hubs from the years 2010 to 2018. A dummy variable was introduced for the year post the venture to analyse the effects. The results showed that the venture did have an impact on passenger number traffic in Bugesera, Jomo Kenyatta, and Bole International Airports. The airports registered increases in air passenger traffic of 444,639, 841,767 and 4,468,258 annually respectively. Increases in passenger traffic for the hubs led to the conclusion that the hubs are complementary as opposed to being competitive. The r-squared from the regression analysis were 57.15, 61.8% and 73.7% respectively which led to the implication that impact of the dummy explained the variations in passenger traffic in Bugesera, Jomo Kenyatta and Bole International Airport's respectively. Policy implications from the study concluded that smaller airlines benefit from forming an alliance with already established airlines and that leading hubs also benefit from alliances. The study therefore met the objectives.

**Key words:** Airline alliances, Qatar venture, Impact of alliances

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## **List of Abbreviations**

<b>IAG</b>	International Airlines Group
<b>IATA</b>	International Air Transport Association
<b>ICAO</b>	International Civil Aviation Organization
<b>ILO</b>	International Labour Organization
<b>KIA</b>	Kigali International Airport
<b>AR</b>	Abnormal Return
<b>CAR</b>	Cumulative Average Residual
<b>JKIA</b>	Jomo Kenyatta International Airport

## ACKNOWLEDGEMENT

My special thanks and appreciation to God the Almighty for the good and safe life that He gave me and the blessings he showered. I thank my supervisor, Dr. Jackson Idi Mdoe. Without his assistance and dedicated involvement in every step throughout the process, this research paper would not have come this far. I, once again, thank you for your support and your ability to understand me over the past few months. He has greatly inspired me with his vision, sincerity and motivation. It was a privilege and honour to work and study under his guidance. Most importantly, without my family, none of this could have been done. In their ways, they offered encouragement. With all the ups and downs, they retained their kindness and supportive nature as I did my research. As proof of their unconditional love and encouragement, this research work stands.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background

Air transport is a major industry in the global economy. The birth of the aviation industry dates its origin to 1903. The preceding years saw advancements in the modern-day aviation industry. Arguably, many nations across the world invested heavily in this industry for its growth to date, Qatar's state being one of them. Qatar Airways is one of the fastest-growing carriers in the aviation industry. Opening its doors following its relaunch in the year 1997, the airline has undergone rapid expansion as it boasts of 151 destinations worldwide. Offering its unmatched levels of service excellence earned the airline the title of 'Voted Airline of the Year 2011 and 2012' in the prestigious Skytrax Industry Audit (Pecha, 2014). Today's aviation industry has seen the transformation that technology has impacted in this industry in recent years. With passengers having alternative airlines to choose to fly with, airlines across the world have been looking for ways on how to maintain and grow their positions in the competitive environment. Qatar has been able to achieve this expansion with its new routes growth of about 30% yearly (Pecha, 2014).

Rwanda's aviation sector was a key economy enabler that would connect the landlocked country to markets across the world. In realization of the growth of this sector, the government elaborated Vision 2020 which was adopted twenty years before its realization. Commencements of the airline's operations began on April 2003 and today, the airline, RwandAir, boasts of 12 high capacity fleet aircraft. It is important to note that RwandAir formally joined IATA in May 2015. Kigali International Airport has over the years been experiencing increased passenger growth of about 13% annually. Prior investments were made to expanding KIA but the rapid growth in Rwanda's economy necessitated a need to construct a new airport. Initially, KIA was designed to cater to 400000 passengers but these numbers grew with KIA serving 710000 in 2016 (Bicknell et al, 2017). The construction of the new airport was estimated to cost \$820million but the figures rose to \$1.3billion following redesigns. This necessitated a need for more funding and an agreement was reached between the Rwandan government and Qatar in which Qatar acquired a 60% stake in Bugesera International Airport.

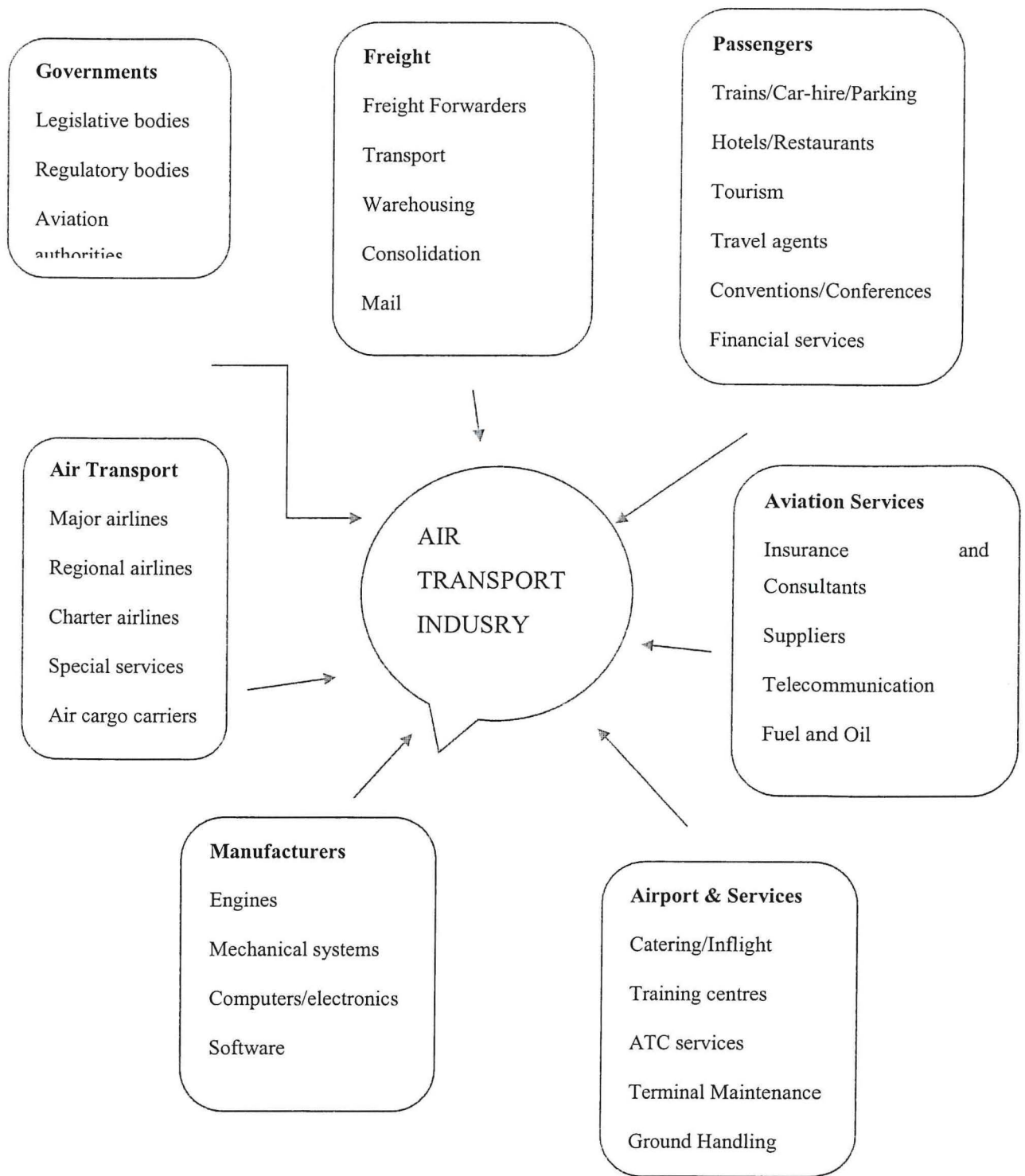


Figure1.1 A glimpse of the air transport network

Source: ILO: Civil aviation and its changing world of work (2013)

According to ILO (2013), air transport systems are interdependent, involving airlines, all service providers, and authorities on the ground.

## 1.2 Strategic Management Models Used by Qatar Airways

With its efficient strategic management, Qatar seeks to expand its horizons in the African continent and thus fully exploiting the opportunities that Africa presents. Strategic management entails an analysis of the industry at large. Industry transformations stem from significant technological changes (Yusuf & Ferhan, 2017). The airline industry is no exemption as its constantly changing and requires innovation of its products that transform its value to its stakeholders. Many different business models have been employed tailored to the specific airline's business design (Yusuf & Ferhan, 2017).

Table 1.1 Models used by airlines to accomplish Strategic Management

MODEL	DESCRIPTION
PORTER'S 5 FORCES ANALYSIS	The Porter's Five Forces is a model that is used to measure competition, intensity, attractiveness and profitability of an industry in context to its market.
PESTEL	The PESTEL framework is a macroeconomic tool that analysis the influence of a factor to business performance.
SWOT	SWOT is an analysis tool that identifies a firm's strengths, weaknesses, opportunities and threats in order to facilitate its strategic planning.
CPM MATRIX	The Competitive Profile Matrix is a tool that firms used to compare their external environment competition relative to a similar firm in the field of operation.
EFE MATRIX	The External Factor Evaluation Matrix is a tool used to evaluate a firm's existing strategies.
SMARTER MODEL	The SMARTER model is used for defining an organization's objectives.

Source: Pecha (2014)

The evidence being presented in Table 1.1 shows the models that have been incorporated by Qatar Airways to achieve its strategic management. This implies that the airline industry uses a combination of some of the models illustrated in table 1.1 to achieve its strategic management.

### **1.3 Main Developments**

Qatar Airways' rapid expansion has seen the airline take drastic steps in acquiring shares of competitor airlines. In 2015, Qatar acquired a stake of 9.999% in the International Airlines Group and before increasing it to just over 20% in 2016 (Beresnevicius, 2019). In 2020, Qatar went further ahead increasing its stake in IAG from 21.4% to 25.1%. Additionally, Qatar Airways owns a stake of 9.6% in Cathay Pacific, 10% stake in Latam Airlines that it acquired in late 2016, 5% stake in China Southern Airlines, which is the largest fleet in Asia, and a 49% stake in AirItaly's parent company AQA Capital Limited (Beresnevicius, 2019).

Recently, the airline has set itself to acquiring a 49% stake in RwandAir, Rwanda's national carrier as it seeks to grow its presence in the African continent. This comes after its acquisition of a 60% stake in the on-going construction of the Bugesera Airport that will place Rwanda's aviation industry on the global map. It is with no doubt that the expansion of Qatar Airway is bringing a profound significance to the aviation industry. More so, its presence in Africa poses a threat to some of the leading airlines such as Ethiopian Airways. Furthermore, its stake in the expansion of the Bugesera Airport would see its transformation into the region's leading hub in East and Central Africa. This poses a huge threat to the current region's leading hub, The Jomo Kenyatta International Airport. It thus calls for an analysis of the impact of this alliance on the East and Central African region.

### **1.4 Conceptualization of the Study**

The past 30 years have seen a number of changes in the airline industry (IATA, 2018). The coming years have airlines anticipating larger changes in this industry. The most important aspect is for airlines and authorities to control them to prepare for future opportunities and challenges to be encountered. It is important too in identifying the drivers of change in order to explore market gaps and threats. According to IATA (2018), the STEEP framework (Society, Technology, Economics, Environment, and Politics) was adopted in order to identify both drivers and threats that might impact the external environment of the industry. These drivers act as stepping stones to trends that aviation experts need to be on the look-out for the future.

Population across the world has been improving owing to improved health care facilities and services. Trends in middle-class growth in Africa and Asia-Pacific are expected to have a great impact on the airline industry (IATA, 2018). With these growths in middle-class societies, more travellers are anticipated to emerge from the non-traditional markets. The

most important question posed on airlines is on how it will tackle the demands especially from the younger generations as the main customer base.

In terms of technological advancements, the airline industry is seen to adapting to new technological advancements as opposed to leading these advancements. According to IATA (2018), some of the disruptions posed in the industry include energy breakthroughs, alternative modes of transport, large data availability and transparency, quantum computing, and new manufacturing tools. Concerns are as to whether how will the industry redesign itself in being the developer rather than adapt to developments so as to be the lead front liner in the technological sector.

Governments across the world are said to be the main influencers of the birth and development of airline industries. This has been seen through infrastructural developments, support for flag bearer carriers, and regulations (IATA, 2018). The key question however is on the evolution of the relationship between the government and the industry. The impact of climate change as a result of human activities has posed a great concern to aviation stakeholders. The key to these concerns is the alternative sources of energy that can be used to drive the industry. With increased pressure surrounding climate change, there has been a need for airlines to develop techniques in the short, medium, and long term on how to counter the threat of climate change as a result of human activities. The global economic growth as a result of globalization has led to increased markets for trade in effect increasing consumer bargain power. Trade wars from oil-producing countries have provided uncertainty as to whether innovations of alternative energy sources could be used to drive this industry.

### **1.5 Problem Statement**

The African continent has been experiencing steady economic growth over the past few years. Despite this, the continent only accounts for 3% of the world's travellers. There are many factors that have influenced the slow growth of air transport in the African continent. One of these factors is ticketing prices. It is expensive to travel within and outside Africa largely because of the high-ticket prices. In addition, the lack of domestic flights has also been a concerning problem. For example, a trip from Abidjan to Kampala would see a stopover in Istanbul as both countries lack direct flights. Furthermore, Africa's air transport infrastructure is not fully developed and thus continues to pose a great challenge to the growth of the industry. Lastly, African carriers such as Ethiopian Airways, Kenya Airways, Royal Air Maroc, and Egypt Air have steadily increased their carriers but still cannot

compete with European and Middle Eastern carriers which cover 80% of the African market. However, the global aviation industry is projected to grow immensely with passenger numbers increasing from 2.7 billion as of 2010 to 5.9 billion in 2030 with the African market contributing to over 356 million passengers.

To take advantage of the projected growth in passenger numbers and address her handicap in not being able to develop aviation infrastructure, Rwanda has partnered with Qatar airways. This partnership is geared towards the development of the Bugesera hub in the capital Kigali. The hub is likely to compete with existing hubs in the region such as Jomo Kenyatta International Airport and the Addis Ababa Bole International Airport. It is the outcomes of this nature that are of interest to this study.

### ***Research Question***

- i. What is the impact of Qatar airways venture in Rwanda on passenger traffic through Bugesera international airport?
- ii. What is the impact of Qatar airways venture in Rwanda on passenger traffic through Jomo Kenyatta International Airport and Addis Ababa Bole International Airport?

### ***Research Objectives***

#### ***Main Objective***

The main objective of this study was to understand the impact of airline alliances. In particular, the case of Qatar airways venturing in Rwanda.

#### ***Specific Objective***

- i. Establish the impact of Qatar airways venture in Rwanda on passenger traffic through the Bugesera hub
- ii. Establish the impact of Qatar airways venture in Rwanda on passenger traffic through Jomo Kenyatta International Airport and Addis Ababa Bole International Airport

### **1.6 Significance of the Research**

RwandAir has been considered one of the fastest-growing airlines in Africa (Bizimungu, 2020). One of the elements that have seen the country desirable is that its strategic position places it at the centre of Central and East Africa. More so, Rwanda enjoys a stable political environment. Lastly, Rwanda has an attractive business environment thus implying great potential in the growth of its economy. Qatar Airways aims at establishing a greenfield

airport which the African continent has not had for decades (Bizimungu, 2020). This will see job creations, economic uplifts as well as improvement in the standard of living for the people of Rwanda.

One of the benefits this alliance will impact Rwanda is economic growth. According to World Bank (2020), Rwanda's growth rate stood at 7.5% as of 2018. Projections have been done and concluded that the hub, Bugesera, will in the short-run be able to connect 1.5 million passengers and in the long-run support over 3 million passengers. Bugesera hub will be the newest green hub airport in Africa. This alone is likely to increase the popularity of the airport. Rwandese will enjoy increased employment opportunities as the construction and completion of the airport would require well trained and skilled personnel to maintain the airport facilities. The general standards of living amongst Rwandese will improve. With these, the country has been projected to be classified as a middle-income country by 2035 and a high-income country by 2050 (World Bank, 2020).

### **1.7 Scope and Organization of the Study**

This study will contain five chapters: chapter one contains the introductory section of the study, chapter two contains the literature review and empirical reviews that have been previously conducted in the area of research and lastly, chapter three contains the data collection, methodology, and tests conducted as well as conclusions arrived at and the general conclusion to the study. Chapter four deals with data analysis while chapter five concludes with the summary, conclusions and implications.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter introduces the literature review aspect related to airline alliances. Section 2.2 introduces the theoretical literature review. Additionally, section 2.3 introduces the empirical literature review and the last section, 2.4, concludes with an overview of the chapter.

#### 2.2 Theoretical Literature Review

Various competing theories have been put forward to explain the impact of alliances on the performance of cooperating firms and competitors. These theories include the cooperative game theory and the multimarket competition theory. This section discusses these theories.

Game theory as a field on its own was put forward by John von Neumann and Oskar Morgenstern (1944) in the publication titled 'Theory of Games and Economic Behavior'. Before this, researchers Antoine Cournot (1838) and Emile Borel (1921) had introduced a formal theory of game analysis. The theory incorporates three elements: players, strategies, rules, and payoffs. This theory attempts to explain how payoffs are realized in an environment of strategic interactions that was put forward by John Nash in 1950. That is, what one player gets is dependent not only on their actions but also on the actions of the competitors. Games are described as being either cooperative or non-cooperative. Cooperative game theory explains the payoffs that each group can obtain by the cooperation of its members. In contrast, non-cooperative game theory models the process in which players make choices in such a way it maximizes their self-interest. The key assumption in game theory is that the players are assumed to exhibit self-interested rationality. That is, the players make decisions that will optimize their payoffs given what the competitor has done. Cooperative game theory has been used over the years to explain airline mergers and coalition decisions. As a result, the coalition in airline alliances leads to its effectiveness is realized. The strength of the game theory is that its methodology provides for structuring and analysis of strategic choices. However, this theory's shortcoming is that it is subject to strict regulation, and any deviation results in huge penalties.

Multimarket competition theory refers to competitive situations in which firms in the same line of business compete against each other in multiple markets. This theory was greatly driven by Michael Porter's (1979) five forces of competitive analysis that assessed the

competitive strength and business position of firms. Increased multimarket competitions have been attributed to increased product and service diversification and geographical diversification. This theory is driven by five main elements, focus on rivalry, resource economizing entry, multimarket spill-overs, multimarket collusion, and one-sided and reciprocal entry. From an aspect of resource economizing entry, strategic barriers of entry impeded thus economizing on entry cost. Therefore, the multimarket analysis offers a framework for analysing entry strategies. The strength of this theory is that it explores the strategic implication of transfers of the market from a firm's home market to a new entrant market. However, the weakness of this theory is that it may lead to an entrant opportunity cost being zero if excess resources are employed.

Event studies theory put forward by Ball and Brown (1968) examines the behaviour of a firm's wealth around events. This theory has become an important field in economics since its key assumption is versatility, able to use many skills. It explains the abnormal returns of a firm persistent after an event. Event studies theory explains both short-run and long-run horizon effects. The strength of this theory is that it measures the magnitude of abnormal performance at a time of an event providing the impact of this event on the firm. Thus being more reliable in the short run. However, it is unreliable in the long-run, despite leading to market efficiency in this horizon, since it lacks valid long run methods thus problematic to interpretation. Furthermore, short-run horizon events may not provide evidence on market efficiency.

### **2.3 Empirical Literature Review**

Perezgonzalez & Lin (2010), conducted a study that focused on the net returns for airlines before and after joining an alliance. Data was compiled from the ICAO database and comprised of fifteen airlines. The duration of the study involved the use of net returns of these airlines over a period of 11 years. The two key variables of interest were the airlines' average three to five year's net performance compared to the average net performance five years after joining the alliance. The results from the study conducted showed a general decline in net return after the alliance and also highlighted the major effect of unpredicted events play on airline net returns. The strength of this study is that it focuses on the immediate short term effects of airline alliances. However, one of the major weaknesses of the study is that it failed to capture some important variables that play an important role in airline alliances analysis, operational costs, and the number of passengers. Additionally, the study focuses on short term net return effects in which its analysis shows negative net returns

for the airlines in the study after an alliance. In the long-term, alliances are anticipated to having an impactful growth in net profitability returns.

Dimanche and Jolly (2006), conducted a study on airline alliances and distribution systems. They identified the main mega-network systems in the air transport alliances: star alliance, one-world, and sky-team. The study further highlights benefits associated with alliances at both consumer-level and firm-level. For organizations to co-exist, they need to have in place a common goal, jointly pool resources for the success of the cooperation, produce results higher than that of its independence before and ensure its objectives are in line with global trends to provide balance with its ally. Dimanche and Jolly (2006) classified alliances as being either endogamy or exogamy. Endogamy alliances are referred to as the situation in which allies operating in the same value chain bring together their similar resources and avoid undifferentiated resources while exogamy alliances involve allies operating in different value chains and together try combining their different resources. Endogamy alliances are viewed as the traditional partnerships while exogamy is the mega modern partnerships. The study postulates that exogamy alliances play an important role in competitive environments as well as consumer behaviour. The weakness of the study is that it fails to describe its data collection and measurement analysis in conclusion to the role exogamy alliances play on competition environments and consumer behaviour.

Li and Netessine (2011) conduct a study that looks at the changes in airlines' entry and capacity decisions, operational costs, after airline alliances. Previous studies had suggested that decreased competition will result in a decrease in production level but the study conducted by the two researchers contradicts previous findings. Li and Netessine (2002) show that as the level of competition reduces, partners often seek to increase their capacities in markets they cooperate. Data was sourced from the Bureau of Transportation Statistics' T-100 Domestic Segment Data and Airline Origin and Destination Survey. The variables used were: number of enplaned passengers, seat capacity, and the load capacity on yearly basis information. The study runs from 1998 to 2006 and uses the Panel data in modelling. The study uses past lagged values to balance the prior and latter periods around major alliance events. This study however laid little emphasis on the long-term effects of airline alliances.

Iatruo and Alamdari (2005) conducted a study to assess the impact of airline alliances on its operations and passenger traffic. To answer this, the authors conducted a comprehensive survey in the four global strategic alliance teams, sky-team, wings, star alliance, and one-world in 2002. The criteria taken during the survey included: highlighting the type of route,

size of the carriers, and origin of the carriers. From the study, the key driver for airline alliances was to reduce operational costs. Airlines believed that they would be better off in an alliance than remaining unaligned which leads to the loss of passenger traffic to other alliance groupings. Furthermore, these saw an increase in passenger traffic. With regards to the route type, passenger increase was realized more on the hub to hub routes than non-hub to hub and non-hub to non-hub routes. In addition, in terms of fleet size, large carriers have experienced a 5% increase in traffic while medium and small carriers experience 15% growth not until two years in the alliance. Lastly, carriers benefited from their geographical regions, Central and South American carriers. The strength of this study is that it assesses airline growth within the four main alliances. However, the weakness associated with the study is that it uses surveys to back its findings. It would have been better to use data to back up its findings as it provides more quantitative analysis.

#### **2.4 Overview**

There have been multiple studies carried out to determine the effectiveness of airline alliances. However, the majority of these studies have paid an extensive focus on the European, North American, and Asian markets. The African air transport industry has experienced forms of alliances over the years but little is known of these alliances. Qatar's venture in Rwanda provides an area of research that would analyse the effectiveness of airline alliances in the African market. As event study methodology seeks to establish the impact of a firm's wealth after an unprecedented event, this study incorporates the use of an abnormal return to capture the changes in passenger traffic.

## CHAPTER THREE

### RESEARCH METHODOLOGY

#### 3.1 Introduction

This chapter provided an analysis of how the research questions and objectives will be achieved. Kothari (2004) states that methodology gives in-depth details on the approaches and procedures in conducting research studies. This chapter begins with section 3.2 that outlines the research design. Section 3.3 highlights the research model used. Section 3.4 will contain the data collection and analysis. Section 3.5 will contain the data analysis and lastly, section 3.6 will contain the diagnostic check.

#### 3.2 Research Design

This study incorporated the use of secondary data in establishing the impact of Qatar Airways venture in Rwanda on passenger traffic through Bugesera, JKIA and Bole international airports. The study employed the use of the deductive approach in research that aimed to move from theory to data.

#### 3.3 Theoretical Framework

The study was anchored using the event study approach proposed by Ball and Brown (1968). There are two regressions based on the event study approach: dummy event variable and quantitative event variable. The dummy event variable involved a regression on the coefficient that indicated the abnormal return whereas the quantitative event variable involved a regression on the coefficient indicating the marginal effect on the returns as using the variable behind the event changes by one unit. Since the theory was establishing the impact of Qatar airways venture in Rwanda on passenger traffic through Bugesera, Jomo Kenyatta, and Bole international airport's, the model was as below;

Setting  $t=0$ , representing the time of the event

$$R_{i,t} = K_{i,t} + e_{it} \quad (1)$$

Where;

$R_{i,t}$  represents the period return relative to the event  $t$

$K_{i,t}$  represents the normal return

$e_{it}$  represents unexpected (abnormal) return

Therefore, the abnormal return, which in the study was measuring the change in passenger traffic, was given as

$$e_{it} = R_{i,t} - K_{i,t} \quad (2)$$

It is interesting to note that the normal return,  $K_{i,t}$  can be estimated in two ways, first by estimating the sample mean and secondly using a market model.

### 3.4 Empirical Model

From the theoretical framework, the error term captured the abnormal returns (changes in passenger traffic). From the reviewed empirical literature, other variables used to measure the impact of airline alliances include operational costs and net return. Since the study was interested in measuring the impact of Qatar airways venture in Rwanda on passenger traffic through Bugesera, Jomo Kenyatta, and Bole international airports, cross-sectional aggregations were used.

The null hypothesis developed for the aggregation was that abnormal returns, passenger traffic, at the time of the event were zero. Thus, implying that passenger traffic at the time of the event was not different from the normal return.

### 3.5 Definition and measurement of variables

The variable used in this study was defined and measured as shown in Table 3.1

Table 3.1: Definition and measurement of variables

Variable	Definition	Scale
Passenger traffic	Annual air passenger carried	Passengers carried

### 3.6 Data analysis

The first objective of the study was to determine the impact of passenger traffic through Bugesera. The objective was to be achieved through cross-sectional aggregation as it determined the cross-sectional distribution of passengers at the time of the event as being abnormal. The model is as below

$$AR_t = \frac{1}{N} \sum_{i=1}^N e_{it} \quad (3)$$

N represents the airports

AR represents the abnormal return

The second objective which was to measure the impact Qatar airways venture in Rwanda on passenger traffic through JKIA and Addis Ababa Bole Airport and took the form below

$$AR_t = \frac{1}{N} \sum_{i=1}^N e_{it} \quad (4)$$

Abnormal returns are rarely useful in drawing general inferences about an event effect, impact, thus they are aggregated first resulting in the cumulative abnormal returns. In addition to the equation (4), the study was to, over the multi-period interval, measure the impact on passenger traffic for periods after the event, alliance, by using the cumulative average residual, CAR, method of the form below

$$CAR(t_1, t_2) = \sum_{t_1}^{t_2} AR_t \quad (5)$$

### 3.7 Data sources

Data was collected from the period 2010 to 2018. This timeframe was ideal since the airlines in the study were reasonably in operation. The estimation period before the alliance was between 2010 to 2015. The estimation window was 2016 when the alliance occurred. The post estimation window was 2016, 2017 and 2018. The post estimation window length was ideal as it determined the short term effects following the alliance. The CAR was assumed to follow a normal distribution with a mean of 0 and a variance of  $\sigma^2_{i,t}$ . A standardized test statistic, t-statistic, was used to calculate CAR. The aggregated standardized abnormal return test statistic is represented in equation 6 below

$$CAR(t_1, t_2) / [\sigma^2(t_1, t_2)]^{1/2} \quad (6)$$

Furthermore, equation (6) states that the test statistic was the CAR divided by its estimate of standard deviation. Since CAR may deteriorate in reliability, averaging was common especially in the case of multiple firms as represented in equations 3 and 4.

### 3.8 Pre-Estimation Diagnostics

#### 3.8.1 Heterogeneity Test

For diagnostics check, heterogeneity test was performed. The hypothesis was as follows

Null Hypothesis

Ho: Individual Uniqueness is equal to zero

Alternate Hypothesis

Ha: Individual Uniqueness is at least different for one group

The test statistic was given as:

$$T = k(k - 1) * \sum_{j=1}^k X_j - \frac{N}{k} / \sum_{i=1}^b X_i - (k - X_i)$$

(7)

Where: b = the number of blocks,

k = the number of treatments,

$X_j$  = column total for the  $j^{\text{th}}$  treatment,

$X_i$  = row total for the  $i^{\text{th}}$  block,

N = the grand total.

### 3.8.2 Unit Root Test

Unit root test was analysed using the augmented dickey fuller test. The hypothesis was as follows:

Null Hypothesis

Ho:  $\sigma=0$  ( $\rho=1$ ) Presence of unit root

Alternate Hypothesis

Ha:  $\sigma<0$  ( $\rho<1$ ) No unit root present

The equation for the test was given as

$$Y_t = \rho Y_{t-1} - \mu_t$$

(8)

## CHAPTER FOUR

### DATA ANALYSIS

#### 4.1 Introduction

This chapter contains an analysis of the data collected and the findings. The results were analysed using STATA.

#### 4.2 Descriptive Statistics

This section discussed the measures of central tendency of the data used for analysis. It informed whether the data had extreme values.

##### 4.2.1 Measures of Central Tendency

Measures of central tendency provide the average values of a data set.

Table 4.1 Summary statistics

Country Name	Observations	mean	Standard deviation	minimum	maximum
Ethiopia	9	6,791,073	2,602,472	3,347,022	11,501,244
Kenya	9	4,736,629	535,458	4,039,583	5,935,831
Rwanda	9	620,256	294,239	188,221	1,073,528

Table 4.1 showed the summary statistics of the variable used to determine hub traffic. These statistics were an aggregate of passenger numbers recorded between the years 2010 to 2018. According to table 4.1, Ethiopia recorded an average of 6,791,073 passengers with a standard deviation of 2,602,472. The standard deviation showed that there was a low dispersion of the observations from the mean implying that air passengers recorded in Ethiopia were closer to the mean. Additionally, the minimum and maximum recorded air passenger numbers were 3,347,022 and 11,501,244 respectively. This disparity showed how air passenger numbers vary across the years.

Table 4.1 also represented the average of Kenya. The average recorded was 4,736,629 passengers with the standard deviation given as 535,458. The standard deviation showed that there was a high dispersion of the observations from the mean implying that air passengers recorded in Kenya were far from the mean. The minimum and maximum recorded air passenger numbers were 4,039,583 and 5,935,831 respectively. This showed a low disparity in air passenger numbers across the year.

In addition, Table 4.1 represented the mean for passenger numbers recorded in Rwanda as 620,356. The standard deviation of 294,239 implied a low dispersion from the mean recorded and thus air passengers recorded in Rwanda were closer to the mean. The minimum and maximum recorded numbers were 188,221 and 1,073,528 passengers. This showed the disparity between air passenger numbers recorded across the years.

### 4.3 Pre-Estimation Diagnostics

#### 4.3.1 Heterogeneity

Table 4.2 Heterogeneity Test

(1) 2. country = 0
(2) 3. country = 0
F (2, 24) = 37.31
Prob > F = 0.0000

From table 4.2, the p-value of the coefficient, country, was given as 0.000 and was statistically significant at the 5% level of significance. This led to the null hypothesis being rejected implying that at least one of the country's had individual uniqueness.

#### 4.3.2 Unit Root Test

The presence of unit root or otherwise non-stationarity in the data for any variable of study may lead to spurious results because the results obtained from it will possess a mean and variance that is varying. Subsequently, the test used was the modified augmented dickey test. DF-GLS.

Table 4.3 Stationarity test at level

Country Name	Test Statistic	Critical value
Rwanda	--2.134	1% -3.770 5% -3.439 10% -2.646
Kenya	-0.988	1% -3.770 5% -3.439 10% -2.646
Ethiopia	-0.422	1% -3.770 5% -3.439 10% -2.646

From table 4.3, none of the variables, Rwanda, Kenya and Ethiopia, were stationary at level. It necessitated stationarity test differencing.

Table 4.4 Stationarity test at second difference

Country Name	Tau Test Statistic	Critical Values
Rwanda	-3.831	1% -3.770 5% -2.776 10% -1.599
Kenya	-2.805	1% -3.770 5% -2.776 10% -1.599
Ethiopia	-6.777	1% -3.770 5% -2.776 10% -1.599

The variables, Rwanda, Kenya and Ethiopia, were integrated of order (2) and from table 4.4, in absolute terms, they became stationary at the 5% level of significance.

#### 4.4 Empirical Results

This section presents the study findings based on the objectives of the study.

##### 4.4.1 Establish the impact of Qatar Airways venture in Rwanda on passenger traffic through Bugesera International Airport

The study involved cross sectional regression analysis for each country using time series analysis. The concept of event study methodology was useful in evaluating the impact of an event on a firm's wealth. It was assessed using the dummy variable approach to establish the impact of the venture by Qatar Airways in Rwanda. A linear regression was performed on each country.

Table 4.5 Linear Regression on Rwanda

VARIABLES	(1) Air Passengers
1.yeardummy	444,639** (145,702)
Constant	472,043*** (84,121)
Observations	9
R-squared	0.571

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

From table 4.5, the r-squared, that measured the goodness of fit of the model was given as 0.571, implying that the model explained 57.1% of the variations in passenger traffic in Rwanda's Bugesera international airport. The coefficient of the dummy variable, year dummy, was 444,639 and was significant at the 5% significance level.

#### 4.4.2 Establish the impact of Qatar Airways venture in Rwanda on passenger traffic through the Jomo Kenyatta International Airport and Addis Ababa Bole International Airport

Table 4.6 Linear Regression on Kenya

VARIABLES	(1) Air Passengers
1.yeardummy	841,767** (250,226)
Constant	472,043*** (144,468)
Observations	9
R-squared	0.617

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

From table 4.6, the r-squared, that measured the goodness of fit of the model was given as 0.617, implying that the model explained 61.7% of the variations in passenger traffic in Jomo Kenyatta international airport. The coefficient of the dummy variable, year dummy, was 841,767 and was significant at the 5% significance level.

Table 4.7 Linear Regression on Ethiopia

VARIABLES	(1) Air Passengers
1.yeardummy	4,468,258*** (1,008,968)
Constant	5,301,654*** (582,527)
Observations	9
R-squared	0.737

Standard errors in parentheses  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

From table 4.7, the r-squared was given as 0.737, implying that the model explains 73.7% of the variations in passenger traffic in Addis Ababa Bole international airport. The coefficient of the dummy variable, year dummy, was 4,468,258 and was significant at the 1% significance level.

#### 4.5 Objectives

##### 4.5.1 Establish the impact of Qatar Airways venture in Rwanda on passenger traffic through Bugesera International Airport

The first objective of the study was to establish the impact of Qatar Airways' venture in Rwanda on passenger traffic through the Bugesera International Airport. The variable of interest was air passenger numbers. A dummy variable was introduced, year dummy, to capture the years post the venture. The coefficient of the dummy variable, year dummy, was significant at 5% significance level. The results also showed that the coefficient of the dummy venture resulted in an increase of 444,639 passengers annually through the Bugesera International Airport. The r-squared explained 57.1% of the variations in passenger traffic through Bugesera International Airport.

Due to the limited literature on the event studies approach in analysing the impact of airline alliances. However, the results obtained are similar to the findings of Iatrueo and Alamdari (2005) in which airlines would be better off in an alliance than remaining unaligned which led to the loss of passenger traffic to other alliance groupings. The results in table 4.4, therefore also conform to theoretical implications.

#### **4.5.2 Establish the impact of Qatar Airways venture in Rwanda on passenger traffic through Jomo Kenyatta International Airport and Addis Ababa Bole International Airport**

The second objective of the study was to establish the impact of the Qatar Airways venture in Rwanda on passenger traffic through the Jomo Kenyatta International Airport and Addis Ababa Bole International Airport. Air passengers were the variable of interest. Since the methodology that guided the study was the event study methodology, the approach used was the dummy variable approach. The p-values were 0.012 and 0.003 respectively for JKIA and Bole International Airport. These p-values were significant at the 0.05 level of significance implying that the calculated test statistics were lower than the tabulated test statistics at the 5% significance level. The results also showed increases in passenger carries by 841,767 and 4,468,258 annually through JKIA and Bole International Airport respectively. The r-squared for JKIA was given as 61.8% while that of Bole was 73.7%. The r-squared for the two hubs explained the variations in passenger traffic.

There is limited literature on assessing the impact of airline alliances using the event study approach on established hubs. However, the above results will be compared to that of Perezgonzalez & Lin (2010) on establishing the impact of airline alliances on net returns. The results displayed in table 4.5 and table 4.6 are similar to their findings in that it captures the short term effects of alliances. The hubs, Jomo Kenyatta and Bole International Airports, in the short-term have benefited in increased number of air passenger traffic. Thus, conform to the theoretical implications.

## CHAPTER FIVE

### SUMMARY, CONCLUSION, AND IMPLICATIONS

#### 5.1 Summary

The objective of this study was to establish the impact of airline alliances, with the case study of Qatar Airways venture in Rwanda. The first objective was to establish the impact of Qatar Airways venture in Rwanda on passenger traffic through Bugesera International Airport. The second objective of the study was to establish the impact of Qatar Airways venture in Rwanda through passenger traffic in Bole and Jomo Kenyatta International Airports. The key variable in consideration was air passenger traffic numbers in the respective hubs under study. The event study methodology guided the regression analysis using the dummy variable approach. Secondary data used to perform the analysis was obtained from the World Bank databank and consisted of four hubs for the time period 2010 to 2018. The study showed that following the venture by Qatar Airways in Rwanda, led to increased passengers carried in Bugesera, Jomo Kenyatta, and Bole International Airports by 444,639, 841,767 and 4,468,258 respectively. This implied that the airports are complementary as opposed to being competitive.

#### 5.2 Conclusion

The first objective was to establish the impact of Qatar Airways venture in Rwanda on passenger traffic through Bugesera International Airport. The findings from the study concluded that the venture resulted in an increase in passengers carried through Bugesera International Airport. This leads to the conclusion that when an alliance is formed between an already established firm, in this case, Qatar Airways, with a growing firm, Rwanda's air transport industry, it leads to an increase in air passengers carried.

The second objective was to determine the impact of Qatar Airways' venture in Rwanda on passenger traffic through Jomo Kenyatta International Airport and Bole International Airport. The venture saw the hubs, JKIA and Bole International Airports, experience increases in passenger numbers. This leads to the conclusion that when the alliance was formed by the venture of Qatar Airways in Rwanda, JKIA and Bole International Airports also benefited from increased passenger numbers. Therefore, completing the venture as opposed to competing with it.

### **5.3 Policy Implications**

One of the policy implications drawn from the first objective that was establishing the impact of the venture by Qatar Airways in Rwanda through passenger traffic in Bugesera International Airport is that smaller airlines benefit from forming an alliance with already established airlines to increasing their capacity.

In addition, the venture by Qatar Airways in Rwanda resulted in an increase in air passenger numbers in the region's leading hubs, JKIA and Addis Ababa Bole International Airport. Therefore, the policy implication is that leading hubs do benefit from airline alliances.

### **5.4 Contribution to Knowledge**

The research was focused on establishing the impact of airline alliances with a case study of Qatar Airways venture in Rwanda. The study has brought to light the possibility of using Event Study Methodology in assessing the impact of airline alliances. The world of knowledge benefits from this study through its ability to address the impact of airline alliances using the Event Studies approach.

### **5.5 Areas for Further Research**

Future research should employ event study methodology in assessing the impact of airline alliances. This study incorporated one variable, air passengers, but further studies on the same could incorporate more variables in its analysis. The research should investigate the impact of airline alliances in different geographical regions.

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