IBN HALDUN UNIVERSITY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF AIR TRANSPORT MANAGEMENT

MASTER'S THESIS

AN IN-DEPTH ANALYSIS OF KEY DETERMINANTS OF NON-AERONAUTICAL REVENUE AT BANJUL INTERNATIONAL AIRPORT AND THEIR IMPACT ON TOTAL REVENUE

GAYE SAHO

THESIS SUPERVISOR
ASSIST. PROF. MERVE ŞAHİN

ISTANBUL, 2024

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by
GAYE SAHO

A thesis submitted to the School of Graduate Studies in partial fulfilment of the requirements for the degree of Master of Arts in Air Transport Management

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APPROVAL PAGE

This is to certify that we have read this thesis and that in our opinion it is fully adequate in scope and quality, as a thesis for the degree of Master of Arts in Air Transport Management.

Thesis Jury Members

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_____	_____	_____

This is to confirm that this thesis complies with all the standard set by the School of Graduate Studies of the Ibn Haldun University.

Date of Submission Seal/Signature

ACADEMIC HONESTY ATTESTATION

I hereby declare that all information in this document has been obtained and presented according to academic rules and ethical conduct. I also declare that as required by these rules and conduct, I have fully cited and referenced all materials and results that are not original to this work.

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Signature:

ÖZ

BANJUL ULUSLARARASI HAVALİMANI'NDA HAVACILIK DIŞI GELİRİN TEMEL BELİRLEYİCİLERİNİN VE TOPLAM GELİR ÜZERİNDEKİ ETKİLERİNİN DERİNLEMESINE ANALİZİ

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Yıllar boyunca, havalimanlarının tek gelir kaynağı uçakla ilgili operasyonlar olmuştur. Bu eğilim, Düşük Maliyetli Taşıyıcıların (LCC) havacılık pazarına yeni bir iş modeliyle girmesiyle değişmiştir. Düşük maliyetli taşıyıcı iş modeli, düşük işletme maliyetlerini güvence altına alarak havayollarının yolculara düşük ücretler sunmasını ve buna karşılık çok az hizmet sağlamasına neden olmaktadır. Bu tez, 2008-2022 yılları arasında Banjul Uluslararası Havalimanı'ndaki (BIA) havacılık dışı gelirlerin (NAR) belirleyicilerinin kapsamlı bir analizini sunmaktadır. Çalışma, reklam, perakende, yiyecek-içecek ve ofis kiralama gibi çeşitli gelir kaynaklarının NAR üzerindeki etkisini ve bu kaynakların toplam gelire katkısını incelemektedir. Araştırma ayrıca, rota türüne ve havayolu kategorisine (Tam Hizmet Taşıyıcıları, Düşük Maliyetli Taşıyıcılar ve Özel Uçuşlar) göre sınıflandırılan yolcu segmentlerinin NAR üzerindeki etkisini değerlendirmektedir. Zaman serisi verilerini kullanarak, NAR ile belirleyicileri arasındaki ilişkiyi tahmin etmek için En Küçük Kareler (OLS) regresyon modelleri uygulanmış ve yolcu hacminin etkisini incelemek için korelasyon analizi kullanılmıştır. Sonuçlar, yiyecek-içecek, reklamlar ve yolcu hacmi gibi belirli faktörlerin NAR üzerindeki önemli etkilerini vurgulamaktadır. Bulgular, havalimanı yönetimine finansal dayanıklılığı ve sürdürülebilirliği artırmak amacıyla hangi havacılık dışı gelir kaynaklarının çeşitlendirilmesi gerektiği konusunda bilgi sağlamaktadır.

Anahtar Kelimeler: Gelirin Belirleyicileri, Havacılık Dışı Gelir (NAR), Havacılık ve Havacılık Dışı Hizmetler**,** Veri Analizi.

ABSTRACT

AN IN-DEPTH ANALYSIS OF KEY DETERMINANTS OF NON-AERONAUTICAL REVENUE AT BANJUL INTERNATIONAL AIRPORT AND THEIR IMPACT ON TOTAL REVENUE

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Over the years, the only source of revenue for airports has been aircraft-related operations. This trend changed when Low-Cost Carriers (LCC) entered the aviation market with a new business model. By securing low operating costs, the LCC business model enables airlines to offer low fares to passengers while providing few services in return. This thesis analyzes the determinants of non-aeronautical revenue (NAR) at Banjul International Airport (BIA) over the 2008–2022 period, highlighting trends and significant contributors. The study examines the impact of various revenue sources such as advertising, retail, food and beverage, and office rental on NAR and their contribution to total revenue. The research also assesses the impact on NAR of passenger segments classified by route type and airline category (Full Service Carriers, Low-Cost Carriers and Private Flights). Using time series data, Ordinary Least Squares (OLS) regression models were applied to estimate the relationship between NAR and its determinants and correlation analysis was used to examine the relationship of passenger volume. The results highlight the significant effects of certain factors such as food and beverage, advertisements and passenger volume on NAR. The findings provide airport management with information on which non-aeronautical revenue sources should be diversified to increase financial resilience and sustainability.

Keywords: Aeronautical vs Non-Aeronautical Services, Data Analysis, Determinants of Revenue, Non-Aeronautical Revenue (NAR).

DEDICATION

This thesis is dedicated to my parents (Alhagie Tijan Saho and Sainabou Njie). The two most important people in my life, for initiating my academic journey even when I barely knew the purpose of education.

A special dedication to the two selfless people (my husband Mr. Edrissa Sallah and my uncle Mr. Max Njie) who stood by me unwaveringly, ensuring I started this journey and reached the finish line.

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Firstly, I express my deepest gratitude to Almighty Allah for guiding me through my thesis journey. I am sincerely thankful to my husband Mr Sallah the man who believed in me more than I do in myself.

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I am grateful to my siblings and in-laws for their unwavering support and love, immense gratitude to my friends and colleagues for their companionship and moral support. Special thanks and appreciation also go to the entire staff and management of the Gambia Civil Aviation Authority.

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Name Surname: Gaye Saho
ISTANBUL, 2024

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LIST OF SYMBOLS AND ABBREVIATIONS

ACI	Airport Council International
ADF	Augmented Dickey-Fuller
AR	Aeronautical Revenue
ATRS	Air Transport Research Society
BIA	Banjul International Airport
DAFZ	Dubai Airport Free Zone
EBITDA	Earnings Before Interest, Taxes, Depreciation, and Amortization
FAAN	Federal Airport Authority of Nigeria
F and B	Food and Beverage
FSC	Full-Service Carrier
GCAA	Gambia Civil Aviation Authority
HKG	Hong Kong International Airport
IATA	International Air Transport Association
LCC	Low-Cost Carrier
MOTC	Ministry of Tourism and Culture
NAR	Non-Aeronautical Revenue
OIC	Organisation of Islamic Conference
Pax	Passenger
RBV	Resource-Base View
SF	Special Flights
TPA	Tampa International Airport
TR	Total Revenue

CHAPTER I

INTRODUCTION

1.1. Overview of Airport Revenue Sources

Airports generate their revenues from aeronautical (flight operation-related) revenues and non-aeronautical (commercial activity-related) sources (Giovanelli & Rotondo, 2022) (Doganis, 1992). The Aeronautical revenues (AR) are mainly related to aircraft operations but are not limited to that; they also include the revenue generated from the passenger and cargo handling process. It is associated with fees attached to aircraft parking, runways, ground handling, passenger check-ins, passport control, security, gate operations, etc. Non-aeronautical revenues (NAR) encompass terminal space allocation revenues, leases, parking fees, commercial activities, and so on, mainly at the airport terminal and vicinity, which are not directly related to aircraft operations (Graham, 2008). The 2022 Airport Council International (ACI) report indicated that the global Airport NAR market worth was calculated at 121,963.68 million US Dollars and is estimated to reach 201,848.46 million US Dollars in 2028 (ACI, 2022). Some airports and the ACI recognized non-operating revenue as a revenue source, making it the third segment of airport revenue. However, the focus of the Airport being studied, which is Banjul International Airport (BIA), only recognised NAR and AR as revenue sources; hence, the non-operating revenue is categorised under NAR (Njie O. , 2023).

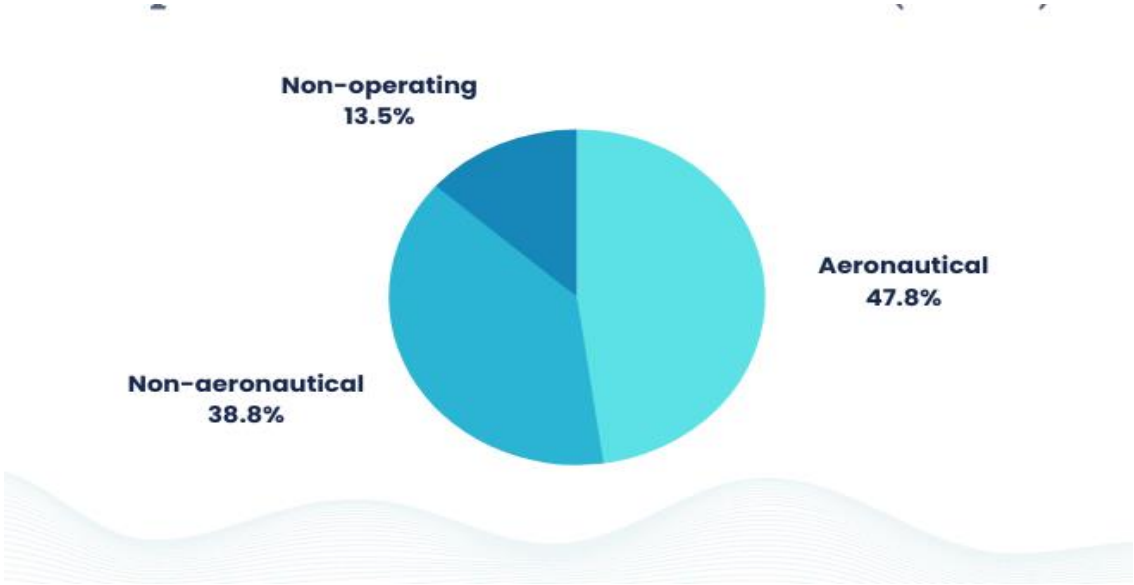

Figure 1.1. Airport Revenue Distribution of 2022

Source: Airport Council International, 2022

From the illustration above, it can be seen that out of the three airport revenue segments, aeronautical revenue accounts for the major sources of revenue (47.8 per cent), followed by non-aeronautical and non-operating revenue, accounting for 38.8 per cent and 14%, respectively.

Airport aeronautical charges are highly regulated by operators. These charges are the blueprints of contract agreements between airports and airline operators. Airports rely on commercial and non-aeronautical services to increase their total revenue. According to the Air Transport Research Society, most airports around the world generate about 45% of their total revenues from non-aeronautical services, primarily from concession revenue (ATRS, 2006)

Table 1.2. Classification of Airport Activity by Revenue Sources

Aeronautical Revenue	Non-Aeronautical Revenue
Landing fees	Retails
Passenger fees	Food and beverages
Aircraft parking fees	Car hire
Handling fees (if handling is provided by the airport operator)	Advertising
Terminal rental fees (e.g., in the USA)	Car park
Others (air traffic control, lightning, airbridges etc.)	Recharges (for gas, water, electricity, etc.)
	Others (consultancy, property development, business services, etc.)

Source: Reproduced from (Yokomi et al., 2017)

Recently, there has been a significant increase in commercial revenue at airports, which is highly dependent on the transformation of the airport from a public sector entity to a more private and commercial industry, giving airports more liberty, technical know-how, and incentives to venture into commercial opportunities. Also, there has been increasing pressure from the airline industry for airports to regulate and reduce aeronautical charges in exchange for this reduction, airlines feed airports with higher passenger (pax) volume. As the airline industry has become progressively more competitive with lower profit margins, careful management of all cost items, including airport charges, particularly for the low-cost carrier sector (LCC), has become a top priority (Graham, 2008).

The COVID-19 pandemic of 2020 brought the international aviation industry to a standstill, with shocking global economic and associated impacts. Airports compete to attract more airlines to boost their AR, and financial stability has gradually become important in maintaining competitive airport charges (Castillo-Manzano, 2010). Nevertheless, Covid-19 provoked concerns regarding the financial stability of the aviation industry. Traveller demand declined greatly, and many airline operators were at risk of insolvency. Owing to COVID-19, each airport lost 50 per cent of its connections on average, and network efficiency was reduced (Sun et al., 2020). Moreover, for the first time, over half of the world's aircraft fleet was grounded; airports documented a fall in passenger traffic of 70-95%, and numerous airlines went

bankrupt. The negative trends in air traffic operations automatically decrease airport aeronautical and non-aeronautical revenues, bringing airports to the lowest level of financial survival. However, after several months and after implementing the World Health Organization anti-COVID-19 measures, a small positive trend starts to be seen (Stimac, Pivac, Matija, & Drljaca, 2020).

1.2. Problem Statement and Research Scope

Aeronautical revenue is the revenue from direct aircraft operations, while NAR is the revenue generated from other sources. This study was conducted using Banjul International Airport (BIA) as a case study. BIA is the only airport in the Gambia. Secondary data of non-aeronautic revenue from the annually published financials of BIA are used, as well as passenger figures and airline segments generated over 15 years (2008-2022).

At the Banjul International Airport (BIA), the AR is well structured with fixed charges per activity hour and ton. There is a fixed charge template to ease the collection of this fee and a systematic approach between the commerce, finance, and audit departments to facilitate revenue generation. This makes it easy to generate, calculate, and reinvest the AR (Njie , 2023).

In contrast, NAR at BIA lacks structured pricing mechanisms, with product prices often negotiated. This inconsistency complicates the accurate computation of NAR and limits its potential as a reliable revenue stream. As the only airport in Gambia, there is potential to harness more of its NAR sources. Since most users of BIA are tourists, there is a need to study what attracts tourists most in other airports so that BIA can improve its NAR sources.

The NAR sources are food and beverage stores (restaurants), rented office spaces, duty-free stores, adverts, banks and forex, concessionaires, and other undefined sources, such as leased properties within the airport territory (Jallow, 2023). Concession revenue has not yet been fully exploited. Airport concessionaires typically pay a percentage of their revenue to the airport as a concession fee for their right to operate within the airport. This calculated mechanism is not applicable to the BIA

because business operators do not declare their financials at the end of the fiscal year; hence, the concession fee is calculated as 5% of the annual rent added to the utility bill to constitute the concession fee (Jallow, 2023). This fee can be negotiated equally during the contract agreement phase and hence varies for different operators (Njie, 2023).

Countries whose airports diversify revenue and invest in NAR remain afloat, while countries that entirely depend on AR, like African airports, almost went to absolute zero. The study also examines the pre- and post-COVID airport revenue structure to analyse whether there is a registered change in operation.

In most cases, the determinants of aeronautic revenue are mainly focused on revenue-related sources; however, some studies have examined the determinants that are not directly revenue-related but indirectly affect non-aeronautic revenue. These determinants could vary across studies, but this study will examine the correlation between these non-obvious determinants. The hypotheses to be proven include the following:

Hypothesis 1: Non-aeronautical revenue (NAR) has a positive relationship with its primary determinants, including retail, food and beverage services, advertising, and office space rental.

Hypothesis 2: There is no significant correlation between the passenger categories by route type (international or regional) and total NAR at Banjul International Airport.

Hypothesis 3: A positive correlation exists between the volume of passengers from low-cost carriers and NAR, as low-cost passengers tend to spend more on airport services.

Hypothesis 4: Total revenue at BIA is positively impacted by NAR, indicating that an increase in non-aeronautical revenue significantly contributes to the overall financial performance of the airport.

1.3. Motivation

The primary motivation for this research stems from the need to enhance the resilience and sustainability of Banjul International Airport, addressing challenges in

diversifying revenue streams amidst fluctuating aeronautical income. The aviation industry is vulnerable to external shocks such as economic downturns, geopolitical instability, and global health crises. A crisis such as COVID-19 brought the Gambia's aviation industry to a standstill for months. By diversifying revenue streams beyond aeronautic activities, BIA and aviation-related businesses can build resilience against unforeseen circumstances to guarantee stability and sustainability in the long run.

As this is the first study to explore the determinants of NAR and its impact on total revenue at BIA, it can be used as a baseline/reference for future studies on the same topic. The BIA has recently created a department of research and development for which I am a member. The First issue identified as a unit is the lack of proper coordination and accountability of the revenue received from non-aeronautical revenue sources. This study identifies the key determinants of non-aeronautic revenue at BIA and shows how they affect NAR. The study will show which determinants impact NAR most and how NAR influences total revenue at BIA.

The aviation industry is very dynamic; hence, the pursuit of innovation is important for growth and a primary measure in securing a sustainable future. Traditionally, the focus has primarily been on aeronautic revenue streams within the industry, to which the Gambia is no exception. However, most airports want to broaden and diversify their revenue streams and delve into the untapped potential of non-aeronautic revenue sources.

BIA is an Airport with NAR growth potential that has not been fully exploited, and this research will show a road map to achieve set-out plans for NAR. There are opportunities to expand the NAR, but even the existing one is not computed to fully see its impact on our total revenue.

1.4. Research Questions

- What are the key determinants of NAR in BIA?
- Which of these determinants has the greatest impact on the NAR?
- What are the relations between NAR and total revenue?

1.5. Research Structure

This study follows the thesis structure approved by the university and is as follows: Chapter 1 discusses the introduction to airport revenue, the problem statement, motivation for the study, and the scope. The chapter also predicts the hypothesis that the research will test, and the research questions this thesis answers.

Chapter 2 discusses the background literature on the determinants of non-aeronautical revenue globally, narrowing it to Africa and specifically to BIA. It presents other studies on NAR conducted around the globe and the results of these studies. The variables used in the model estimations are clearly defined in this section.

Chapter 3 presents the data sources, methodology, and various tests conducted to answer the research questions and prove the results of the predicted hypothesis. This chapter also explains the model estimations, variables used, estimation methods, and tests conducted to examine the validity of the model individually and as a whole.

Chapter 4 analyses the findings of the data collected, indicating which determinant has the greatest impact on BIA's NAR. The chapter also examines the correlations between NAR and total revenue, NAR and low-cost carriers, and NAR and passenger segments by route type.

Chapter 5 summarizes the study, which was found during the data analysis, the limitations of the study, and policy recommendations that will have a positive impact on the revenue sources at BIA.

CHAPTER II

LITERATURE REVIEW

2.1. Airport Revenue

The traditional understanding of airport revenue is the aeronautical revenue generated from ground operations such as landing charges, aircraft parking, and passenger facility charges (Fasone et al., 2016). However, airports have diversified their revenue streams to reduce their dependency on airline companies and gain more economic growth. Non-aeronautical revenue sources now play an important role in retail stores, concessions, parking services, advertising, and real estate development (Fuerst et al., 2011). Globally, aeronautical revenue, which comes from fees charged to airlines and aviation-related activities, is the biggest source of income, accounting for almost half of the total revenue at 48%, while non-aeronautical revenue, generated from commercial activities, makes up 39. per cent of total revenue, and lastly, non-operating revenue, which comes from sources such as investment income and government grants, accounts for 13.50% of total revenue (ACI, 2022). However, at Banjul International Airport, similar to a few other airports, non-operating revenue is classified as non-aeronautic revenue, making only two revenue sources (Njie M. O., 2023).

To cater to the increasing desire for air services globally, the aviation industry is strategizing ways of expanding to adjust to increasing demand. In addition to these expansion strategies, airports need to increase capacity, modernize infrastructure, and digitalize processes/procedures to meet complex airport operation expenditures. To match its expenditure and contribute to future investments, airports need to generate more commercial revenue to break even or make a profit (Halpern and Graham, 2013) .

A growing number of airports have implemented strategic revenue-generating mechanisms within their charging systems to increase their relative attractiveness to

both passengers and airlines. Strategies aimed at increasing airport flight frequencies and volumes have been examined by considering access characteristics to airports, such as airport service characteristics and airline service characteristics(Saraswati & Hanaoka, 2014). The non-aviation business has become increasingly important to airports within the last 20 years noting that on average, non-aviation revenues now account for around half of all revenues generated byan airport (Fasone et al., 2016)

Airports have implemented innovative tactics to increase income and enhance the traveller experience. One such tactic is the construction of commercial buildings on airport property, making use of the space available for hospitality, entertainment, and retail establishments. In the same way that duty-free shops, upscale retailers, and food and beverage establishments boost airport earnings, there should be an increased emphasis on drawing in airport patrons and researching their purchasing pattern (Silva et al., 2023). To keep up with the rapid advancement of technology, airports are making significant investments in all areas of business to improve passenger satisfaction and boost income. Using digital apps that make it simple for travellers to make service reservations, get personalized adverts, and pre-order necessary services before they arrive is one way to achieve this. These measures improve passenger convenience and lead to increased sales of ancillary services.

In summary, for the airport business to continue thriving, efforts to enhance more diversified commercial revenue have to be innovated as the industry has, throughout the COVID-19 shocks, altered all the traditional modes of operations. The 2022 edition of the ACI Airport Economics Report presents the first in-depth global analysis of how the pandemic has affected airport industry revenues (aeronautical and non-aeronautical) by source, costs (operating and capital), and related trends globally and over time (ACI, 2022). Research has shown that Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA) reached a new record of €1,204 million, and the grouped results rose significantly to €430.5 million. Fraport benefits from traffic dynamics driven by its broad international portfolio, which aims to boost EBITDA to around €2 billion annually by 2030 (CEO Schulte, 2023).

2.2. The Evolution of Non-Aeronautic Revenue (NAR)

The aviation industry has undergone a series of business transformation models over the years. While airlines reduce dependency on the revenue from fares, airports also redirect their focus to generating revenue beyond flight charges (Saraswati & Hanaoka, 2014).

Historically, airports have been understood to be places where flights land and take off, and have infrastructure including runways, control towers, terminals, and hanger facilities that only serve aircraft operations, passenger processing, and cargo handling(Jiang et al., 2024). This old understanding is giving way to a much broader view, more inventing business from basically within-terminal revenue generation to the concept of airport city, which has become the conventional way forward for airports around the world (C.Chen et al., 2023).

Airports have now transformed from being a simple means of facilitating flight landing and take-off to switching focused on commercial activities. This is because most airports are no longer operated by the state, they are either owned by private companies or managed by larger multinational corporations(C. Chen et al., 2023). These multinational companies greatly invest in advanced infrastructure and to cover costs and cater for future investments, airport operators need to generate and diversify more revenue streams (Halpern & Graham A., 2013). This transformation has boasted the need to maximize commercial revenue since Airports are now business entities and have become a priority for both academics and airport operators (Jiang et al., 2024).

With major automated structures within the terminals, increasing passenger volume and the need to enhance passenger experience during dwell time, generating more commercial revenue in airports has to be a critical aspect of financial sustainability and growth for the sustenance of these facilities(Silva et al., 2023). The pressure exerted by the Low-Cost Carriers (LCC) to wave or reduce airport charges is another motive for generating revenue from a variety of sources, including retail, commercial activities, real estate, and more(Castillo-Manzano, 2010). While LCC brings in a high passenger volume to most airports, there is a need to harness revenue from these

passengers during their dwell time to balance the reduction or arrangements made for LCCs.

This industry has gone through a series of evolution phases from strictly aircraft operation to airport city concept and more digitalized services offered. To understand this evolution phase, below are the key stages giving references to a few airports and their change over time.

2.2.1. 20th Century - Emergence of Duty-Free/Retail Shopping

Concerning the early 20th century, which marked a turning point in the operation of airports, the first to develop the commercial revenue concept was the Shannon Airport in Ireland. This business visionary approach rebranded and changed the viewpoint of airport management forever with the emergence of duty-free shopping as a pioneer source of non-aeronautical revenue. In 1947, Shannon Airport made history by commencing the world's first duty-free shopping stall, a massive and bold ideology that would fundamentally change the dynamics of travel and commerce (Shannon Airport, 2023).

The duty-free business started by giving airports means to make more revenue. When the first duty-free stores opened at Shannon Airport in Ireland in 1947, Since then, duty-free and travel-related retail have grown to be enormously profitable global businesses that play a significant role in airport funding. The first in a series of studies examining the economic effects of the duty-free business, the newly released economic analysis by the Duty-Free World Council, has brought this to light (Keith Spinks , 2016)

By being the first to operate a duty-free store within an airport, Shannon Airport offers shopping options to passengers with a new means to indulge passengers without the burden of paying import duties, effectively changing the airport into a retail shopping spot (Keith Spinks , 2016). This shopping mechanism was not only a great incentive offered to passengers to always choose Shannon as their preferred transit point but also triggered a huge increment in retail revenue. The display of duty-free goods attracts

passengers from all around Europe, showcasing Shannon Airport as a destination in its own right, where shopping became an integral part of the travel experience.

Shannon's pioneering idea on the concept of duty-free has made the concept popular globally. This has inspired other airports to embrace the concept of duty-free. As the concept of duty-free has become popular and is embraced by many airports worldwide, it become synonymous with modern-day airport experience, enriching passengers' journeys while catapulting non-aeronautical revenue streams. The legacy of Shannon's duty-free concept is a testament to the transformative power of innovation and critical thinking in shaping the evolution of airport commerce.

2.2.2. Late 20th Century - Retail and Commercial Expansion Stage

During the latter part of the 20th century, the birth of airport commerce made a wave into the confines of duty-free shopping ideology, pushing airports globally to research the idea of new methods of revenue diversification. A successful reference of this transformative change emerged with the coming up of Singapore's Changi Airport. In 1990, Changi Airport restructured the paradigm of airport experiences with the launching of Terminal 2, a visionary move that propelled the airport into the echelons of global excellence.

The second terminal (terminal 2) shows a change in airport design and infrastructures as the airport hopes to be more than just a transit airport but also a multipurpose centre and to serve as a destination of its own. The terminal's environment, architecture and facilities showcase a diverse array of leisure amenities thereby displaying the Changi Airport as a reference airport globally. There are a lot of international luxury brands, local crafts and delicious meals that greet travellers as soon as they enter the terminal building.

2.2.3. Early 21st Century - Real Estate Development Stage

Leveraging on the strategic location and infrastructure, airports around the world have begun to embrace a new revenue-generating source by investing in real estate. Dubai

International Airport is such an example. Dubai International Airport is a global hub that has restructured the incentives of real estate development and airport excellence.

The Dubai Airport Free Zone (DAFZ) is an expansive economic zone that arose as a beacon of opportunity for enterprises looking to establish a foothold in the booming Middle Eastern market (DUBAI AIRPORT FREEZONE, 2023), thanks to Dubai International Airport's ambitious development into the real estate sector. DAFZ, which covers a large region around the airport, provides cutting-edge amenities, simplified regulatory frameworks, and unmatched connectivity, making it an ideal setting for both local and international businesses.

Dubai's economic landscape has undergone a significant transition since the creation of DAFZ, drawing a wide range of businesses from manufacturing and logistics to technology and finance. In addition to stimulating economic growth, the free zone's corporate community has made a substantial contribution to Dubai International Airport's non-aeronautical revenue streams. The airport has solidified its position as a diverse economic powerhouse, propelling innovation, investment, and prosperity on a worldwide scale, by expanding its revenue sources outside aviation operations.

Furthermore, the innovative approach used by Dubai International Airport to real estate development highlights the general trend of airports acting as engines of urban and economic growth. Airports may promote economic growth in their surrounding communities by utilizing their infrastructure and connectivity to attract investment, job creation, and innovation. The success of Dubai International Airport, or DAFZ, is evidence of the transformative power of visionary leadership and strategic foresight in enabling airports to realize their full potential as 21st-century engines of economic growth.

2.2.4. Recent Years of Digital Transformation and Innovation Surging to Future Trends

The recent stage of evolution involves embracing and implementing digital technology and innovation to enhance non-aeronautical revenue. For instance, some airports now use mobile apps for pre-ordering duty-free items, which not only boosts sales but also

enhances the passenger experience (Florido-Benítez, 2016). Airports have also begun to engage in data analytics to maximize retail offers and gain a deeper understanding of customer preferences. Airports are anticipated to prioritize sustainability and the passenger experience to increase non-aeronautical revenue in the future.

To appeal to environmentally concerned travellers, certain airports in Europe have integrated sustainable practices and green technologies into their operations(Alonso et al., 2014). Others are enhancing passenger experiences with unique offerings like art installations, spa services, and cultural exhibits.

2.3. Non-Aeronautic Revenue in African Airports

Airports across the world have unanimously agreed to recognise the importance of diversifying their revenue streams beyond aeronautical sources. This section aims to provide an in-depth analysis of non-aeronautical revenue generation in African airports, shedding light on the strategies, challenges, and opportunities that these airports encounter in their pursuit of financial sustainability.

Airports are known to be owned and operated by the state and hence made a public entity. Studies show that commercial growth happens when airports start to evolve from a public sector to a privatized industry (Gu, 2019). The change to harness more revenue occurred when the change in ownership nature took place; Privatized airports started to generate more revenue while state-owned airports continued to operate the routine. Privatized airports started being more creative and had the freedom to redesign and redevelop the operational incentives.

For airports like BIA, the operation and management are entirely state decisions making it a rigid system to explore new conventional revenue means (Njie M. O., 2023). Having to deal with all the regulations and seek approval from the state to expand on infrastructure and the funds to digitalise most operations has become a hindrance to most airports, especially in African airports (Jammeh, 2023). There is a great need to develop airports from the landside, this switch focus to real estate and possibly airport cities. Giving out land to be leased for the duration of 10 to 15 years

is always to the advantage of the airport since after the expiry of the lease contract the infrastructure becomes airport property (Jallow, 2023)

From pre-covid statistics from the ACI, Africa has the lowest percentage of non-aeronautic revenue amounting to 20% of the global revenue made (AVIADEV, 2022). According to Marcel Langeslag, the CEO of AVIADEV, the growth rate of NAR in African airports is quite very low and the best way to grow both NAR AND AR is to grow passenger volume since passengers are the main determinants.

According to the Managing Director of FAAN (Federal Airport Authority of Nigeria), COVID shock made Nigeria review the need to diversify revenue and plans are on the way to further generate more non-aeronautic revenue by improving facilities that can accommodate more businesses and looking into the need to improve on customer experience at Airports (Nigeria-FAAN, 21 JUNE, 2022).

African airports rely mainly on aeronautic revenue, amounting to 69% of revenue from aeronautic revenue and 26% of non-aeronautic revenue (ACI, 2022). The regulatory framework within which African airports operate plays a pivotal role in determining the feasibility and extent of non-aeronautical revenue generation. Compliance with international standards and local regulations is essential for successful revenue diversification (Njie M. O., 2023).

African airports continue to rank among the lowest in NAR generation according to Airports Council International (ACI) ratings as shown in Fig 2.1. Limited passenger volumes, fewer international flights, and constrained commercial development capacities are among the challenges impacting their growth. While some African airports are making strides, significant structural and economic limitations still prevent them from reaching the revenue levels seen in other regions. With targeted investments and supportive policies, there is potential for substantial future growth.

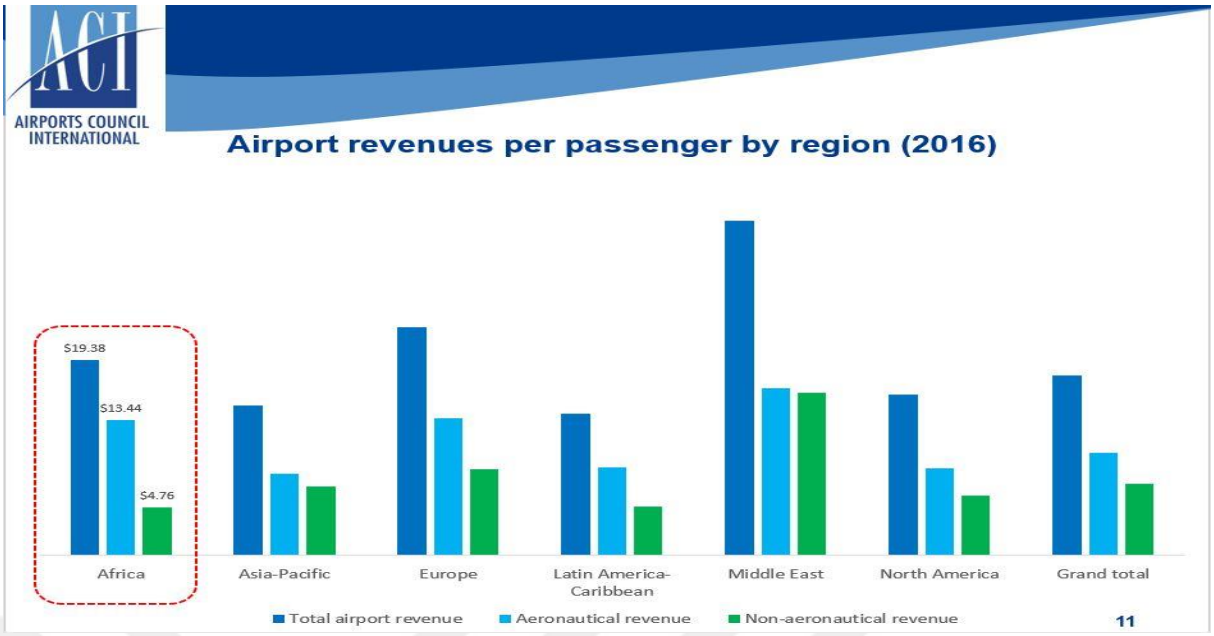

Figure 2.1. ACI Airport Revenue Report 2016

Source: ACI, 2016

2.4. Non-Aeronautic Revenue in Banjul International Airport

2.4.1. Introduction of Banjul International Airport

Banjul International Airport (BIA) is the primary and only airport serving the Gambia, located in a town called Yundum. BIA is a state-owned Airport and the airport is operated by the Gambia Civil Aviation Authority (GCAA).

Banjul International Airport is a developing airport with a passenger figure of 253,287 as of 2022 indicating growth compared to 2021 (COVID recovery) where there is a record passenger figure of 138, 147 (Bojang, 2022) (MOTC, 2023). This growth manifests for almost a 100% recovery rate. The airport business at Banjul International Airport involves providing a range of services to airlines, passengers, and other stakeholders (Njie M. O., 2023). This growth manifests a positive recovery rate from the pandemic when the airport was on a complete shutdown.

Figure 2.2. Banjul International Airport

At the Gambia Civil Aviation Authority (GCAA), there are several directorates responsible for overseeing various aspects of civil aviation. These directorates play a crucial role in ensuring the safe and efficient operation of the aviation industry in the Gambia (Gambia Civil Aviation Authority, 2023). While some directorates are responsible for the Authorities' regulations and inspections other directorates are sorely for airport operations and management.

The GCAA is the Authority that handles both the aviation industry's regulatory aspect and airport operations (Njie M. O., 2023). The management that sets the regulations of airport operations are the same players that operate this airport making a two-sided entity a single-state operation. This hinders the commercial decisions made at BIA since the authority is not entirely a business entity. Like most airports, BIA classifies its revenue stream into two i.e. Aeronautic and non-aeronautic revenue.

At the BIA, NAR's contribution to total revenue has been relatively small compared to aeronautical. However, after the COVID-19 pandemic, there was a steady increase in NAR sources. The pattern of change in the AR has been behaving in a wavy pattern by increasing in figure every four years and then decreasing the subsequent four years. The recovery from the last four years could be attributed to the completion of the BIA

expansion project which included more business space within the terminal. Revenue sources peaked in 2018 and 2019 at around GMD 600,000,000.00 (six hundred million dalasis) just a year or two before covid 19 as shown in the figure below.

Fig 2.2 below highlights a significant disparity in the ratio of Non-Aeronautical Revenue (NAR) to Aeronautical Revenue (AR), underscoring the need for Banjul International Airport (BIA) to place a greater focus on enhancing NAR generation. While 2019 shows the peak year of revenue generation at BIA, it still has insignificant proportionality to NAR. However, the post covid shows a promising era of a new focus to NAR.

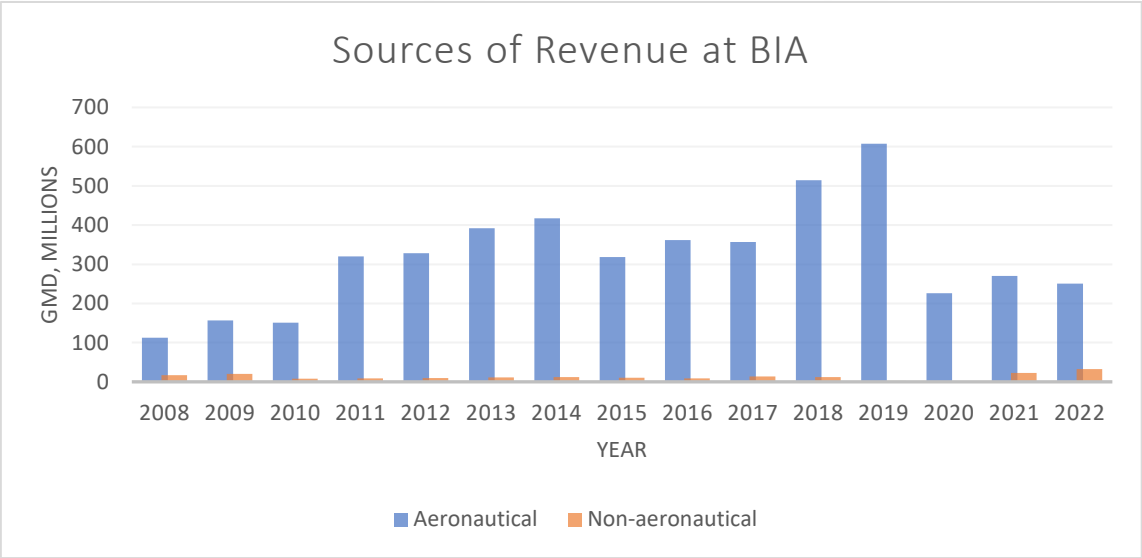

Figure 2.3. Sources of Revenue at Banjul International Airport

Source: Data Compiled by Author

Aeronautical Revenue at BIA is generated from fees charged for services directly related to the operation of airlines and aircraft, such as landing fees, parking fees, lightning fees, and fuel fees. These fees are typically charged to airlines, and the amount of revenue generated depends on the number of flights, the size of the aircraft, the number of passengers, and other factors. BIA is unable to charge a navigation fee because The Gambia dimension of airspace as is covered under the Senegalese meteorology unit, hence the flight get clearance information from the tower at BIA which is supplied to them by the Senegalese. According to Mr Fatty, BIA does not

charge for navigation since the Banjul Air navigation space is monitored by the Senegalese and other international oversight body (Fatty, 2023)

Non-aeronautical Revenue at BIA refers to the income generated by the airport from sources other than the fees charged for aircraft-related services. This revenue can be generated from a variety of sources, such as retail, food and beverage, advertising, car parking and car rental. Non-aviation revenue is important for airports and airlines because it can offset the costs of running an airport and help improve their financial performance (Jallow, 2023). Additionally, non-aviation revenue can be a way to diversify an airport's revenue streams and reduce its dependence on aviation-related services (Njie M. O., 2023). Sources of NAR at BIA are classified into the segments mentioned below, this classification is by the payment accounts created at the banks (Jallow, 2023).

- **Retail Duty-free:** Airport shops or stores selling products such as duty-free goods, souvenirs, and luxury items.
- **Food and Beverage (F&B):** F&B refers to restaurants, cafes, and bars located within the airport terminal, basically all stores selling food and its related items within the airport premises.
- **Advertising:** Advertising space in the airport terminal or within the airport territory, on airport websites, and on airport vehicles.
- **Car parking and Car rentals:** Fees charged to passengers and visitors for parking their vehicles at the airport.
- **Concession:** At BIA, the concession fee is calculated at 5% of the annual rent added to the calculated utility bill i.e. electricity, water, AC, Wifi and sanitary facilities.
- **Bank and Forex: office** space or stalls allocated to banks and forex bureau operating at the BIA.
- **Office Space:** space allocated to airline, telecommunication and profiling companies**.**
- **Other**: revenue generated from any non-aeronautic revenue besides the classified ones above, this includes government subvention, interest rate from staff loans, revenue from sold-out used vehicles and many others.

2.4.2. Determinants of Non-Aeronautic Revenue at BIA

Understanding the determinants of non-aeronautical revenue is crucial for airport operators aiming to optimize financial performance and diversify revenue streams. This overview will delve into the key factors influencing non-aeronautical revenue generation at BIA, focusing on direct revenue-related determinants, passenger volume by route segments, and airline segments. By examining these determinants, BIA stakeholders, including the GCAA board, can devise strategies to maximise non-aeronautical revenue while meeting the evolving needs and expectations of travellers. It is important to note that while BIA primarily considers direct revenue-related determinants, studies have shown that various other factors also impact non-aeronautical revenue (NAR) and total revenue (TR). Below are the key determinants of NAR, classified as either directly or indirectly revenue-related.

2.4.2.1. Direct Revenue-Related Determinant

2.4.2.1.1. Food and Beverage

The rent revenue generated from the spaces for the food and beverage businesses is also an important source of revenue for the airports(Del Chiappa et al., 2016). The airport is one of the transport hubs that receives a good number of people also is a place where visitors tend to come early and stay for a long time before boarding the planes, which creates huge business opportunities for many businesses, large and small, thinking that the huge flow rate can ensure the constant and great revenues and profits. While using the spaces and locations provided by the airports, businesses need to be charged higher costs for lease rentals (Gu, 2019). It is the higher costs of lease rentals that offer a great number of additional revenues for the airports.

At the BIA, the open concourse; where passengers escort hangs around to wait while the passengers process their travelling documents has no seating accommodation which makes them automatically resort to hanging around restaurants. This trend is equally similar to most airports around the world and is probably a strategy to boost the F and B sectors. The factor of passenger dwell time is also a good reason to enhance

F and B revenue but, unfortunately, BIA has little or no transit passengers which negates the factor of dwell time in this study.

During the renovation phase of BIA in preparation for the OIC, more space for restaurants was created, leading to the establishment of the NIRO restaurant. Today NIRO is known to be the biggest restaurant at BIA and by account the greatest source of Fand B revenue (Jallow, 2023)

2.4.2.1.2. Adverts

Airports generate non-aeronautical revenue by selling advertising space for businesses inside and outside of the terminals because there are a lot of spaces inside and outside of the terminals and there are hundreds of thousands of passengers visiting airports (Gu, 2019). Considering the number of convergences at airports, it has made it a strategic space for marketing businesses within and outside the airport.

The airport has been one of the best strategic spots advertisings for different sorts of products or services, which is especially accurate acknowledging the fact that the purchasing power of visitors and travellers in the airports is usually much larger than the average person. Advertisements in airports can take both conventional forms as in paper and signboards as well as digital forms. There is a growing trend of the adoption of digital form by more and more businesses and marketers, one advantage of airport advertisement is that airport advertisements can be different kinds of channels and can be applied in different locations within the terminal, gates, corridors and other places inside and outside of the airports

BIA earn revenue by leasing space within the airport to third-party companies such as CFTM and Neon-Signs company that provide advertising services. These companies pay concession fees to the airport for the right to display advert content within the airport.

BIA sometimes partners with third-party advertising companies and shares in the revenue generated by the advertising. In these cases, BIA receive a percentage of the

revenue generated by the advertising displayed within the airport and this is recognised as a hybrid advert revenue source (Njie O. , 2023)

BIA also earn revenue by partnering with companies that sponsor various aspects of the airport, such as a terminal, a gate, or an event. In exchange for their sponsorship, companies such as Standard Chartered Bank may receive prominent branding opportunities and advertising space within the airport in exchange for providing free internet services (Njie O. , 2023).

2.4.2.1.3. Car Park and Car Rental

Another important source of income for many airports is the car parking service. Many travellers who opt to fly into the airports can decide to leave their automobiles at the lots the airports provide. asserts that, despite the widespread belief that there is no connection between passenger spending and airport parking, airport parking services generate 25% of total commercial revenue. It emphasizes how crucial automobile parking services are to the expansion and growth of airport revenue (Gu, 2019). It goes on to say that there is always a trade-off between revenues and parking fees and that increasing parking fees may have an impact on how much money passengers spend in the departure lounge. Airport parking is a double-edged sword.

Additionally, the car-hailing businesses that operate outside of airports have recently threatened to disrupt the parking services that airports provide. This indicates that a large number of people would want to pick and make use of car-hailing services rather than using airport transportation and driving their vehicles(Evangelinos et al., 2021). This might potentially jeopardize airports' income from parking services.

2.4.2.1.4. Duty-Free

Because of the greater specialization that is made feasible with a larger retail area that can be supported at major airports, non-aviation revenue should increase more than proportionately with size. Additionally, this makes it possible for additional specialist stores which typically have larger margins than straightforward traveller discount stores to achieve a critical volume(Y. Chen et al., 2020).

specialized space where a convergence of different products and services meets a range of traveller needs. Airports are now able to accommodate a wide variety of retail establishments, from well-known brands to specialized shops. This is because they have wider spaces available. This range of choices not only improves the overall shopping experience but increases the likelihood that non-aviation income will grow at a rate that exceeds linear growth. Airports may efficiently cater to the changing interests of passengers by offering a wide range of goods and services that go beyond the traditional duty-free shopping experience.

2.4.2.1.5. Banks and Forex and Other Office Space

Revenue generated from airport office space can vary depending on factors such as location, demand, and market conditions as applicable in BIA. Airports often lease out office space to various tenants, including airlines, aviation-related businesses, retail outlets, and other commercial entities, these companies have their major offices outside but rent office space to meet their clientele at the airport. The rent bill paid by these companies contributes to the airport's non-aeronautical revenue stream.

Additionally, airports may explore opportunities to diversify their office space offerings by accommodating businesses in sectors such as telecommunication companies, banks and forex, and hospitality agencies. By providing them with comfortable and conveniently located office space that meets the needs of diverse tenants, airports can maximize their revenue potential from office space leasing.

Overall, revenue generated from the airport office in BIA space represents an important component of the airport's overall financial performance, they also contribute to the sustainability and ability to invest in infrastructure and services that benefit passengers and stakeholders alike.

2.4.2.1.6. Concession

The term "airport concession revenue" describes the revenue made from non-aeronautical services rendered by BIA, such as a predetermined share of sales from retail stores, F&B, Carpark, and other amenities for passengers (Njie O., 2023). In

addition to providing passengers with extra value, these services generate income for airports that goes beyond conventional aviation sources like landing fees and passenger fees.

Unlike most airports, concession revenue in BIA is 5% of the agreed amount on the annual rent contract of all businesses registered added to the calculated sum of electricity, Wi-Fi, cooling system, and sanitary facility (Jallow, 2023). This arrangement was made because the Authorities had it difficult to get these companies to declare their finances at the end of each fiscal year. To certain airports concession revenue is a ratio of the annual revenue made by these companies.

Interestingly, the structure of concession revenue-sharing agreements and the ownership model of the airport can significantly influence the level of concession revenue and overall social welfare. For instance, public airports may share more concession revenues than private ones, potentially leading to higher welfare levels. Moreover, the presence of low-cost carriers and the design of airport terminals can affect the purchasing power of passengers and, consequently, the concession revenue (Zhang & Czerny, 2012)

Airports are public facilities that serve the needs of airlines and travellers; they are vital to the aviation industry. However, in recent times, airports have faced pressure to become more financially independent and to cease relying on government assistance. Since non-aeronautical services are governed by rules, airports are placing an increasing amount of emphasis on these activities as a source of revenue. Research states that 39.4% of airport revenues come from non-aeronautical operations; yet, some airports, like Tampa (TPA) and Hong Kong (HKG), receive about 70% of their revenue from non-aeronautical services (Wang et al., 2023).

The chart below shows the trend of all the direct determinants of NAR at BIA from 2008-2022. This time frame shows a steady trend to 2019, also showing the COVID-19 period lapses and how BIA has quickly recovered from COVID-19. The quick recovery could also be attributed to the expansion project that was ongoing during the COVID-19 period. The expansion project was in preparation for the Organization of

Islamic Conference (OIC) summit which includes terminal expansion. This terminal expansion also created room for more NAR.

However, Covid-19 period gave the management a chance to rectify most charges levied and the new charges were to be implemented after waving almost all fees for 2020. The high concession revenue recorded is also a result of new companies like NIRO and SecuriPort and more office space for airline companies.

The data presented in the fig 2.3 shows trends in various categories of non-aeronautical revenue (NAR) streams at Banjul International Airport from 2008 to 2022, measured in Gambian Dalasi (GMD) millions. Overall, revenue across categories remained relatively stable with modest fluctuations until 2022, where there is a sharp and notable increase in advertising revenue, reaching over 12 million GMD. This substantial rise in advertising suggests a strategic shift or expanded focus on this revenue stream, indicating its growing importance. In contrast, other categories show more gradual growth, emphasizing a need for targeted development in other NAR areas to achieve balanced revenue diversification.

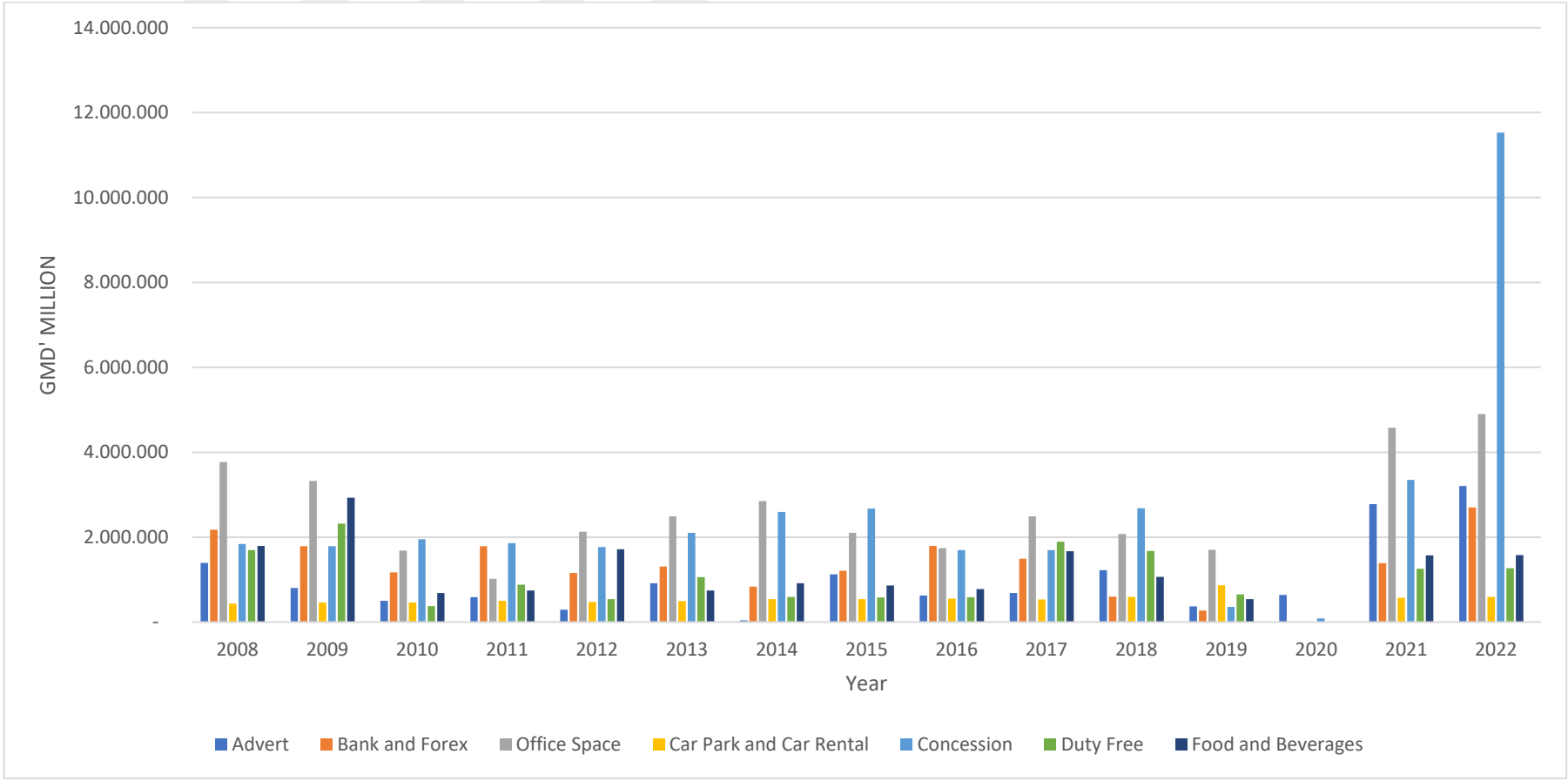

Figure 2.4. The Determinants of NAR at BIA

Source: Data Compiled by Author

2.4.2.2. Non-Direct Revenue Related Determinants

2.4.2.2.1. Passenger Volumes by Nature of the Airline

BIA classified flights as Full-Service Carriers (FSC), Low-Cost Carriers (LCC) and Special Flights to ease its passenger identification. FSC at BIA is recognized as just national carriers such as Turkish Airlines, Brussels Airline, Royal Air Maroc, Tap Air Portugal and KLM Air France. However, the seasonal flights and regional flights are classified as Low-Cost Carriers even though not all seasonal flights are LCC and finally the chartered flights and ad-hoc flights are classified as Special Flights.

With the above classifications, BIA naturally receives more passengers from LCC than any other flight segment. In 2019, Turkish Airlines and Tap Air Portugal started operating and this brought about significant increments in the FSC pax volume. This was disrupted by the pandemic however recovered at a rapid rate hitting a new peak of over 120,000 pax volume which was never recorded in the history of BIA.

Low-cost carriers (LCCs) have reshaped the aviation industry with their no-frills approach and competitive pricing strategies (Yokomi et al., 2017). While LCCs primarily focus on generating revenue from ticket sales, they also play a significant role in non-aeronautical revenue generation at airports. Despite their minimalist service offerings, LCCs contribute to airport revenue streams through various channels, albeit in different ways compared to full-service carriers.

One of the primary sources of non-aeronautical revenue associated with LCCs is ancillary services. These services include add-ons such as baggage fees, seat selection, onboard food and beverage purchases, and priority boarding. LCCs have pioneered the unbundling of services, allowing passengers to customize their travel experience and pay for only what they need. As a result, ancillary revenue has become a substantial contributor to LCCs' overall revenue and indirectly benefits airports through revenue-sharing agreements or fees associated with facilitating these services (Gu, 2019).

Furthermore, LCCs stimulate demand for ancillary services offered by airport concessionaires, such as retail outlets, food and beverage establishments, and car rental

companies. Passengers, often attracted by LCCs' lower fares, may spend more time at the airport terminal, leading to increased patronage of these retail and dining options. Consequently, airports can capitalize on the increased foot traffic generated by LCCs to enhance their non-aeronautical revenue streams.

Moreover, LCCs' cost-conscious operational model can influence airport management decisions regarding commercial partnerships and infrastructure investments. Airports may tailor their retail and dining offerings to align with the preferences of LCC passengers, focusing on value-oriented brands and quick-service options. Additionally, airports may prioritize cost-effective terminal designs and operational efficiencies to accommodate the high volume of LCC traffic while optimizing revenue-generating opportunities.

At BIA, there is a mandate to entice low-cost carriers (LCCs) to increase traffic and improve financial performance. Given the intense competition in this environment, management usually experiences strong downward pressure on airport fees. Low-cost airlines can have both positive and negative effects on airport non-aeronautical revenue, depending on the specific circumstances.

On the positive side, low-cost airlines may constitute passengers who are willing to spend at the airport due to the minimal services offered by airlines, which can result in increased sales in shops, F and B stores, and other non-aeronautical revenue sources. low-cost airlines often attract budget-conscious travellers who may be more likely to spend money on lower-priced goods and services at the airport since they are duty-free. On the negative side, low-cost airlines typically operate on a very low-margin budget and often negotiate lower fees than airport charges. This results in less revenue for the airport from airline fee s, which can then reduce the amount of funds available for non-aeronautical revenue sources. low-cost airlines may operate at off-peak times, but they are mostly seasonal reducing the number of passengers in the airport, potentially reducing sales in non-aeronautical revenue sources.

This table 2.1 provides detailed data on passenger movement at Banjul International Airport (BIA) from 2008 to 2022, segmented by different flight types: Full-Service Carriers (FSC), Low-Cost Carriers (LCC), and Special Flights. Over the years, LCCs

consistently registered the highest passenger volumes, with notable increases in 2013, 2014, and a peak in 2019 at 260,982 passengers. In contrast, FSCs and Special Flights demonstrate more variability, with FSCs spiking in 2019 as well. However, due to the COVID-19 pandemic, there was a sharp decrease in all categories in 2020, reflecting global travel restrictions. Despite a partial rebound in 2021 and 2022, passenger numbers in all segments illustrate the recovery stage as travel resumes post-pandemic.

Table 2.1. Passenger Movement by Flight Segment

PASSENGER MOVEMENT BY FLIGHT SEGMENT			
Year	**Full-Service Carriers**	**Low-Cost Carriers**	**Special Flights**
2008	26,900	198,345	84,366
2009	23,002	187,030	81,942
2010	39,385	200,007	63,082
2011	25,704	200,912	89,637
2012	33,002	189,200	94,654
2013	31,900	210,200	106,148
2014	14,900	220,000	86,432
2015	22,310	189,345	51,311
2016	34,900	219,000	72,857
2017	41,098	187,900	95,501
2018	49,006	204,890	152,133
2019	98,002	260,982	118,352
2020	19,439	80,399	91,485
2021	64,385	120,889	15,199
2022	120,104	149,077	90,728

Source: Data Compiled by Author

2.4.2.2.2. Passenger Segment by Route Type

Passenger segment is a term used at Banjul International Airport (BIA) to classify passengers travelling on international or regional flights (Jammeh, 2023). BIA does not use the term "domestic passenger" because there is only one airport in The Gambia, which disqualifies the term "domestic". The passengers are classified into four segments: arriving domestic, departing domestic, arriving international, and departing

international according to the raw statistical data. This segment refers to the distinction between travellers flying on international routes and those on domestic routes, and further categorizes their nature and direction - either arriving or departing. This differentiation can be a significant determinant of non-aeronautical revenue at airports due to the different passenger behaviours, shopping preferences, and spending habits of these passenger segments.

International passengers at BIA are those travelling longer distances, beyond the borders of Africa. As a result, they may tend to spend more on retail stores, food and beverage, and other services within airport terminals. International travellers may be more inclined to shop for duty-free items, souvenirs, luxury goods, and speciality products, contributing significantly to non-aeronautical revenue. Since The Gambia is a well-recognized tourist destination and is branded the "smiling coast," most of the passengers are tourists who come to explore the country's nature and culture according to the Ministry of Tourism and Culture (MOTC, 2023). BIA's marketing team often capitalizes on this by accepting tenancy agreements from companies that wish to operate a diverse range of upscale retail outlets, fine dining options, and exclusive amenities tailored to the preferences of international travellers (Njie M. O., 2023). On the other hand, domestic passengers at BIA are usually flying shorter distances, within Africa. While domestic travellers may still engage in retail and snack activities, their spending behaviour may be quite different from international passengers, with a preference for quick-service meal options like grab-and-go snacks. Understanding the passenger nature is necessary to decide whether the same services should be offered to international or domestic travellers or not. By analysing passenger demographics, travel patterns, and spending habits, airports can optimize their retail and dining offerings, marketing initiatives, and overall passenger experience to maximize non-aeronautical revenue.

The Gambia is a major tourist destination with a rich cultural heritage, it even has a historic site that signifies the Atlantic slave trade. Thus, it is evident to receive more international passengers as shown in the table below. Most of these tourists are either non-Gambian or Gambian living abroad, and hence there will be no significant difference in the arrival and departing international passenger figures. Considering the issue of intra-Africa air connectivity issue, it is hard to travel within Africa by air and

it sometimes takes the passenger to travel out of Africa and back to Africa. Hence the regional passenger figures are generally low compared to international passengers.

Table 2.2 tracks passenger movements based on route type, differentiating between international and regional departures and arrivals from 2008 to 2022 at BIA. International departures and arrivals have consistently higher volumes than regional segments, underscoring Banjul's attraction as an international travel point. Over time, both categories show a gradual increase, with peaks in 2018 and 2019. COVID-19's impact is evident in the reduced 2020 figures, particularly among international routes. However, passenger movements in 2021 and 2022 reveal a steady recovery, with increasing figures across all categories as travel demand resurges. This trend highlights BIA's role in catering to both international and regional passengers while adapting to fluctuations in travel patterns

Table 2.2. Passenger Movement by Route Type

Year	Dep. Int. Passenger	Dep. Reg. Passenger	Arr. Int. Passenger	Arr. Reg. Passenger
2008	130,488.0	27,818.0	124,851.0	26,454.0
2009	120,727.0	26,469.0	118,075.0	26,703.0
2010	111,864.0	38,086.0	114,813.0	37,711.0
2011	115,988.0	43,014.0	115,802.0	41,449.0
2012	115,686.0	43,589.0	115,031.0	42,550.0
2013	124,753.0	50,211.0	123,603.0	49,681.0
2014	125,691.0	40,536.0	117,555.0	37,550.0
2015	104,870.0	26,377.0	105,057.0	26,662.0
2016	136,636.0	29,689.0	132,988.0	27,444.0
2017	129,317.0	32,969.0	129,790.0	32,423.0
2018	154,049.0	48,412.0	156,585.0	46,983.0
2019	187,149.0	54,522.0	181,087.0	54,578.0
2020	84,012.0	18,386.0	69,762.0	19,163.0
2021	66,854.0	31,588.0	71,293.0	30,738.0
2022	129,867.0	52,113.0	123,420.0	54,509.0

Source: Data Compiled by Author

2.5. Theoretical Frame and Hypothesis Development

2.5.1. Theoretical Framework

The theoretical framework for this research dives into the different theories that are relatable to airport strategic and financial management and a comprehensive understanding of the dynamics of airport operations. Although there is not a single model or theory that is unanimously agreed to represent Airport commercial revenue. The closest proxy theory is the Result Base View (RBV) Theory.

Result Based View Theory (RBV) proposed by Birger Wernerfelt and later improved by other researchers provides a framework to assess the strategic fit of resources for a business. A major idea behind this theory is that competitive advantage is a function of the resources and capabilities of the business (Birger, 1984)

(Barney, 1991) explained that there are four resources of a business that can give it a competitive advantage and are value, rarity, imperfect imitability, and lack of substitutability. He further explained that these resources are determined by organizational routines, systems, and cultures.

This RBV theory postulates that a business can outperform other competitors by combining its technical, human, and other resources. By improving ergonomic jobs and workplace design, ergonomics can contribute to the maximization of the use of valuable, rare, and costly human resources, thus leading to the growth of a competitive advantage that is sustainable (Kshetri, 2008)

A valuable resource helps a business create strategies that take advantage of opportunities and reduce threats. Perhaps the valuable resources BIA has are Prime location, Passenger Volume and abundant land for Businesses. One explanation for the success is the BIA as an organisation is a culture that encourages businesses to advertise at the airport recognising airports as the first point of contact of their potential market.

2.5.2. Hypothesis Development

2.5.2.1. Total NAR and Determinants

At the Banjul International Airport's Accounts and Records, total NAR is the sum of all commercial activities, thus an increase in any of these determinants should reflect on the total NAR. The first hypothesis is grounded in the assumption that non-aeronautical revenue (NAR) sources, such as retail, food and beverage (F&B) services, advertising, and office rentals, have a direct impact on overall airport revenue. BIA financial records have shown that commercial activities within the airport, especially in areas such as retail and F&B, contribute to non-aeronautical revenue. Airports with higher passenger volumes and longer dwell times tend to see increased spending in these sectors, thereby boosting NAR. Additionally, advertising space in airports is highly valued due to its visibility to a captive audience. Therefore, this hypothesis assumes that as these determinants increase, NAR will proportionally rise, strengthening the airport's financial sustainability which lead to the hypothesis below;

Hypothesis 1: NAR has a positive relationship with its primary determinants, including retail, food and beverage services, advertising, and office space rental.

2.5.2.2. Total NAR and Passenger Nature

This hypothesis is based on the observation that Banjul International Airport (BIA) primarily serves as a point of departure and arrival rather than as a major transit hub. As a result, passenger dwell time a key driver for non-aeronautical spending is limited. Additionally, international and regional passengers may have different spending behaviors, but the limited variety of non-aeronautical services offered at BIA, especially compared to larger airports, suggests that this difference is not substantial enough to influence overall NAR. Hence, this hypothesis posits that there is no strong correlation between passenger categories (international versus regional) and the total non-aeronautical revenue.

Hypothesis 2: There is no significant correlation between the passenger categories by route type (international or regional) and total NAR at Banjul International Airport.

2.5.2.3. Total NAR and Air Carrier Nature

The nature of Air Carriers operating at BIA differs and it is categorised as the global standard i.e. full-service carriers, low-cost carriers and chatter or special flights. There is a common and agreed-upon opinion that increasing the market power of low-cost carriers correlates to a decrease in aviation revenues (Yokomi et al., 2017). while also accepting that there is a positive correlation between LCC passenger volume and NAR. This is justified by the fact the LLC operates with little or no free in-flight services, and all services have been charged. Low-Cost Carriers (LCCs) typically offer minimal in-flight services, which may prompt passengers to spend more on services and amenities within the airport, such as food, beverages, and retail. LCC passengers often seek value for money, making them likely to make additional purchases to enhance their travel experience Passengers travelling with LCC are believed to spend more at the airports which leads to the presumption of the mentioned hypothesis.

Hypothesis 3: A positive correlation exists between the volume of passengers from low-cost carriers and NAR, as low-cost passengers tend to spend more on airport services.

2.5.2.4. Total NAR and Total Revenue

According to BIA financial records, Total revenue is the summation of NAR and AR, so one could accept that it's a linear equation. NAR is globally recognised as a secondary source of airport revenue, thus it can be automatically accepted and recognised that an increase in NAR is to trigger an increase in TR. This leads to the proposed hypothesis mentioned below;

Hypothesis 4: Total revenue at BIA is positively impacted by NAR, indicating that an increase in non-aeronautical revenue significantly contributes to the overall financial performance of the airport.

CHAPTER III

METHODOLOGY

3.1. Methodology of the Study

This study used Ordinary Least Squares (OLS) to identify and differentiate the key determinants of NAR as well as a correlation analysis between NAR and passenger segment by route, and NAR and pax volume by nature of the airline. Secondary data is used and the study dives into previously published financial records from state websites, authorities archives and old printout annual audit reports, these reports also contain passenger figures in different categories to showcase trends, patterns, correlations, and predictive models. This chapter outlines the research design, data collection, and statistical methods utilized to achieve the research objectives.

3.1.1. Data Collection

This research utilized data collected from ministry reports, for comprehensive intel on BIA and other African airports, the information was gathered through interviewing senior management at the BIA and members of the Board as well as reviewing literature and a few from my experiences as a Senior Research Officer at the Airport.

3.1.2. Data Sources

There are two sources of data in this study: qualitative and quantitative. Most of the qualitative data regarding certain management decisions at BIA were generated through interviews either face-to-face or via phone calls. Data regarding financial gap explanations were collected from the interview with the finance manager, Mr Sowe, while information regarding the segmentations of revenue streams and why BIA distinguished these from other airports was generated during an interview with the Director of Commerce, Mr Njie.

The quantitative data were secondary data obtained from The Gambia Civil Aviation Authority (GCAA) records, published reports of the Ministry of Finance and Economic Affairs of The Gambia, audit reports and ACI publications.

The data ranging from 2008 to 2012 was obtained from the records of the Department of Finance the Department of Commerce, and Air Transport of the GCAA and verified from the annual printed, and audited financials of the authority. The data from 2013 to 2022 was collected from the official website of the Ministry of Finance's publication of annual finances of parastatals including GCAA and verified from the annual printed and audited financials of GCAA and the National Audit Office. Other finance-related data not used in the model estimations were obtained from other airport authorities, industry publications, and databases such as the Airport Council International (ACI) and the International Air Transport Association (IATA).

3.1.3. Data Scope

The research encompasses a comprehensive analysis of the determinants of NAR at the Banjul International Airport and passenger volume par segment, covering the period of fifteen years (2008-2022 fiscal year). The 15-year data was collected to run a time series analysis and observe trends, seasonality, and predictive models. The significance of this scope of studies is that it covers both pre and post-COVID-19 NAR scenarios of the BIA.

A notable upward trend in NAR is observed from 2010 to 2019, with a sharp decline during the COVID-19 pandemic (2020). Post-2020 data indicates a recovery trajectory, likely driven by infrastructure expansions and improved passenger volumes. o significant seasonal patterns were detected, which aligns with BIA's predominantly international and regional passenger base, operating throughout the year without peak domestic travel seasons. Extrapolation of the time series data suggests that sustained investment in concessions and retail could result in a 10–15% annual growth in NAR over the next five years.

3.2. Description and Measurement of Variables

3.2.1. Variables

In this research, a model with non-aeronautical revenue as the dependent variable was estimated, this is a result of the need to independently study the determinants of NAR at BIA, the relationship between NAR and passenger volume by route and finally the relationship between NAR and pax from different flights.

There is no universally accepted definition of airport non-aeronautic revenue and hence there is no specific economic model to fully illustrate the determinants (Fasone et al., 2016b)**.** Every study is based on available data and which sector has been studied and merges with a close economic model. From the review of existing works of literature, most studies conducted on NAR used pool data from different airports over a certain period.

All variables in the estimated model are measured in the currency of Gambian Dalasi (GMD) except passenger volumes, which are measured in numbers and distinguished by several routes and several carriers, respectively. These have been well defined in the literature review chapter as used at BIA. The following is used to briefly define them.

- **Advert revenue** is the revenue generated from advertising companies for theuse of electronic screens and signboards within the Airport premises.
- **Bank and forex revenue** is the revenue generated from space allocated to banks and forex bureaus to operate within the Airport.
- **Office space revenue is** the revenue generated from office spaces designedby airline offices and telecommunication companies.
- **Car park and rental** is revenue generated from land leased to car park and car rental companies.
- **Concessions** are revenue generated from the calculated 5% of the annual rent added to the calculated utility bill i.e. electricity, water, AC, Wifi, and sanitary facilities.

- **Duty-free is revenue generated** from shops or stores selling products such as duty-free goods, souvenirs, and luxury items within the Airport terminal.
- **Food and beverages revenue generated from** restaurants, cafes, and bars located within the airport terminal, basically all stores selling food and its related items within the airport premises.
- **Passenger Volumes by route** is the volume of arriving or departing passengers either from regional or international routes.
- **Passenger Volumes by Airline** are the passenger volume from full-service carriers, low-cost carriers and special flights.

3.3. Model Specification

The study used the method OLS (Ordinary Least Squares) to estimate the effects of the determinants of NAR at the BIA. There are seven determinants used in this study, however, the determinants will be categorized into two groups, model one (1) will study the first 3 determinants and model two (2) will study the remaining four determinants. The next steps are to use the significant determinants in model one and two to estimate model three. Correlation analysis is used to determine the relationship between revenue sources and non-revenue sources under review.

3.3.1. The Determinant of Non-Aeronautical Revenue at BIA

Linear regression was applied to identify relationships between non-aeronautical revenue and its determinants. NAR as a function of revenues from advert, bank and forex, office space, car park and rental, concession, duty-free, food and beverages (F&B) and other (unclassified sources).

Therefore NAR= advert bank and forex+ office space +car park and rental +concession+ duty free+ F&B + (others).

Mathematically Total NAR = $\beta 0 + \beta 1(\text{advert}) + \beta 2(\text{bank and forex}) + \beta 3(\text{office space}) + \beta 4(\text{car park and rent}) + \beta 5(\text{concession}) + \beta 6(\text{duty free}) + \beta 7(\text{F\&B}) + \varepsilon$

Where the variables are mathematically defined.

- Non-aeronautical revenue (NAR) is the dependent variable.
- Advert, bank and forex, office space, car park and rental, concession, duty-free, and F&B are the independent variables.
- ε: is the error term (other explanatory variables affecting NAR and not in the model)
- β1, β2, β3…. β7 represents the respective beta parameters and: β0 is the constant.

3.3.2. The Relationship Between NAR and The Passenger Volumes

In determining the relationship between NAR and the passenger volumes, a correlation analysis is used. In a correlation analysis, the relationship between two variables is tested using different methods. For this study, simple regression line (trendline) and correlation coefficient will be used as follows.
Correlation Analysis: Using Pearson's product-moment correlation coefficient:

If x and y are the two variables that we want to check the relationship, then the correlations are calculated to see how one variable responds to a change in the other variable. The relationship between determinants of NAR and passenger segment will be tested using a correlational analysis technique.

3.4. Descriptive Analysis

This includes examining the mean, median, and standard deviation of the determinants of non-aeronautical and all the other independent variables. It is essential since it creates the initial picture of upcoming analysis.

3.4.1. Analytical Techniques

This section explains the general framework for analysing time series data and the required tests. Time series data is a set of data gathered over a specific period (e.g., daily, weekly, monthly, yearly, quarterly, etc.) to extract useful statistical information for forecasting, estimation, and inference. In other words, time series data is a set of time-bound observations of an event/parameter in which the interval between the observations remains constant.

Generally, for model estimations, time series data are collected for a period of at least more than 20 periods. However, when this is not possible, a time series should be long enough to capture the research objective as the case in this study. The only available data is from 2008, covering 15 years.

The data will be analysed using EViews statistical software. The model will be estimated using ordinary least squares (OLS) and correlation coefficients. The correlation coefficient can take values from +1 to -1. A relation of +1 indicates a perfect correlation, a relation of zero indicates no association between the variables and a relation of -1 indicates a perfect negative correlation. The closer the relation coefficient is to zero, the weaker the association between them.

3.4.2. Diagnostic Test on Parameters

3.4.2.1. Stationary Test

Stationarity is a basic principle in time series analysis that tests if the data is stationary with time. Since descriptive statistics of a series (e.g., its mean and variance) are only true population estimates if they stay stable all through the series. When a series is stationary, it will not make a difference when the variable is examined. According to (Chatfield, 2004) the properties of one part of the data are similar to the other. Consequently, a stationary series is easy to estimate.

However, many time series data in actual life are directed by trends and seasonal effects that impede stationarity. A time series with a trend cannot be stationary as a trend occurs when the average level of the series alters over time. Seasonal effects also prevent stationarity, as they are reoccurring patterns of change in the mean of the series within a fixed period (e.g., a year). Thus, trend and seasonality are the two-time series components that must be tackled to attain stationarity.

When a data set is non-stationary, it can be made stationary by incorporating the components within the model estimators or by alteration mathematically. The most widely used method of making time series stationary is “differencing”. Differencing

can be used to eliminate any trend in the data set that is not relevant. A time series can be determined by changing the main series of the first difference.

A widely accepted method of testing for stationary time series is the Augmented Dickey-Fuller (ADF) test. It is a statistical test used to make a series stationary by using the unit root. The ADF test is a test used to test for the null hypothesis that the dataset is non-stationary against the alternative that the data set is stationary. The ADF test is conducted to test the null hypothesis that the data is non-stationary. Thus, rejecting the null hypothesis and providing evidence for stationary data. By using the ADF test in conjunction with the transformations described above an analyst can ensure that a series conforms to stationarity.

3.4.2.2. Test for Parameter and Overall Model Significance

The widely used tests for individual and overall model significance are the t and F tests respectively. The t-test also called the student test, is used to determine whether a significant difference exists between the means of two parameters and show how they are linked when the time series follows a normal distribution pattern and has known variances.

The F-test is used to analyse data variance in more than one parameter or overall model. It is calculated as F=σ1σ2, or variance 1/variance 2 and its variance hypothesis testing relies on the F distribution for its comparison.

The null hypothesis of both tests is that the variance between the parameters or among the parameters is equal and that the parameter or parameters are significant. If the value of the t and F statistic is greater than the critical value of the test (0.05) then it can be concluded that the parameter or model is statistically significant respectively.

3.4.2.3. Autocorrelation Test

Autocorrelation, also known as serial correlation, is the degree of resemblances between a given time series and its lagged version over a consecutive period. In other words, it measures the relationship between a parameter's present value and any value

in the past that is been examined. Autocorrelation of the dependent variables is tested using a Durbin-Watson statistic.

3.4.2.4. The R-Square

The R^2 in a regression model determines how strong the independent variables explain the dependent variable. A strong R^2 between the range of 0.8-1.0 shows that about 80 % -100% of the change in the independent variable is explained by the dependent variables. An R^2 of 0.5 or less shows a weak regression line and that other independent variables explain the variation in the dependent variables and are not factored in the model.

CHAPTER IV

DATA ANALYSIS AND FINDINGS

4.1. Descriptive Statistic

The figures shown below provide a complete picture of the distribution, variability, and form of non-aeronautical revenue sources, providing useful insights for future study and decision-making. The mean indicates the average value of each revenue stream. For example, "Concession" has the highest mean revenue of around GMD 2,532,398. In contrast, the median is the centre number in a dataset, indicating that half of the observations are below it and half are above it. It provides insight into the data's core tendency. For example, the median "Duty Free" revenue is GMD 879,061. The standard deviation represents the dispersion or spread of numbers around the mean. A higher standard deviation suggests greater variability in the data. For example, "Concession" revenue has a large standard deviation of around GMD 2,623,622. Skewness assesses the symmetry of the distribution. Positive skewness shows that the data is skewed to the right, whereas negative skewness suggests skewed to the left. For example, the income category "Bank and Forex" has a positive skewness of 1.53, indicating a right-skewed distribution.

Table 4.1. Descriptive Analysis of NAR

	NAR (million)	Advert	Bank and Forex	Car Park Car rentals	Concession	Duty-free	Food and Beverages	Office Space
Mean	12.7	1012200.	1312853.	508582.6	2532398	1024827.	1172564.	2456674.
Median	11.1	682000.	130827.	533600.0	1861000	879061.0	911488.0	2128550.
Std. Dev.	7.93	883224.8	706696.9	173834.1	2623622	647082.	710268.8	1288339.
Skewness	0.96	1.531283	-0.043618	-1.188262	2.871656	0.452313	0.793637	0.270885
Probability	0.23	0.030265	0.975647	0.001138	0.000000	0.658965	0.399066	0.901273
Sum	191	1518300	1969271	7628739.	37985973	15372404	1758845	36850117

Source: Author

4.2. Unit Root Test for Dependent Variable

The test for the stationarity of the dependent variable (NAR) indicates that the null hypothesis of **non-aeronautical** having a unit root is rejected at conventional levels of significance. This implies that **non-aeronautical** is stationary, which means it doesnot follow a systematic pattern over time. The inclusion of a constant factor in the model implies that the lagged values do not explain the baseline level of **non-aeronautical**. The coefficient of the lagged **non-aeronautical** variable (-1) is statistically significant andnegative, indicating a negative link between the present and lagged values of **non-aeronautical**. Simply said, historical values of **non-aeronautical** have a considerable impact on its current value.

Null Hypothesis: Non-Aeronautical has a unit root.

Table 4.2. Unit Root Test for the Dependent Variable

Unit Root Test for Dependent Variable			
Exogenous: Constant			
Lag Length: 1 (Automatic - based on SIC, maxlag=3)			
		t-Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-4.802132	**0.0029**
Test critical values:	1% level	-4.057910	
	5% level	-3.119910	
	10% level	-2.701103	
***MacKinnon (1996) one-sided p-values.**			
Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 13			

The coefficient of the differenced **non-aeronautical** variable is similarly significant and positive, implying that changes in **non-aeronautical** from one period to the next are positively associated with their lagged variations. This implies that the variable tends to settle into its long-term equilibrium over time.

4.3. Unit Root for The Independent Variables

The Augmented Dickey-Fuller (ADF) test is used to assess whether a time series contains a unit root, indicating that it is non-stationary of variables. In this study, the null hypothesis is that the variable has a unit root, suggesting non-stationarity. A unit root indicates that a time series variable is non-stationary, which means it has a stochastic trend but no consistent mean or variation across time.

The ADF test of the independent variables shows that all the variables are stationary with the following characteristics.

- All the variables except Adverts and Bank and Forex are stationary at their level. The duos are stationary at their first difference.
- The test statistic of -4.081472 rejects the null hypothesis of (**Advert**) havinga unit root at the 1% significance level because it is smaller than the crucial value of -4.057910. This implies that (**Advert**) remains constant after differencing.
- The coefficient for the lagged variable "**Car Park and Car Rental** (-1)" is significant (-1.399504) at the 1% level, indicating that the variable's initial laghas a significant impact on its present value.
- The results indicate that there is sufficient evidence to reject the null hypothesis that the variable (**Bank and Forex**) has a unit root. The Augmented Dickey-Fuller test statistic of -3.229758 has a corresponding p- value of 0.0487, which is less than the standard significance level of 0.05. Thissuggests that (**Bank and Forex**) is likely stationary, which means it does nothave a unit root and instead oscillates around a constant mean throughout time.
- The null hypothesis that the variable "Car Park and Car rental" has a unit rootis rejected with high confidence (p-value = 0.0011), indicating that the series is likely stationary.
- The regression coefficients show that the lagged values of **Concession** and its first difference (**Concession**)) are statistically significant, indicating a substantial autocorrelation in the data. **Concession** at lag 1 and its initial difference exhibit negative coefficients, implying that **Concession's** present and lagged values are negatively correlated.
- The test statistic of -5.44 indicates a significant result at the 1% level, implyingstrong evidence against the null hypothesis. This suggests that we reject the notion that **Food and Beverages** have a unit root, meaning that it is probably stationary.

4.4. Serial Correlation Test

The Breusch-Godfrey Serial Correlation LM Test determines whether the regression model's residuals exhibit serial correlation (autocorrelation).
The F-statistic and Prob. F (2,5) test the null hypothesis that no serial correlation exists up to the specified lag order. The F-statistic is 1.278567, with an associated probability of 0.3561. Because this p-value is more than the standard significance level of 0.05, we cannot reject the null hypothesis. Thus, the residuals show no strongindication of serial correlation up to the required lag order.

Obs*R-squared and Prob. Chi-Square (2): These statistics offer an alternate test for serial correlation. The Obs*R-squared statistic is 5.075602, with an associated probability of 0.0790. Similarly, since this p-value is bigger than 0.05, we cannot reject the null hypothesis of no serial association.

Table 4.3. Serial Correlation Test Result Using Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:			
F-Statistic	1.278567	Prob.F (2,5)	0.3561
Obs*R-squared	5.075602	Prob. Chi-square (2)	0.0790
Breusch-Godfrey Serial Correlation LM Test:			
F-Statistic	1.278567	Prob.F (2,5)	0.3561
Obs*R-squared	5.075602	Prob. Chi-square (2)	0.0790

Table 4.3. (cont.)

Sample: 2008 2022						
Included observations: 15						
Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. **| . |	. **| . |	1	-0.241	-0.241	1.0571	0.304
. **| . |	. **| . |	2	-0.252	-0.329	2.3022	0.316
. *| . |	. **| . |	3	-0.111	-0.323	2.5647	0.464
. |* . |	. *| . |	4	0.117	-0.156	2.8806	0.578
. |* . |	. | . |	5	0.115	-0.028	3.2194	0.666
. **| . |	. **| . |	6	-0.217	-0.267	4.5501	0.603
. |** . |	. |** . |	7	0.334	0.314	8.0954	0.324
. **| . |	. **| . |	8	-0.267	-0.208	10.685	0.220
. *| . |	. **| . |	9	-0.178	-0.288	12.037	0.211
. |* . |	. *| . |	10	0.108	-0.104	12.634	0.245
. |* . |	. *| . |	11	0.158	-0.131	14.218	0.221
. |* . |	. | . |	12	0.106	-0.012	15.177	0.232

Durbin-Watson Statistic: This statistic checks for the presence of autocorrelation in the residuals. The value of the DW statistic implies only mild autocorrelation in the residues.

Table 4.4. Serial Correlation Test Result Using Durbin-Watson Statistic

Sum squared resid	10.33986	Schwarz criterion	3.910127
Log-likelihood	-18.49375	Hannan-Quinn criter.	3.528477
F-statistic	84.12053	Durbin-Watson stat	2.166628
Prob(F-statistic)	0.000003		

Estimated model of the determinants of Nar model is given in the following graph and equation.

Table 4.5. Ordinary Least Squares Result

Method: Least Squares				
Date: 04/20/24 Time: 00:05				
Sample: 2008 2022				
Included observations: 15				
Variable	Coefficient	Std. Error	t-Statistic	**Prob.**
C	0.889446	1.167344	0.761940	**0.4710**
Advert	1.05E-06	7.80E-07	1.345601	**0.2204**
Bank and Forex	7.90E-07	7.14E-07	1.107352	**0.3047**
Car Park and Car Rental	-5.32E-06	2.28E-06	-2.330931	**0.0525**
Concession	1.23E-06	2.35E-07	5.222338	**0.0012**
Duty Free	1.92E-06	9.31E-07	2.065624	**0.0777**
Food and Beverages	1.70E-06	1.06E-06	1.603757	**0.1528**
Office Space	2.20E-06	6.45E-07	3.403286	**0.0114**
R-squared	0.988252	Mean dependent var		**12.74800**
Adjusted R-squared	0.976504	S.D. dependent var		**7.928855**
S.E. of regression	**1.215369**	**Akaike info criterion**		**3.532500**

The regression analysis sheds light on the link between the dependent variable, **non-aeronautical**, and various other factors. Here is a brief analysis:

Estimation Equation:

Non-Aeronautical = β0+ βAdvert + βBank and Forex + β3) *Car Park and Car Rental + β4*Concession + β5*Duty Free + β6*Food and Beverages + β7*Office Space

Substituted Coefficients:

Non-Aeronautical = 0.889446451035 + 1.04982270893e-06*Advert + 7.90326705468e-07*Bank and Forex - 5.31543220196e-06*Car Park and Car Rental +1.2274555066e-06*Concession + 1.92277064084e-06*Duty Free +1.69631514047e-06*Food and Beverages + 2.19553956956e-06*Office Space

4.5. Interpretation of Regression Results

Coefficients: The coefficient for each independent variable represents the change in the dependent variable for a one-unit change in the independent variable, while other variables remain constant.

Significance: The t-Statistic and Prob. columns show the statistical significance of each coefficient. A low p-value (usually < 0.05) indicates that the coefficient differs from zero.

R-squared: The R-squared number (0.988252) reflects how much of the dependent variable's variance is explained by the independent variables. In this situation, the independent variables explain about 98.8% of the variance in non-aeronautical.

Adjusted R-squared: This modifies the R-squared value to reflect the number of predictors in the model, resulting in a more accurate assessment of goodness of fit.

The Standard Error of Regression (S.E. of regression) is the average distance that the observed values deviate from the regression line. Lower values indicate a better fit between the model and the data.

The F-statistic assesses the overall significance of the regression model. A low probability (Prob(F-statistic)) means that at least one independent variable makes a significant contribution to the model.

To ensure that a more realistic model is produced, four of the significant independent variables are used to estimate the impact of the determinants on NAR. They are as follows:

Office Space
Concession
Duty Free
Food and beverages

Table 4.6. Non-Aeronautical Revenue and Determinants at BIA

SUMMARY OUTPUT					
Regression Statistics					
Multiple R	0.961023				
R Square	0.952127				
Adjusted R Square	0.944977				
Standard Error	1205955				
Observations	15				
ANOVA					
	Df	*SS*	*MS*	*F*	*Significance F*
Regression	4	7.99E+14	2E+14	137.3739	1.07808E-08
Residual	10	1.45E+13	1.45E+12		
Total	14	8.14E+14			
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	-323925	718744.9	-0.45068	0.661833	-1925388.358
Office Space	2.447106	0.484611	5.049627	0.0005	1.367324663
Concession	1.40179	0.180234	7.777628	1.51E-05	1.00020454
Duty Free	2.028957	0.855482	2.371713	0.039163	0.122824699
Food & Beverages	1.435131	0.874577	1.640944	0.131843	-0.513547349

NAR = β0+β1(Office Space) + β2(Concession)+ β3(Duty free) + β4 (F&B) … (4.1)

In the above regression model, **NAR** is used as a dependent variable while the most significant determinants of **NAR** at BIA are used as independent variables. The results shows that **Office Space, Concession and Duty Free** are significant determinants of **NAR** during the period under review with P-value of 0.0005, 0.00005 and 0.039

respectively. However, the impact of Food **and Beverages** during the period under review was statistically insignificant with a P Value of 0.13

The variation of the model as explained by the $\mathbf{R^2}$ is 95 percent which means that all the significant determinant of **NAR** during the review period are almost captured in the model. The result of the regression shows that there is a positive increment in **NAR** for every unit increase in the determinants ceteris paribus with **Office Space** and **Duty Free** having more positive impact on **NAR during** the period under review.

Since the R-square (R^2) shows very near perfect goodness of fit and the P-value of the determinants shows that **Food and Beverages** statistically insignificant, a further analysis of the independent variables at random will enable a thorough understanding of the most important determinant of **NAR.** The independent variables will be estimated using two model. The first model (model 2) will use Office **Space** and **Duty-Free** as independent variables and second model (model 3) will use **Food & Beverages** and **concession)** as independent variables. After this analysis, the significant variables in model two and model three will be grouped and a regression analysis estimated.

Table 4.7. Non-Aeronautical Revenue vs Office Space and Duty-Free

SUMMARY OUTPUT					
Regression Statistics					
Multiple R	0.934884				
R Square	0.874008				
Adjusted R Square	0.85301				
Standard Error	2922873				
Observations	15				
ANOVA					

Table 4.7. (cont.)

	df	*SS*	*MS*	*F*	*Significance F*
Regression	2	7.11E+14	3.56E+14	41.62215	3.99994E-06
Residual	12	1.03E+14	8.54E+12		
Total	14	8.14E+14			
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	-924846	1729266	-0.53482	0.602544	-4692593.857
Office Space	5.117283	0.748357	6.838022	1.8E-05	3.486753087
Duty-Free	1.320386	1.489977	0.886179	0.392934	-1.92599567

NAR = β0+ β1(Office Space) + β2(Duty Free) ..…… (4.2)

In the above regression model, an R-square of 87 per cent shows a good fit in terms of the variables used to explain the variation in **NAR**. However, only **Office Space** was statistically significant and will be used in the proceeding model. The regression result also shows that both independent variables have a positive effect on NAR. A unit increase in **Office Space** ceteris paribus **will** lead to a five (5) unit increase in **NAR.**

Table 4.8. Non-Aeronautical Revenue Vs Concession, and Food and Beverages

SUMMARY OUTPUT					
Regression Statistics					
Multiple R	0.958942				
R Square	0.919569				
Adjusted R Square	0.906164				
Standard Error	2335336				

Table 4.8. (cont.)

Observations	15					
ANOVA						
	df	*SS*		*MS*	*F*	*Significance F*
Regression	2	7.48E+14		3.74E+14	68.59851	2.70724E-07
Residual	12	6.54E+13		5.45E+12		
Total	14	8.14E+14				
	Coefficients	*Standard Error*		*t Stat*	*P-value*	*Lower 95%*
Intercept	1570720	1244374		1.262257	0.230837	-1140538.39
Concession	2.042212	0.24605		8.299984	2.57E-06	1.506115131
Food & Beverages	5.336517	0.908871		5.871589	7.58E-05	3.356257561

NAR = β0+ β1 (Concession)+ β2(Food and Beverage) …… (4.3)

In the third regression model, both variables have a significant positive effect on **NAR**. The R-square's percentage of model 3 is 4 per cent more than that of model 2. Since both independent variables are statistically significant, they will be used in the estimation in model 4.

Table 4.9. NAR and Significant Independent Variables in Models 2 and 3

SUMMARY OUTPUT					
Regression Statistics					
Multiple R	0.955938				
R Square	0.942073				
Adjusted R Square	0.934457				
Standard Error	1437292				
Observations	15				

Table 4.9. (cont.)

ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	7.91E+14	2.64E+14	127.6281	7.916E-09
Residual	11	2.27E+13	2.07E+12		
Total	14	8.14E+14			
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	-91958.8	848652.8	-0.10836	0.915663	-1959831.056
Food & Beverages	2.781895	0.792757	3.509142	0.004891	1.03704955
Office Space	2.602452	0.572274	4.547565	0.000833	1.342886059
Concession	1.356995	0.213625	6.352232	5.43E-05	0.886809991

NAR = β0+ β1(Advert) + β2(Office Space) + β3(Concession) + β4(Food and Beverages) ……. (4.4)

Using the significant variables in model 2 and 3, it was further evident all the independent variables that were significant in both model two and model three are jointly significant when combined in model four. This shows that during the period under review, **Food and Beverages, Office Space** and **Concession** are significant determinants of **NAR** at BIA and that they positively affect it. Any increase in the determinants (independent variables) ceteris paribus, will positively increase NAR. The coefficient of the independent variable shows that **Food & Beverages** have a more positive impact on **NAR** followed by **Office Space, and** then **Concession.**

The results suggest that for BIA to have maximised revenue from NAR sources, they should have focused on the above determinants during the period under review.

Table 4.10. Total Revenue vs Selected Determinant of Non-Aeronautical

SUMMARY OUTPUT					
Regression Statistics					
Multiple R	0.881924				
R Square	0.77779				
Adjusted R Square	0.688906				
Standard Error	73349345				
Observations	15				
ANOVA					
	Df	*SS*	*MS*	*F*	*Significance F*
Regression	4	1.88E+17	4.71E+16	8.750634	0.002648688
Residual	10	5.38E+16	5.38E+15		
Total	14	2.42E+17			
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	2.12E+08	67007734	3.165604	0.010063	62817436.79
Bank & Forex	-88.051	34.2041	-2.57428	0.027687	-164.2625001
Car Park & Car Rental	528.2146	116.9908	4.51501	0.001117	267.5428891
Duty-Free	59.68646	52.59136	1.13491	0.282884	-57.49439976
Food & Beverages	-80.7618	50.66653	-1.59399	0.142023	-193.6538679

Total Revenue (TR)= β0+ β1(Bank & Forex) +β2(Car Park & Car rental) + β3(Duty free) + β4(Food and Beverages) …….…. (4.5)

To find the impact of selected determinants of **NAR** on total revenue, **TR** is used as the dependent variable while the above independent variables are used. The result shows that only **Bank & Forex**, and **Car Park & Car Rental** are statistically significant with p-values of 0.027 and 0.001 respectively. The goodness of fit is 77 per cent.

Table 4.11. Total Revenue vs Concession, Office Space and Car Park &Car Rental

SUMMARY OUTPUT				
Regression Statistics				
Multiple R	0.784246578			
R Square	0.615042695			
Adjusted R Square	0.510054339			
Standard Error	92050186.44			
Observations	15			
ANOVA				
	Df	*SS*	*MS*	*F*
Regression	3	1.48914E+17	4.96379E+16	5.858199117
Residual	11	9.32056E+16	8.47324E+15	
Total	14	2.42119E+17		
	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	149372593.6	79091456.32	1.888605932	0.085583789
Car Park & Car Rental	619.4844234	153.1201499	4.045740706	0.001929506
Office Space	-59.35042674	27.28987882	-2.174814594	0.052336151
Concession	5.135745367	12.71547972	0.403897099	0.694029541

Total Revenue (TR)= β0+ β1(Car Park & Car rental) + β2(Office Space) + β3(Concession)…….... (4.6)

The regression model's R-square indicates that approximately 62% of the dependent variable's variance is explained by the independent variables. All the independent variables except Concessions are statistically significant.

	Advert	Bank and Forex	Office Space	Car Park and Car Rental	Concession	Duty Free	Food and Beverages	NAR	Dep. Int. Pax	Dep. Reg. Pax	Arr. Int. Pax	Arr.Int. Pax	TOTAL Revenue	FSC	LLC	SPECIAL FLIGHTS
Advert	1															
Bank and Forex	0.252427	1														
Office Space	0.618333	0.519456	1													
Car Park and Car	0.038767	0.109316	0.363342	1												
Concession	0.53765	0.417442	0.658752	0.286859	1											
Duty Free	0.367036	0.513857	0.627835	0.234444	0.321833	1										
Food and Bevera	0.257292	0.59634	0.707468	0.142897	0.336015	0.80718	1									
NAR	0.654094	0.605651	0.934586	0.259701	0.677578	0.786034	0.818206	1								
Dep. Int. Pax	-0.47147	-0.13379	-0.13953	0.640124	-0.31627	0.173774	-0.05184	-0.22203	1							
Dep. Reg. Pax	-0.25559	-0.2255	-0.04218	0.667997	0.064943	-0.02883	-0.18927	-0.14682	0.625119	1						
Arr. Int. Pax	-0.39358	-0.06344	-0.06791	0.72234	-0.19422	0.237268	0.005426	-0.13486	0.984744	0.678245	1					
Arr.Reg Pax	-0.24892	-0.26282	-0.06695	0.655103	0.022048	-0.03084	-0.19438	-0.1671	0.620829	0.995335	0.673768	1				
TOTAL Revenue	-0.2127	-0.49433	-0.17562	0.644743	-0.03934	-0.10816	-0.35039	-0.26691	0.637918	0.72055	0.643715	0.714615	1			
FSC	0.23723	-0.31756	0.123991	0.676582	-0.15649	0.03741	-0.1086	0.019757	0.456145	0.517656	0.499425	0.547474	0.559495	1		
LLC	-0.45109	0.183919	0.06577	0.783615	0.040486	0.124311	0.038726	-0.0455	0.842867	0.675576	0.874679	0.651083	0.510664	0.291763	1	
SPECIAL FLIGHTS	-0.49156	-0.37446	-0.39903	0.127227	-0.38031	0.154924	-0.14766	-0.37736	0.733738	0.554217	0.695412	0.559442	0.546929	0.127909	0.416157	1

Figure 4.1. Correlation Analysis for All Determinants

In figure 4.1, a correlation analysis was done to see the relationship between the non-revenue-related and revenue-related determinants. It indicated that only Car Park and Car Rental revenue has a significant positive correlation with the passenger volumes either by route type or flight segment. To further see this relationship, a regression analysis uses Car Park and Car Rental revenue as the dependent variable and the passenger volumes as the independent variable to test for their coefficient and R-square.

4.5.1. Non-Revenue Related Model

Table 4.12. Car Park and Car Rental vs Passenger Volume by Route Type

SUMMARY OUTPUT						
Regression Statistics						
Multiple R	0.83319					
R Square	0.694206					
Adjusted R Square	0.571889					
Standard Error	113740					
Observations	15					
ANOVA						
	df	*SS*	*MS*		*F*	*Significance F*
Regression	4	2.94E+11	7.34E+10		5.675448	0.01195501
Residual	10	1.29E+11	1.29E+10			
Total	14	4.23E+11				
	Coefficients	*Standard Error*	*t Stat*		*P-value*	*Lower 95%*
Intercept	-17984.4	141696.6	-0.12692		0.901518	-333704.1354
Dep. Int. Pax	-11.7286	6.482953	-1.80914		0.100543	-26.17348809
Dep. Reg. Pax	4.259986	25.58612	0.166496		0.871085	-52.74944844
Arr. Int. Pax	15.05493	6.817878	2.208154		0.051722	-0.136252089
Arr.Reg. Pax	-0.07426	24.5407	-0.00303		0.997645	-54.7543341

The effect of passenger volume based on their route type on Car Park and Car Rentals is estimated using the latter as the dependent variable. The result shows that only the Arrival of International Passengers significantly impacts Car Park and Rental Revenue. while there is a negative impact of Departure International Passengers, and Arrival Regional Passengers on the dependent variable as shown in the result.

Table 4.13. Car Park vs Passenger Volume by Flight Segment

SUMMARY OUTPUT					
Regression Statistics					
Multiple R	0.935036				
R Square	0.874291				
Adjusted R Square	0.840007				
Standard Error	69532.06				
Observations	15				
ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	3	3.7E+11	1.23E+11	25.50132	2.96918E-05
Residual	11	5.32E+10	4.83E+09		
Total	14	4.23E+11			
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	-120828	88774.44	-1.36107	0.200722	-316219.4961
FSC	3.381882	0.62658	5.397363	0.000218	2.002787508
LLC	3.241539	0.468101	6.924864	2.5E-05	2.21125461
SPECIAL FLIGHTS	-1.44696	0.668211	-2.16543	0.053199	-2.917686495

The effect of passenger volume by flight segment on **Car Park and Car Rental** showed a very interesting result. With an R^2 of 87 per cent, all the independent variables are statistically significant. The impact of the independent variables on Car Park and Car Rental is positive except **Special Flights**.

CHAPTER V

CONCLUSIONS AND LIMITATIONS

5.1. Summary

This study provides an in-depth analysis of the key determinants of non-aeronautical revenue (NAR) at Banjul International Airport (BIA) using secondary time-series data from 2008 to 2022, yielding several significant findings. The analysis confirms that the variables used in the study are stationary at both level and first-differencing stages, with no significant serial correlation in the residuals. This outcome indicates that the model accurately reflects the relationships between independent variables and NAR. Key findings indicate that office space, food and beverage services, and concession fees are the primary contributors to NAR, with car park and car rental services also playing a significant role. These results underscore the importance of expanding revenue streams beyond traditional aeronautical sources.

When Total Revenue (TR) is used as the dependent variable against selected NAR determinants, car park and car rental revenue emerge as primary contributors to overall revenue growth. Among NAR determinants, office space rentals hold the highest impact on NAR and have contributed more to total revenue during the review period. Additionally, passenger volumes from Full-Service Carriers (FSC) and Low-Cost Carriers (LCC) were found to significantly impact car park and car rental revenue positively.

Special flights, however, negatively impact car park and car rental revenue, as these passengers often do not engage with these services. Special flights include military flights, state visits, and emergency landings, where passengers have minimal interaction with regular airport amenities.

5.2. Policy Implications

The study recommends that BIA should continue diversifying its revenue streams by expanding parking facilities, concession areas, and office space rentals. By strengthening these non-aeronautical revenue sources, BIA can reduce its dependence on aeronautical revenue, thereby enhancing overall financial resilience.

Given the significance of car park and rental revenue for NAR, the Gambia Civil Aviation Authority (GCAA) should consider infrastructure investments to improve parking facilities, enhance customer experience, and maximize revenue generation. These improvements could include increasing parking capacity, implementing efficient parking management systems, and upgrading security measures.

To enhance NAR growth, BIA should prioritize retail and commercial development, attract recognized brands, and optimize retail layouts to increase passenger spending. Attracting recognized brands, optimizing retail layouts, and creating engaging commercial spaces would likely increase passenger spending and enhance the airport's revenue potential.

Regular monitoring and evaluation of non-aeronautical revenue performance are essential for identifying emerging trends, assessing the effectiveness of revenue-generating strategies, and making well-informed decisions. Periodic assessments should focus on evaluating policy impact on overall revenue and pinpointing areas for improvement.

Real estate development is another promising but underutilized revenue source for BIA. With limited commercial activities within the terminal, the airport could explore the concept of an airport city or Aerotropolis to accommodate future growth. By precisely demarcating land for commercial activities, BIA could attract more investors interested in securing a specific location. Senior management and board members should consider initiating this development by clearly defining commercial-use areas and gradually expanding the Aerotropolis concept.

Finally, the study underscores the critical role of non-aeronautical revenue sources in ensuring BIA's financial viability. Policymakers can strengthen revenue resilience and drive long-term growth by adopting targeted policies focused on revenue diversification, infrastructure investment, retail expansion, and consistent monitoring.

Future studies should explore non-linear models, such as ARIMA or machine learning approaches, to capture complex interactions between NAR determinants and external factors like passenger demographics.

5.3. Limitations

This research acknowledges certain limitations. Due to the absence of comparable airports in The Gambia, the study was unable to perform panel data analysis, as no other sub-Saharan or West African airport data on NAR was available for comparison.

Passenger dwell time and business space dimensions, recognized as critical determinants of NAR in many airports, could not be fully analyzed. BIA's management negotiates rent prices for business spaces rather than setting fees based on allocated dimensions. Additionally, the lack of transit passengers at BIA prevents a detailed study of dwell time as an influencing factor on NAR.

Real estate as a revenue source is emerging globally, offering diverse income opportunities from hotels, airport cities, and recreational facilities. Currently underutilized at BIA, this revenue stream is categorized as "other" in revenue reports without being fully leveraged.

Addressing these gaps would enable a more comprehensive analysis of NAR, providing management with a deeper understanding of its potential and paving the way to capitalize on new revenue opportunities. Future research should seek to obtain NAR data from sub-Saharan African airports to facilitate panel data comparisons. Additionally, future studies could explore the impact of real estate investments as a growing component of NAR in African airports.

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