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**AN ASSESSMENT OF KEY INDICATORS OF SUSTAINABLE DEVELOPMENT IN THE
SOUTH AFRICAN AIRLINE INDUSTRY**

Thesis Submitted in Partial Fulfilment of the Degree of

MASTER OF TECHNOLOGY

in the

Department of Quality and Operations Management

at the

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

of the

UNIVERSITY OF JOHANNESBURG



by

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September 2019

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PREFACE

The work presented in this Master's thesis was conducted at the Department of Quality and Operations Management within the Faculty of Engineering and the Built Environment of the University of Johannesburg under the Supervision of Dr Ndala Yves Mulongo .



ACKNOWLEDGEMENTS

I would like to extend my sincere gratitude to Dr Ndala Yves Mulongo, my supervisor, who pushed me beyond my limits. I thank him for his unwavering support, guidance and insight throughout this study, and especially for his confidence in me .

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My acknowledgement would be incomplete without thanking the biggest source of my strength, my father Fleiras Pepe Rivelino De Gove, whose dreams for me have led to this achievement. His infinite belief in me always motivated me to keep going. Thank you for all of the sacrifices that you made on my behalf. Your prayers and your encouragement were a great source of strength to me.

I also gratefully extend my thanks to all concerned persons who co-operated with me on this project.



DECLARATION

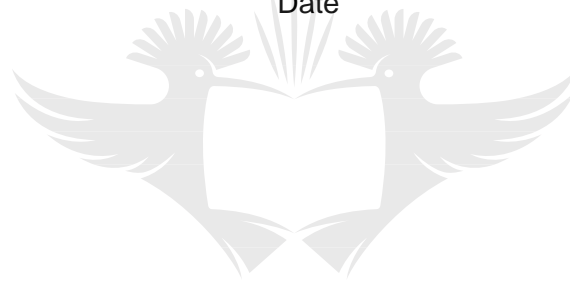
I, **Sabina Valentina De Gove** hereby affirm that this dissertation entitled, “**An Assessment of Key Indicators of Sustainable Development in the South African Airline Industry**” “is the product of my personal work. It is being tendered for the degree of Master of Technology in the University of Johannesburg. All the sources used and quoted in this study have been cited, referenced and acknowledged. I affirm that this dissertation has never been submitted to, and has not been presented at, any other institution”.

SVD GOVE

Signature

SEPTEMBER 6, 2019

Date



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DEDICATION

I dedicate my dissertation to my parents, Fleiras Pepe Rivelino De Gove and Masinca Oancea for their constant love and support. I can never thank you enough for making your children the main priority in your lives. What I have done, I have done to make you proud .

I would also like to dedicate this dissertation to my lovely son Mizaël Manuel Baptista. He was always the one who most encouraged me to continue with my studies. And thank you also to my amazing nanny, Dona Tina, whose devoted care for my son made it possible for me to complete this dissertation .

Finally, I again dedicate my dissertation to my family and friends for their support throughout the whole process. I will always appreciate all their support.



ABSTRACT

Sustainable development is a central topic of debate with regard to the social, economic and environmental activities of public and private organisations. The South African government has adopted a forward-looking policy in this area since the concept of sustainable development must be integrated into the activities of the various government departments and organisations. The aviation industry involves mass transport which is rapid, safe and reliable. To date, over the 20th century, the quality of air transport had seen a significant improvement, costs were reduced and demand kept on increasing. The social and economic advantages of air transport are extensive; however, its environmental costs are high. At the current rate of development, air transport is considered to be unsustainable in the long-term. Since, it is considered as a process based on innovations, which would ensure long-term sustainable airline. To this end, this study aimed at assessing the key indicators of sustainable development in the airline industry, using the South African airline industry as case study. In order to achieve this goal, the study adopted a two-fold approach noting that (1) critical appraisal of existing literature on sustainability practices within the airline sector (2) refining the identified flaws by means of quantitative research questionnaires survey. The findings demonstrated that Improved fuel efficiency of new aircraft; payment of full external environmental costs; effective environmental legislation; community participation in airport environmental decisions; spreading benefits of aviation to socially deprived areas and unemployed people; development of renewable fuel for aviation; environmental impact assessment for all civil aviation activities; public education on sustainability of air transport; limitation of greenhouse gas emissions; integration of environment and development in civil aviation policy making are the key indicators to successfully implement sustainable development in the airline industry. , if appropriately managed, could be of benefit to airlines. It is recommended that these indicators be implemented responsibly to addresses the current environmental concerns and to ensure that operations can be carried on in the future.

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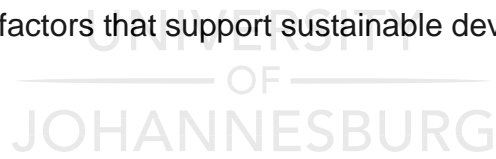
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LIST OF ACRONYMS

AFCAP	African Civil Aviation Policy (AFCAP)
ICAO	International Civil Aviation Organisation
EU	European Union
UN	United Nations
GDP	Gross Domestic Product
IATA	International Air Transport Association (IATA)
ME	Middle East
MENA	Middle East and North Africa
MDGs	Millennium Development Goals
SAA	South African Airways
SAX	SA Express
SDGs	Sustainable Development Goals
ORTIA	Oliver Reginald Tambo International Airport
UNDP	United Nations Development Programme
PEDs	Personal Electronic Devices
PPP	Public–Private Partnership
UK	United Kingdom
UAE	United Arab Emirates
SPSS	Statistical Package for Social Sciences
SDI	Sustainable Development Indicators

CHAPTER ONE

INTRODUCTION AND BACKGROUND

1.1 Introduction

As of the beginning of the 20th century, civil aviation has provided large-scale, rapid, safe and reliable transport for long distance travel in (Hawkins, 2017). In the latter half of the 20th century, the reliability and safety of air transport improved while costs were reduced as the volume of traffic greatly increased and demand has risen. The social and economic benefits arising from aviation are substantial; however, its environmental costs are significant and constantly rising. Hence the question of the sustainability of this mode of transport needs to be scrutinised. Sustainable development as a concept first arose in the latter part of the 20th century . There has been advocacy for changes in technology and the way that business is conducted so that industry addresses sustainability concerns, hence the “the need to apply the principles of sustainable development to the practice of the civil aviation industry” (Griggs and Howarth, 2016)

As there is no universal definition of the concept of sustainability, this has sparked heated debate. The National Register of Citizens (NRC, 1999) and World Commission on Environment and Development (WCED, 1987) sees sustainability as an “expedition” exploring “changes in technology and behaviour” which are required in order to move “towards a better level of sustainability”. The continual growth of the civil aviation is resulting in high environmental costs which in turn are attracting increasing attention. Sustainable development as a concept has received considerable support regardless of it not being fully understood. According to Paling, Hooper and Thomas (2016, pp. 141-156), civil aviation “may deviate from the principles of sustainable development and the expected development may strengthen this discrepancy. Therefore, there is an obligation for research that deal with ideas and principles of sustainable development to the civil aviation industry.”

1.2 Problem statement

Aviation plays a critical role in the development of the economy in most countries across the globe and in particular, it promotes the tourism industry. However, despite the success of civil aviation, there have been concerns about its negative impact on the environment.

Environmental concerns have already delayed or reduced some “airport capacity projects in the last decade” (De Mestral *et al.*, 2018). Predictably, substantial environmental impact on different sections of the national airspace system will be experienced due to increased demand for national airspace. As evidenced by operational trends, it is clear that aircraft noise and emissions will negatively impact the environment. This will be an impediment to the capacity and flexibility of the next generation air transport system unless they are managed and mitigated (McManners, 2016). In light of these anticipated obstacles, this research study intends to address and assess critical indicators of sustainable development within the South African airline industry.

1.3 Research Goal

Given the need to examine the relationship between civil aviation and sustainable development, the aim of this study was to assess the key indicators of sustainable development in the airline industry, using the South African airline sector as case study.

1.4 Research Objectives

To achieve the aim of this study, the following research objectives were developed:

- **RO1:** To determine the extent of sustainable development practices in the airline industry
- **RO2:** To determine the main purpose of sustainable development indicators for civil aviation
- **RO3:** To determine the barriers to the introduction of sustainability approaches in the airline industry
- **RO4:** To determine the issues that may be relevant to sustainable development of the civil aviation industry.
- **RO5:** To determine the extent of policy actions that were taken to support the sustainable development of aviation
- **RO6:** To recommend a set of sustainable development indicators in civil aviation.

1.5 Research Questions

Listed below are the research questions which seek to address the research objectives:

- **RQ1:** To what extent sustainable development practices have been implemented in the airline industry?
- **RQ2:** What is the main purpose of sustainable development indicators for civil aviation?
- **RQ3:** What are the barriers to the introduction of sustainability approaches in the airline industry?
- **RQ4:** What are the issues that are relevant to sustainable development of the civil aviation industry?
- **RQ5:** To what extent policy actions have been taken to support the sustainable development of aviation?
- **RQ6:** What are the indicators of the sustainable development in the civil aviation for South Africa?

1.6 Significance of the Study

Various studies (Shaw, 2016; Zhou, Wang, Yu, Chen & Zhu, 2016, Scott & Trimarchi, 2017) have sought to explain various issues in relation to the aviation industry, however, none has succeeded in establishing sustainable development indicators, particularly in the South African airline industry. Most of these studies have been conducted in the USA, which does not necessarily apply to the South African context.

This study is significant to the South African aviation industry as it seeks to bridge this gap by developing indicators for sustainable development relevant to the South African airline industry.

1.7 Research Methodology

A quantitative research methodology was employed to investigate issues related to the airline industry whereas a qualitative approach was used to obtain participants' perceptions and experiences by reviewing available literature. The advantage of

qualitative methods in the context of this study is that they enhance understanding and permit the inquiry into new areas

1.8 Overview of the Study

The study is organised into eight chapters, as follows:

Chapter 1: This chapter presents the research problem, research goal, research questions, study objectives, significance of the study, research methodology and overview of the study .

Chapter 2: This chapter outlines the literature review of airline industry and other variables related to the study. It also explains the theoretical framework which guides the structure of the thesis .

Chapter 3: This chapter covers the airline industry from a Global perspective .

Chapter 4: This chapter covers the airline industry from an African perspective .

Chapter 5: This chapter covers the airline industry from a South African perspective .

Chapter 6: This chapter outlines the research method used to collect data from the participants .

Chapter 7: This chapter presents the findings and their analysis and interpretation .

Chapter 8: This chapter addresses the conclusions drawn from the study and the study recommendations .

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The objective of the literature review is to elaborate on the concept of sustainable development. In addition, the chapter seeks to identify the challenges faced in transforming these concepts into operational contexts while at the same time establishing areas in which the reviewed literatures can be applied. The origins of sustainable development are traced and the indicators are explored, examining possible definitions, characteristics and formats.

2.2 Theoretical Framework; Sustainable Development Theory

2.2.1 Origins of Sustainable Development

Sustainable development was the subject of the 1992 United Nations environment and development conference, hosted in Brazil, Rio de Janeiro (Mitcham, 1995). The objective of the conference was to try to develop a plan that would spark the movement towards a more sustainable development model. There was a representation of 178 national governments, coupled with a total of 100 heads of state. Also, in attendance were civil aviation representatives who participated in the conference. The solution to the challenges of environmental degradation depend on the sustainable development concept; these challenges were discussed by the Brundtland Commission in the 1987 report, *Our Common Future* (Pearce, 2014). The mandate of the Brundtland Report was “to investigate the many concerns that had arisen in previous decades, namely that human activity was having serious and negative impacts on the planet and that the models of growth and development would be unsustainable if they remained uncontrolled”. Other key works highlighting this notion include Carson's *Silent Spring* (1962), Hardin's *Tragedy of the Commons* (1968), *Ecologist's Blueprint for Survival* (1972) and the *Limits to Growth* report from the Club of Rome (1972).

The idea of manageable advancement was first globally acknowledged in 1972 at the United Nations Conference on the Human Environment held in Stockholm. Up until then, it was decided that progress and nature, which up to that point had been treated as isolated issues, should not be viewed in isolation (Bende-Nabende, 2017).

Fifteen years later, the term sustainable development gained wider recognition through the report of the World Commission on Environment and Development, namely, *Our Common Future*. Nonetheless, it was not until the Rio Summit, that the world's heads stated that "reasonable advancement is the fundamental test that still exists today" (van den Bergh & Hofkes, 2013).

In 2002, Johannesburg hosted the World Summit on Sustainable Development which 191 national governments attended, including the United Nations, multilateral financial institutions and other key stakeholders. The aim of the summit was to evaluate the progress made since the Rio Conference. Three major results emanated from this summit, namely, a political declaration, the Johannesburg Implementation Plan and a series of partnership initiatives. The major commitments included those of sustainable consumption, production, water, sanitation and energy (Bende-Nabende, 2017).

2.3 The Process of Sustainable Development

Sustainable development has been viewed from various perspectives, yet the most frequently used definition originates from *Our Common Future*, otherwise known as the Brundtland Report (1987): "sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs. "Sustainability is the premise of the present universal collaboration system, the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDG).

Environmental governance supports sustainability as the supreme consideration in the management of all human, political, social and economic activities. The idea of sustainability depends on maintainable improvement. Sustainable advancement depends on the three mainstays of manageability: ecological, economic and social sustainability. It is only achieved when there is balance or a trade-off between these three aspects.



Figure2.1:Relationships in sustainable development
 (<http://macaulay.cuny.edu/eportfolios/akurry/files/2011/12/SDspheres.jpg>)

On the other hand, several authors have broadened this conceptualisation and included a fourth aspect (for instance, institutional, political or social factors). It is essential to comprehend that sustainable development is an all-encompassing and coordinated methodology, which implies that there must be balance between the diverse life cycles.

2.4 Indicators for Sustainable Development

Sustainable Development Indicators (SDI) according to Mitchell (1995, p.2), are defined as follows: several statistical values that collectively measure the ability to meet current and future needs. The SDI will provide crucial information for national policy decisions and for the general public. An indicator is something that helps one understands where she stands; going and how far she is from where she wants to be. A good indicator warns of a problem before it becomes too bad and helps one recognize what one needs to do to solve it. The indicators of a sustainable community indicate areas in which the links between the economy, the environment and society are weak. They allow one to see where the problem areas are and help show how to solve these problems .

Bruntland (WCED, 1987, pp. 9-15) acknowledged that “there were gaps in the information available for the debate on sustainability and called for strengthening environmental reporting capabilities. To address this information gap, the UN has explicitly introduced the concept of sustainable development indicators into Agenda 21, Chapter 40”. Agenda 21 uses the terms ‘sustainable development indicators’ and “indicators of sustainable development’ in an interchangeable way, a convention which is adopted in this study.

The vast majority of the literature on sustainability before 1992 does not allude explicitly to indicators of sustainable development (WCED, 1987; Elkin&McLaren,1991; Markandya et al., 1989; Lele 1991). Some authors began using the term in the mid-90s (Griggs and Howarth, 2016).

2.5 Objectives of Sustainable Development Indicators

The objectives of sustainable development indicators were defined by Agenda 21 as:

40.4 “Indicators of sustainable development need to be developed to provide solid bases for decision-making at all levels and to contribute to a self-regulating sustainability of integrated environment and development systems”.

40.4 “The need for information arises at all levels, from that of senior decision makers at the national and international levels to the grassroots and individual levels”.

40.22.... “information suitable for both planning and public information”.

Therefore, in Agenda 21, the objectives of the indicators are defined as “information for decision makers, public information, contribute to the self-regulatory sustainability of the systems. As with many aspects of Agenda 21, there are some ambiguities in these purposes, although more specific requirements can be derived from related references” (Lafferty &Eckerberg, 2013).

2.5.1 Decision-Making Information

The term ‘decision maker’ has a broad interpretation in Agenda 21, which explicitly includes individual consumers, local and national governments and global policy makers.

Organisations are expected to “play an important role in the implementation of Agenda 21 and, as a result, managers are regarded as decision makers. Agenda 21 states that indicators should reflect the scope of decision makers, suggesting in Chapter 20 that data should be collected at the local, provincial, national and international levels” (Waas, Hugé, Block, Wright, Benitez-Capistros&Verbruggen, 2013, pp. 5512-5534).

The objective, according to Spangenberg *et al.* (2002, pp. 61-77), covers “the four dimensions of sustainable development: social, environmental, economic and institutional (means of implementation in Agenda 21). The institutional dimension is explicitly included in the scope of indicators for sustainable development”. Therefore, a set of indicators must cover all aspects relating to the concept (Waas *et al.*, 2013).

2.5.2 Information for the Public

Agenda 21 states that “indicators should be used both to inform decision makers and to be adequate for public information”. These two objectives produce a degree of conflict as “information for decision makers should reflect their needs and could be quite specific, related to their scale of responsibility, which could lead to the need for a complex hierarchy of indicators; on the other hand, public information indicators must be very simple, general and few” (O’Riordan&Voisey, 1997).

The United Kingdom has embraced a ‘headline’ or ‘framework’ approach, supported by a series of more detailed indicators Department for Environment Food and Rural Affairs (DEFRA, 1999; 2005). De Wit (2003, pp. 436-459) suggests that “this technique, also adopted by the United States and Sweden, could constitute a base for public information indicators at the national level”.

2.5.3 Self-Controlling Sustainability

The objective of "contributing to a self-regulated sustainability of the integrated environment and of the development systems" has broader implications, assuming the existence of some form of self-regulation systems of sustainability. Agenda 21 provides no explicit interpretation of such systems, pointing merely to institutional capacity and capacity-building capacities. The concept was recognised by the Bellagio Principles (Hodge& Hardy, 1997, pp. 7-20) who recommend that sustainable development: must be guided by a dream, destinations and noteworthy targets and unambiguous institutional

duties. Decision making must be iterative, adaptable and able to adjust objectives as indicators change and understanding of problems develops. Others express the capability to steer a path of change towards sustainability in an adaptive manner.

Therefore, the "self-regulation system" is designed to embrace institutional responsibilities and capacities, sustaining an adaptive and iterative process of decision-making based on the following factors:

- Accountability and decision-making capacity;
- Directed by principles of sustainable development;
- Adaptability; and
- Repeatability.

2.6 Definition of the Indicators

Agenda 21 provides limited guidance on the attributes of the indicators, although it does contain some useful information. Agenda 21 requires indicators to show change programs in addition to existing states. Thus, the types of indicators were subsequently classified as a driving force, state, response (UN, 1996; 2001). These categories are viewed as necessary evaluation criteria for the indicators to assess the importance given to change programmes (response indicators). The resulting features are summarised by Smith (2002, pp. 305-310) as "simple, widely credible, and easily understood by policymakers and the public: characteristics that reflect Agenda 21 purposes of the indicators that avoid prescriptive formats".

2.7 Accountability for Indicators

Bruntland observes that all global agencies of the United Nations are responsible for promoting sustainable development practices and policies (WCED, 1987). Agenda 21 explicitly identifies organisations with responsibilities for the development of sustainable development indicators (Spangenberg *et al.*, 2002). Agenda 21 Ch. 40.6 specifies that "the responsibility rests with the countries at the national level and with international governmental and non-governmental organisations at the international level". For areas outside national jurisdiction, Agenda 21 is specific about the role of UN agencies: Relevant organs and organisations of the United Nations system, in cooperation with other

international governmental, intergovernmental and non-governmental organisations, should use a suitable set of sustainable development indicators and indicators related to areas outside of national jurisdiction, such as the high seas, the upper atmosphere and outer space (Agenda 21, Ch.40.7).

The function of companies and industry is recognised in Chapter 30 of Agenda 21: Business and industry, including transnational corporations, and their representative organisations should be full participants in the implementation and evaluation of activities related to Agenda 21.

Organisations are required to implement Agenda 21 as industry and business are considered to be responsible for creating feasible progress indicators. Agenda 21 recommends that “the indicators should be developed by countries, international governmental organisations, UN agencies, international non-governmental organisations, industrial sectors and companies” (Spangenberg *et al.*, 2002, pp. 61-77). While there is no additional explanation on which groupings could be incorporated into the class of ‘worldwide non-governmental associations’, it is reasonable to suppose that the UN would include into this classification “international trade organisations and representative groups in the industrial sector” (Spangenberg *et al.*, 2002, pp. 61-77).

2.8 Evolution of Indicators

In Chapter 40 of Agenda 21, it can be seen that information needs are constantly evolving. There is acknowledgement that indicators can alter, a view confirmed by the more precise definition of the United Nations at the Rio Conference: “No set of indicators can be final and definitive, but must be developed and adjusted over time to fit country specific conditions, priorities and capabilities” (DiSano, 2001).

Characteristics of Indicators from Agenda 21

The evaluation measures for the indicator sets are summarised in Table 2.1 below:

Table 2.1 Assessment Criteria for Indicator Sets

Accountability for Creating Indicators	
	Countries
	International Government Organisations
	UN Agencies
	International Non-Government Organisations
	Industrial sectors
	Companies
Objectives of sets of Indicator	
Notify	Global Policy Makers
decisions of:	National & Local Government
	Business Managers
	Customers
	Information for the Public
Indicator sets Characteristics	
Targets	Decisions makers: global, national, local government
	Business executives, customers
	Information for the public
Scale	Local, national, international
Scope	Four dimensions: social, economic, environmental, institutional
	All appropriate chapters of Agenda 21
Type	Driving force, state, response
Characteristics of Indicator	
Evolution	Variable over time – will evolve
Accessibility	May require new data
Characteristics	Simple
	Extensively reliable
	Easily understood by policy makers and the public

2.9 Nature of Sustainable Development Indicators

Different studies offer various definitions for indicators of sustainable development. These definitions mostly highlight aspects of assessment or information rather than objective criteria. Below are some of the definitions:

- **National Register of Citizens (1999):** “Indicators are repeated observations of natural and social phenomena that represent systematic feedback. They provide quantitative measures of the economy, human well-being, and impacts of human activities on the natural world”.
- **Pastille Consortium (2002):** “A policy-relevant variable that is specified and defined in such a way as to be measurable over time and or space. It need not be quantified; measurement can be on the basis of qualitative scales.”
- **Gallopın (1997):** “An indicator is something that represents a particular attribute, characteristic or property of a system.”
- **GRI (2002):** “A measure of performance either qualitative or quantitative.”

Segnestam (2002) remarks that the diversity of these points of view suggests that “there is no agreed definition of the terminology of sustainable development and a compelling need for an agreed terminology lexicon. It is useful to differentiate the terms in the discussion; information, indices, indicators and data can mean different things to different people”.

Data, according to McLellan (2003, pp. 225-228) means “basic measurement, which can be transformed into a more meaningful level (indicator) and can be used to show trends or results against a goal. Indices can be complex combinations of indicators and or data”. The indicators should be able to provide information. The UN (2001) states that “they can translate physical and social science knowledge into manageable units of information that can facilitate the decision-making process whereas Hart (1999) maintains that an indicator is something that helps you understand where you are, which way you are going and how far you are from where you want to be”.

For the purposes of this study, an indicator is considered to “help you understand where you are, where you are going” (Hart, 1999) and translates the data into adequate information for the decision-making process (UN, 2001). This interpretation remains consistent with the purposes of Agenda 21 .

2.10 Globalisation and the airline industry

Globalisation can be defined as “the process of creating, transforming things or phenomena into global ones and is synonymous with the expansion of international capital, in various forms throughout the world” (Cristian, 2011). The airline industry plays an important role in this expansion. Both airlines and air transport infrastructure must respond to the ever-changing demands inherent in their services. Air transport must respond to international transport requirements of quality, speed, reliability and safety (Hitt *et al.*, 2016).

The global liberalization of trade flows has a remarkably synergistic relationship with the travel and airline industry. Each stimulates the other, just as neither is completely practicable in isolation. However, in a sector as global as that of airlines, it seems unlikely that there may be significant artificial limitations imposed on international cooperation, not to mention mergers. There is now a growing consensus in the airline industry that the 70-year provisions that prevent ownership and control of airlines abroad are archaic and should be liberalized or abolished significantly.

The removal of the restrictions would allow significant cross-border acquisitions and mergers worldwide and will result in substantial benefits for the economic performance of the airline industry. There have been some alterations in this area and some significant examples of relaxation on the part of the government, or the implicit waiver of the rules.

However, the provisions, which are a series of bilateral intergovernmental agreements regulating international air transport, have remained largely unchanged for many decades. Currently, most of the efforts at change come from airlines seeking new ways of avoiding control and ownership restrictions. This illustrates both the growing irrelevance of the rules and their ongoing persistence (Hsu&Liou, 2013).

Globalisation, according to Kang (2018): has become a fashionable concept in the social sciences, the main motto of management specialists, journalists and politicians of all

kinds. Globalisation says that we live in a time when most of social life is driven by global processes, in which economies, cultures and national borders are disappearing. The evolution of airlines is a very intuitive example for the development of alliances and globalisation strategies for the coming years. For airlines, this development has several advantages, such as strengthening the market position, extending the network, integrating products, brand loyalty and reducing costs.

Air transport is a large industry and contributes significantly to economic, political and social progress. As with other types of transport: the demand for air transport services is derived and is based on the need and desire to achieve more final objectives. For example, air transport contributes to the economic development of a particular region or sector, like tourism. The lack of air transport, as in the absence of any other economic component, can prevent effective growth. On the other hand, excessive or inappropriate transportation is a waste (Hitt *et al.*, 2016).

2.11 Critical Analysis of Empirical Studies

This section critically examines various empirical studies on the global aviation industry to identify a gap that justifies the rationale for this study.

Table 2.2: Empirical Studies (*Author's own compilation*)

Author	Type of manufacturing				Research Methodology		Country
	Airline	Auto-motive	Const- ruction	Food industry	Qualitative	Quantitative	
Teichert, T (2008)	x					X	
Mannering, F (2006)	x					X	USA
Suzuki, Y (2001)	X					X	
Mallikarjun, S (2014)	X					X	USA
Katila, R (2012)							
McFadden, KL (2008)	X				X	X	USA
Garrow, LA (2014)	X				X	X	USA
Dresner, M (1995)	X					X	USA

Scheraga, CA (2004)	X					X	USA
Strong, JS (2012)	x					X	Global
Bitzan, JD (2006)	x				X		USA
Wittman, MD (2013)	x				X	X	USA
Bhadra, D (2002)	X					X	USA
Wojahn, OW (2011)	x					X	USA
Bilotkach, V (2010)	X					X	Global
Gorin, T (2004)	X					X	USA
Sandada, M (2016)	X					X	USA
Allen, AM (2015)					X	X	Southern Africa
Martin-Rios, C (2016)							
Uhlenbruck, K (2017)	X					X	USA
Bujisic, M (2016)							
Messner, W (2016)	X					X	
Kuhn, SW (2015)	X				X	X	
Hunter, JA (2016)	X					X	South Africa
De Meyer, CF(2011)	X				X		USA
Yimga, J (2017)	X				X	X	South Africa
Kurian, G (2017)	X					X	
Smith, VK (2013)	X					X	USA
Schnell, MCA (2005)	X					X	
Escobari, D (2017)	X					X	USA

2.12 Conclusion

Various studies cited in Table 2.2 have sought to explain various issues in relation to the aviation industry, however, none of them has managed to improve upon the indicators of sustainable development, particularly in the South African airline industry. Most of these studies have been conducted in the USA, which does not necessarily apply to the South African context.

This study is significant to the South African aviation industry as it seeks to close this gap developing indicators to sustainable development relevant to the South African airline industry. The study will benefit airline industry stakeholders beyond those under study, as it will assist in developing indicators to sustainable development.



CHAPTER THREE

AIRLINE INDUSTRY FROM A GLOBAL PERSPECTIVE

3.1 Introduction

The globalisation of manufacturing and production has resulted in inter-firm collaboration of international firms and has been of interest among many scholars. This increase of integration of commerce and manufacturing has been termed the advent of the 'global village'. The international airline industry is no exception to this trend. The international aviation industry has been experiencing continuous growth, doubling every 15 years since 1970 (International Civil Aviation Organization (ICAO), 2013a). However, increasing calls are being made to offset this progress with sustainable development as aircrafts have been exploiting loopholes to maintain economic growth.

The international airline is characterised by intense regulation and high capital costs (Lynes&Andrachuk, 2008). This has resulted in fierce competitive conditions which are driving the airline industry at an ever-increasing pace and their operations of air transport inevitably give rise to substantial environmental and social consequences (Knieps, 2014, pp. 30-37). Therefore, the airline industry has engaged in various competitive strategies such as differentiation to sustain itself. Active buy-in into corporate social responsibility (CSR) initiatives has been seen as a sound differentiation strategy by many airlines (Chen *et al.*, 2012). This participation has been affected by increasing pressure resulting from concerns about environmental deterioration and fuel efficiency. CSR requires genuine budgetary and human capital initiatives, however, many have questioned their genuineness and impact in the aviation industry (Valor, 2005).

3.2 Overview of the Global Airline Industry

Civil aviation is today an integral part of the world's economy contributing to approximately 9% of the global GDP and carrying more than two billion passengers and 41 million tonnes of freight and mail each year (Airbus, 2007; International Civil Aviation Organisation, 2007). The total world traffic revenue (international and domestic, passenger and cargo) on scheduled airlines in 2006 exceeded 510 billion revenue tonne kilometres (RTK), which included almost four trillion in Revenue Passenger Kilometres

(RPK). This success of the aviation industry is set to continue for the coming years at an average rate of approximately 5% per annum within the next 20-year period. Cargo traffic, as measured in RTK, is expected to grow at around 6% over the same period .

According to PwC (2016), the global airline industry has been enjoying good results due to an increase in demand and a drop in fuel prices, posting a profit of US \$35 billion in 2016, which was nearly double that of 2014. For the industry to remain competitive there has been an increase in the digitalisation as airlines are partnering with holiday-makers to offer flight packages which incorporate promotional, discounted holiday flights.

This demonstrates that airlines are no longer solely focusing on ticket sales but are instead entering other areas such as accommodation, car rental services and entertainment. To remain competitive, airlines have also introduced low-cost carriers which offer flights at ultra-low costs but add extra charges for inflight services such as food and services.

3.3 Industry Structure

Canada is the host nation of the International Civil Aviation Organisation (ICAO). At the Quebec Conference of 1943, President Roosevelt and Prime Minister Churchill communicated the possibility of a multilateral association to administer worldwide aviation. In the field of civil aviation, ICAO plays the leading role in environmental issues . Signatory states will be required to modify their approach to the environment, and Canada is actively working in this area, in accordance with the mandate of the international community to protect the environment and at the same time maintain profitability and economic security of civil aviation.

ICAO (2013) has focused on: how it helps its 190member states to fight for the new 21st century civil aviation benchmarks: optimal security; the progressive liberalization of air transport throughout the world; an interoperable, harmonized and continuous air traffic management system worldwide; maximum compatibility between the safe and orderly development of civil aviation and the quality of the environment; and further development of a unified global legal package. All are absolute priorities for the organisation and the industry, since we evaluate our collective horizons .

3.4 Policy Objectives for the Airline Industry

There has been increasing deregulation within the airline industry which has increased competition and reduced profitability. The EU has proposed an 'open skies' policy to allow greater access for aircrafts to new routes throughout Europe. This has not been straightforward; however, as European aviation authorities are not fully co-ordinated.

In addition to this, the European and other international air traffic control bodies have lowered their barriers for new carriers. Deregulation began in Australia in 1990, when controls on prices and schedules were removed; resulting in domestic price warfare, cost cutting measures and the entry of a new national airline. Countries such as the United Kingdom have actually gone as far as to privatise their national airways. In 1991 the British Civil Aviation Authority relaxed certain aviation rules, allowing new airlines to fly into and out of Heathrow for the first time since 1977. This resulted in an increase in competition as large American airlines which are also the largest in the world were able to use the Heathrow airport. The Virgin Atlantic was also allowed to operate from Heathrow as well as Gatwick; allowed to fly to more American destinations; and given a number of British Airway's slots on the lucrative Heathrow to Tokyo route. All of these changes increased competition. These changes in competitiveness within the industry will be discussed in more detail in the section below.

3.5 The Importance of the Airline Industry

The airline industry is a critical factor in international economic growth. The growth in air transport has increased world trade by allowing quicker and easier movement of travelers and merchandise. It has also created employment for a large number of individuals. According to Dobson (2017), the airline industry accounts for the: employment of 56.6 million people, a US\$2.2 trillion contribution to the global gross domestic product (GDP), and carries 2.9 billion passengers and US\$5.3 trillion in cargo each year. As air passenger traffic increases, the value of tourism spending is expected to increase by 5.2% in 2014.

Dobson (2017) continues to state that: economic growth has been the primary reason for the growth in demand as network expansion through the addition of more unique city pairs over the years has supported growth in air travel. With 16,000 unique city pairs, connectivity by air is estimated to have doubled in the past two decades. Moreover,

although demand continues to rise, the price of travel has fallen. Reducing air transport costs have made air travel more affordable in recent years”.

This improvement in air travel has also promoted greater cultural integration.

3.6 Impact of the Airline Industry on Global Economic Growth

According to Nawabshah Airport (WNS) (2016), in 2016, close to 3.8 billion travellers were estimated to travel over 54,000 routes yearly. The same Airline Insights article records that in 2014: the global airline industry had an operating margin of 4.3 percent, and recorded profits of USD 30.4 billion in the United States. During the same period, profits for the North American (NAM) region stood at USD 17.2 billion, Europe at USD 5.9 billion and Asia-Pacific (APAC) at USD 3.3 billion. This resulted in the industry seeing a profit of USD 2.1 billion in the Middle East (ME), USD 1.7 billion in the Latin American (LATAM) region and USD 0.2 billion in Africa. The Indian sub-continent bucked the global profitable trend.

The WNS (2016) referred to a statement by IATA's Director General and CEO, who summed up the state of the industry succinctly: The airline industry is delivering solid financial and operational performance. Passengers are benefiting from greater value than ever with competitive airfares and product investments. Environmental performance is improving. More people and businesses are being connected to more places than ever. Employment levels are rising. And finally, our shareholders are beginning to enjoy normal returns on their investments.

It can be seen that this picking up of profits within the airline industry has driven airlines to seek for new leavers for growth in order to absorb it. Airlines are looking for global partners to collaborate on high-end work such as analytics, network planning, pricing and revenue management. This is a new facet for the airline industry. This has been a change in their business strategy as until recently, airlines looked at outsourcing to reduce costs and improve efficiencies. As a result, they focused on outsourcing non-core, non-strategic, process- and people-intensive tasks to partners. However, it can be seen that now they are looking to achieve enhanced profits and higher valuation by outsourcing more complex work .

3.7 United Arab Emirates (UAE)

The UAE is a “federal absolute monarchy sovereign state in Western Asia at the southeast end of the Arabian Peninsula on the Persian Gulf, bordering Oman to the east and Saudi Arabia to the south, sharing maritime borders with Qatar to the west and Iran to the north”. The UAE is a multicultural society that comprises a total population of 9.2 million. Of these 9.2 million, 1.4 million are native citizens whereas 7.8 million are foreigners. The country’s airline industry was established in 1971. According to Dobson (2017), it is a federation of seven emirates which are Abu Dhabi (which serves as the capital), Ajman, Dubai, Fujairah, Ras al-Khaimah, Sharjah and Umm al-Quwain. Each emirate is governed by an absolute monarch; together, they jointly form the Federal Supreme Council. One of the monarchs (traditionally always the Emir of Abu Dhabi) is selected as the President of the United Arab Emirates.

The UAE boasts large oil reserves. These untapped oil resources and natural gas resources are considered to be among the world’s largest.

3.8 United Arab Emirates Economy

The UAE's economy, according to Kiani (2017): is the most diversified in the Gulf Cooperation Council, while its most populous city of Dubai is an important global city and an international aviation hub. Nevertheless, the country is much less reliant on oil and gas than previous years and is economically focusing on tourism and business.

It should be noted that the increasing global profile of UAE means it is recognised as a large regional power. A summary of the economy of UAE is shown in Table 3.1 below:

Table 3.1: UAE Economic Data (Focus Economics; 2008)

Economic Factor	2012	2013	2014	2015	2016
Population (million)	8.8	9.0	9.3	9.6	9.9
Population (million)	8.8	9.0	9.3	9.6	9.9
GDP per capita (USD)	41,685	42,136	42,336	37,743	-
GDP (USD bn)	365	381	394	362	-
Economic Growth (annual)	6.8	4.7	3.1	3.8	3.0

UAE has: the second biggest economy in the Gulf region after Saudi Arabia, and as showed on Figure 1 above the nation has a (GDP) of \$377 billion (1.38 trillion AED). The UAE has been known for its huge development having developed in excess of multiple times since its freedom in 1971. Additionally, the development of the oil business, the non-oil trade has developed astoundingly by up to 1.2 trillion AED which is a development by around multiple times from 1981 to 2012.

Regardless of considerable development in different sectors of the economy, “the UAE's economy still remains largely dependent on oil. The exception to this is Dubai. Oil and flammable gas are key in the economy, particularly in Abu Dhabi. Dubai, which has far smaller oil reserves, was more forward-looking and has marketed itself as desirable holiday destination in the Middle East .

Fitch (2015) reports that the UAE has: the most advanced and developed infrastructure in the region Since the 1980s, the UAE has been spending billions of dollars on infrastructure. These developments are particularly evident in the larger emirates of Abu Dhabi and Dubai. The northern emirates are rapidly following suit, providing major incentives for developers of residential and commercial property.

In addition to this: UAE laws do not allow trade unions to exist. The right to collective bargaining and the right to strike are not recognised as migrant workers who participate in a strike can have their work permits cancelled and are deported. On the other hand, there are very few anti-discrimination laws in relation to labour issues, with Emiratis and other Gulf region Arabs getting preference in public sector jobs despite having lesser credentials than competitors and lower motivation. In fact, just over eighty percent of Emirati workers hold government posts, with many of the rest taking part in state-owned enterprises such as Emirates airlines and Dubai Properties.

It must be observed that the aircraft business of the UAE contributes immensely to the economy and the Airport of Dubai is the busiest compared to other international players. Furthermore, Emirates is the biggest airline which is owned by Dubai. It is followed by Etihad Airways which is the second largest airline, owned by Abu Dhabi.

3.9 Historical Background of the United Arab Emirates Airline Industry

The United Arab Emirates owns several airlines comprising of commercial airlines, cargo airlines, government airlines and charter airlines. The commercial airline consists of Air

Arabia, Emirates, Etihad Airways and Fly Dubai. The cargo airline consists of Emirates Sky Cargo, Etihad Cargo, Maximum Air Cargo, Unique Air and Sky Bizz. The government airlines are made up of Abu Dhabi Amiri Flight, Dubai Royal Airwing and Sharjani Rulers Flight.

Emirates contributes 20% of the GDP of Dubai and has become the embodiment of Dubai's rise to international prominence (O'Connell, 2001). The government of Dubai has been investing massively in the air transport industry and has procured large number of aircraft (O'Connell, 2001). Much of this investment has been aimed at expanding the existing facilities, with the government sponsoring the building of Dubai World Central, which is the world's largest airport. The government has also spent more than \$4.5 billion on a new terminal at the Dubai International Airport.

Dubai's largest airline, Emirates, was established in March 1985, with backing from Dubai's royal family, and was required to operate independently of government subsidies, apart from an initial investment of US\$10 million. This initiative was supported by Pakistan International Airlines which provided technical and administrative assistance to the new carrier as well as leasing a new Boeing 737-300 and an Airbus A 300B4-200 (Flight Global, 1987). The same source also indicated that "the Royal Family's Dubai Royal Air Wing also provided the airline with two used Boeing 727-200 Adv. During the airline's first year, it carried about 260,000 passengers and 10,000 tons of freight contributing to the 56% drop in profits of the Gulf Air in the same year". Over the years the airline, along with the rest of the airlines in the UAE, has been increasing in profitability, approximately at an average of 30%.

3.10 United Arab Emirates Airline Industry and Market

The development of mega hubs in the Gulf region and the Dubai area has increased industrial development and has made the area popular as international headquarters for companies. This growth in the airline industry has also facilitated the development of other sectors of the economy within the region such as the light assembly industry. This has facilitated worldwide exhibitions, expanding the inflow of tourism as well as the development of the logistics business (Swan, 2006).

Emirates, along with Etihad Airways and Qatar Airways, have increased their seat capacity four-fold over the period 2002 and 2008 (O'Connell, 2001). Within the Middle East alone, these companies have extended their capacity from 4.7 million seats in 2002

to 13 million seats in 2008. Collectively, Emirates and Qatar Airways transported around 44% of the traffic carried by the 24 members of the Arab Air Carriers Organisation in 2007 .

3.11 Major Trends in the United Arab Emirates Airline Industry

The European Union is “the single biggest destination market from the UK, grasping 49% of passengers and 54% of scheduled commercial flights in the Middle East at large. In turn, the UK is an important source of business and a travelling hot spot for all major European airlines”. In the UK, initial approximations by IATA report that “the number of UK air passengers may slip by 3 to 5% by 2020, and the UK will face the biggest trade-off: accessing the European Single Aviation Market or having the policy freedom to set its own regulations”.

The foreign policy of the US concerning the Middle East compounded challenges to the airline industry in 2017. According to the Blominvest Bank (2017): The Trump administration imposed a ban on US entry for people from seven Muslim-majority countries as well as an aircraft cabin ban on Personal Electronic Devices (PEDs) later in March 2017. A report by the IATA estimated the PEDs ban impacted on average 333 flights per week from the Middle East and North Africa (MENA). The ban also inflicted travel plans, as 74% of business travellers explained that the need to check-in their devices while flying would affect how they plan business travel, while the other 15% indicated they would look to reduce the frequency of travel.

Middle East airlines have been recently criticised for their increased fares, yet for some passengers, these may be justified by the carrier’s competitive advantages as pricing has been the airline’s toughest challenge for years now. This has resulted in a debate on what is fair or unfair in terms of overpricing tickets. The UAE airlines have the distinct advantage of having a large domestic market due to the high number of expatriates who frequently travel to and from UAE to their home countries.

A new trend has emerged in the UAE airline several years ago consisting of: operating low-cost airlines to reduce prices for travellers. According to a report by Price Waterhouse Cooper’s (PWC) 2017 on trends in commercial aviation they described smaller aircrafts or low-cost Carriers (LCCs) as the key to unlock the future potential in aviation. Several Gulf States including the UAE airline industry have already tapped into the LCCs market this year to serve budget conscious passengers.

For instance, the KSA launched its second low-cost carrier, Fly Deal, in 2017 operating with one Airbus 320 and expecting seven additional aircrafts in 2018: Budget flight comprises of providing a lower level of service, starting from a smaller aircraft, to more cramped seating, no food served, to rare or no multimedia services on board. The lack of these amenities may save travellers money, but the opportunity costs which include lower passenger comfort and quality of service may weigh down particularly on Arab travellers who have an affiliation for high quality flights and who usually travel in business class.

3.12 Economic Performance of the United Arab Emirates Manufacturing Industry

In Dubai, government airlines such as Emirates operate in a tax-free environment with no legal costs. Due to this support from the government and its increase in operation and efficiency, Emirates has been profitable over the last 20 years and was one of the global airlines with the highest profits. It recorded a net profit of US\$843 billion, earning a net profit of 11.6% in 2007-2008 (Emirates Financial Statistics, 2007-2008). During that period, Emirates operated 109 aircrafts which included both the Boeing and the Airbus (Griggs and Howarth, 2016). Emirates has also been able to distribute the sales of its tickets across the continents, for example, 36% of its tickets are from Europe and the Americas, Asia Pacific and Australia New Zealand account for 30%, Africa and the Middle East for over 25% and India producing almost 9% (Griggs and Howarth, 2016).

3.13 Competitiveness of the United Arab Emirates Aircraft Industry

The airline industry of the UAE has been dominated by Emirates, which is wholly owned by the government and is heavily subsidised. It therefore has a strong competitive advantage. This has resulted in some European airlines finding it very difficult to penetrate the market. IATA has predicted a slump in profits among Middle East airlines this year, stating in its latest report that “the region’s aviation industry will make a return of just \$300m in 2017, down from \$1.3bn the year before. It should recover some of the lost ground next year, with a forecast total net profit of \$600m in 2018”.

These figures means that: Middle East airlines will on average have some of the slimmest profit margins in the world, with earnings before interest and tax (ebit) of just 0.6% of revenues in 2017. The only region in a weaker position is Africa, with a predicted profit margin of 0.5% of revenues. In contrast, North American airlines are expected to report

ebit of 13.2%, followed by Asian and Pacific airlines with 8.5% and European carriers with 6.3% .

The suggested causes of this trend and decline of competitiveness and profit margins have been attributed to lower oil revenue and the uncertainty of the political environment.

3.14 Factors Affecting the United Arab Emirates Airline Market

The airline policy of UAE has been termed the most liberal in the world. This because the UAE relies heavily on the influx of people to the region. For example, Dubai depends on an influx of travellers to support the tourism sector. Therefore, in order to sustain its growth: Dubai's flagship carrier will continue to have unhindered access to the world's biggest cities. Beyond the impressive passenger and tourism expansion in Dubai, Emirate has established a massive multi-modal freight hub. At Dubai Airport airfreight has mirrored passenger growth, more than tripling over the decade with 1.41 million tons last year. The multimodal role will be enhanced once Jebel Ali, which will be connected by bridge to both the Jebel Ali Free Zone and the seaport.

The significance of the aircraft industry to Dubai, according to Ziadah (2018): is underscored by the 2006 establishment of the visionary US\$15 billion Dubai Aerospace Enterprise. The ambitious undertaking will lead the government-owned body in highly competitive fields such as aircraft leasing, airport infrastructure investment and management, aircraft maintenance and aviation education.

Furthermore, the government has expanded its aircraft infrastructure to fund the construction of new airports and air hubs (Griggs and Howarth, 2016). In 2002, it rolled out a programme that is currently in progress, amounting to \$5.4 billion with an estimated capacity of 30 million. It was predicted that when the programme finished in 2010, the airport would have capacity for 60 million annual travellers.

The Jebel Ali Dubai Central Airport was officially opened in June 2008 and was utilised as a cargo facility. The airport is combined with the Jebel Ali Free Zone to provide a single custom-bonded free zone and what is described as "the world's first truly integrated, multi-modal logistics platform". According to Albers *et al.* (2017): ultimately it will replace Dubai International Airport. With a scheduled completion date of 2017, the \$8.1 billion project will create an airport with annual capacity of 120 million passengers and 12 million tons of cargo, covering a 140 sq. km. The Dubai Government weighed up various options to facilitate investment in this project, including the possibility of 100% foreign ownership. A scheme to permit international airlines to build their own passenger and freight terminals

at the airport, and to outsource ground handling to any of a range of companies, or even self-handle is underway. The new policy is in sharp contrast to the one at the existing Dubai Airport, where the umbrella company handles all passenger flights except for those of Emirates, and all cargo operations .

3.15 Sustainability Performance Measurement in the United Arab Emirates Aviation Industry

The UAE aviation industry has been working on sustainability concerns in recent years. To make a case in point, Emirates has been part of the INSPIRE Programme (Indian Ocean Strategic Partnership) that was created with the objective of the best use of air space and the best ways of decreasing carbon emissions associated with aviation.

In addition to this, the airline has also been reengineering the design of its aircraft, particularly the Unit Loading Devices (ULDs), which were replaced by lighter weight Kevlar units in place of the heavier aluminium ULDs. The airline has also been measuring the nitrogen oxides emission level of all its aircraft and keeping track of any that are falling outside expected levels.

3.16 Conclusion

In conclusion, despite the challenges that the international airline industry has been facing, the UAE has been experiencing a massive growth in the airline sector. This has been mostly attributed to development in infrastructure, massive inflow of passengers and the high GDP in the region. “The industry has suffered lots of losses in the past few years; and airlines are shifting from the classical way of thinking of doing business to be more creative and pro-active rather than reactive to changes”. The UAE companies have been striving to offer quality services, competitive pricing and other added values “to have a competitive edge in the industry”.

Furthermore, as Adapa and Roy (2017) concluded: customer satisfaction researches are used to make business and operational decisions. The implementation of customer satisfaction research, the analysis of the results, the use of benchmark information and how to raise the awareness of the airlines to customer satisfaction are all key indicators of healthy competition in the Arab Gulf region, benefiting all stakeholders, especially the

passengers. The Arab Gulf region is witnessing an unprecedented investment in aircraft, airports and tourism infrastructure that outpaces all other geographical economies . The Gulf based airlines such as Emirates, Qatar Airways and Etihad have extensive networks that stretch across most of the worlds' major cities and are beginning to threaten the dominant long-haul competitors such as Singapore Airlines.

3.17 Lessons Learned

In the world of aviation, security is the subject of much attention, and rightly so. Redundancy and checklists are everywhere and there is strict regulation according to which everything is codified. Importantly, there are organisations linked to aviation whose main objective is avoid making mistakes committed in the past. The business world could surely learn one or two things from the aviation sector.



CHAPTER FOUR

AIRLINE INDUSTRY FROM AN AFRICAN PERSPECTIVE

4.1 Introduction

Despite the available literature on the aviation industry and the various changes that are taking place within the industry on the global landscape, there has not been much research on the airline industry in Africa (Bieger *et al.*, 2002; Doganis, 2010). There is therefore a wide research gap on the airline industry in Africa. While the rest of the global airline business has been experiencing growth in the past few years, the airline industry in Africa has been dogged by a range of problems which, according to Heinz and O'Connell (2013, pp. 72-83), include: high operational costs; poor safety; government interference; corruption; low productivity and overstaffing; old aircraft; sparse demand over long sectors; low load factors; strong travel agent networks that operate in a cash economy; last minute booking profiles; low internet penetration; skills shortage; and difficulty in obtaining Air Operating Certificates.

The authors further outline that these are serious challenges that need to be addressed and managed in order to maintain economic viability.

4.2 Overview of the African Airline Industry

Growth in the airline industry in Africa has remained significantly low compared to other continents, as evidenced by its limited traffic measured by passenger kilometres carried. Despite this low kilometre, it is surprising to note that high accident rate on the continent (IATA, 2010). Consequently, passengers have switched to international carriers, resulting in almost 80% of the passengers from Africa being carried by airlines from non-African airlines such as Emirates, Air France, KLM, Brussels Airlines and British Airways (Dunn, 2012). Some African airlines which have impacted the global airline industry and these include South Africa Airways, Egypt Air and Kenyan to name but a few. However, there are countries such as Nigeria which have most of its passengers preferring non-African airlines. The same difficulty is experienced when African couriers try to persuade foreigners to fly with them.

In addition to the challenges cited above, African carriers are facing higher operational costs than their global counterparts. For example, fuel is very costly as it usually has to be transported over long distances, adding on to its initial purchase price. The fuel costs of running an aircraft would normally account for 25% of the operational cost but this tends to be even higher for African carriers (Heinz & O'Connell, 2013). The situation is worsened by the generally poor infrastructure in most African countries. Most of the fleet sizes of African countries are small and therefore they do not have high negotiation powers with the suppliers. This makes African aviation industries vulnerable to price fluctuations.

The distribution channels of airline travel are again a major impediment as most flights are concentrated in big cities with only few, or in some cases none, in smaller towns and non-urban centres. Again, the sales of tickets have not improved with many people opting to use other forms of transport such as rail. Chingosho (2009) also cites this problem and suggests that African airlines incentivise travel agents so that they can market flights more effectively. In addition, the government owns most of the airport and navigational services, thereby monopolising the industry. This leads to unjustified and expensive prices as compared to other governments internationally. It has been noted that it is cheaper for an aircraft to land in Heathrow than it is to land in an African airport such as OR Tambo, with the latter charging up to three times higher than the former (Chingosho, 2009).

The airline industry in Africa is battling with an ageing airline with some of the aircrafts being more than ten years old. This creates high maintenance costs and results in rising safety issues, as the planes age and have more mechanical failures. The ageing fleet also results in: significantly increased fuel usage, poor reliability and increased downtime. Aircraft utilisation rates in Africa remains among the lowest in the world with rates averaging just 6.9 hours per day compared to Europe with 9.9 hours per day due to poor scheduling, night flying restrictions, extended downtime of aging aircraft and a shortage of flight and skilled maintenance personnel" (Chingosho, 2009).

Air travel remains a luxury with only few people being able to afford it due to the high costs of tickets and the lower disposable income of most Africans. Therefore, while the industry has potential and has been experiencing growth, it has quite a number of challenges that it needs to overcome for it to reach its maximum potential.

4.3 Industry Structure

Africa's airline industry structure can be looked at from four different angles namely, top African airline routes, top African airlines, most-used aircraft and top African airports.

- **Routes for Top African Airlines:** “Domestic routes in South Africa are currently ranked number one and two, with Johannesburg O.R. Tambo International (JNB) to Cape Town (CPT) with the most seats available. The route is served by seven airlines, with South African Airways having the largest available capacity”.
- **Top Airlines for Africa:** “Ethiopian Airlines made it to the top in July 2018 with 1,124,252 seats available, up 6.6% from the previous. Royal Air Maroc was the largest month-to-month climber among the top ten airlines”.
- **Most-used Aircraft:** “The capacity share of Boeing 737 in Africa in July 2018 was 42.4 percent. Ethiopian Airlines had 25 in its fleet, while South African Airways had 73”.
- **Top African Airports:** “Major African airports include O.R Tambo with Casablanca Mohammed V having recorded the highest capacity growth in July 2018. The increase comes after Royal Air Maroc increased its services to New York JFK and Sao Paulo Guarulhos, while EgyptAir also increased the frequency of its Cairo route”.

4.4 Policy Objectives for the Airline Industry

According to the African Union (2011), joint aviation initiatives have been part of the plans for Africa but the implementation has not been effective. One of these initiatives is: The Yamoussoukro Declaration on a new African Air Transport Policy of 1988 which was aimed at progressive amalgamation of African airlines into larger, more efficient and competitive entities through joint activities and operations. The Yamoussoukro Decision (YD) related to the implementation of the Yamoussoukro Declaration through the Liberalization of Access to Air Transport Markets. The main objective of YD was to harmonize air transport policies and free exchange of traffic rights in the intra - African market”.

In addition to this: several resolutions, declarations and action plans were adopted by various conferences of African Ministers of Civil Aviation and these includes the Sun City Conference, South Africa, 2005 which was a follow up of the implementation of the YD ; the Libreville Conference, Gabon, 2006 which was for the adoption of the Libreville Plan of Action which set targets for accident rates and considered an African external policy for

negotiation with third parties; The 2007 Addis Ababa Declaration on civil aviation security in Africa Conference and The 2010 Abuja Joint Declaration and a Road map to counter the new emerging threat to civil aviation adopted through collaboration of AU, AFCAC, ICAO and other non-Africa ICAO member States.

It was discovered, however, that most of these conferences and policies, while they were well intended, did not produce the desired outcomes as there has been little political will from the various countries and organisations. The efforts have thus been hampered by institutional and procedural constraints.

In addition to this, the initiatives were not properly structured and their poor co-ordination, coupled with different views and objectives, resulted in challenges in terms of implementation (African Union, 2011). It was necessary to formulate a well thought out and coherent policy framework which would obtain the necessary political commitment.

This resulted in the formulation of “an African Civil Aviation Policy (AFCAP) which provides a framework and the platform for the formulation, collaboration and integration of national and multinational initiatives in various aspects of civil aviation”. The AFCAP was seen as: an overarching framework document that enlists and consolidates the political commitment of African States to work together through agreed roadmap with the purpose of positioning Africa’s air transport in the global economy. The policy was to provide for the appropriate empowerment of national and regional technical bodies to enable them carry out their responsibilities effectively.

According to the African Union (2011), the strategic aims of the African aircraft industry were to “foster sustainable development of air transport, to enhance civil aviation safety, to enhance civil aviation security, to ensure sustainable human resources development for aviation and to strengthen the rule of law in aviation”. To ensure that the African Civil Aviation Policy achieves its objectives the key principles were put in place, safety and security was to be given priority and liberalisation of the industry was to be pursued. They African Civil Aviation Policy also set some key performance indicators that would help the aviation companies in Africa to measure if they were achieving their set goals. These KPIs include: number of accidents and major incidents; number of fatalities; accident rate in the AFI Region as compared to the global average; safety Management Maturity Level; oversight capabilities of Civil Aviation Authorities; aircraft movement (arrivals and departures); passenger and cargo traffic; international market share; average load factor for the African air carriers and African city pairs .

In addition to this, the policy encouraged regional cooperation among members to support the integration of airline industry plans, principles and measures. This would result in the

optimisation of scarce resources, thus giving African airlines a competitive advantage. There will be need to integrate the aviation systems of the member countries. Along with this the policy also provided that human resource was critical and as such, the industry must encourage human development to satisfy labour needs.

4.5 The Importance of Airline Industry

The aircraft industry has played an important role in enhancing the development of economies in Africa which has been evidenced by the acceleration in trade activities among African countries and globally. The aircraft industry has improved rapid and easy mobility of travellers and goods which has resulted in the creation of jobs for millions of people, both directly and indirectly through industries such as tourism and hospitality, freight and logistics.

The African aviation industry sustains about 6.8 million jobs and helps generate US\$72.5 billion for the African economy (Li, 2017). According to African Development Bank (2012), the aviation industry supported 17 million jobs and is set to create more 879,000 jobs within the next 20 years. These figures and projections are set to grow as the African airline industry is anticipated to expand.

Some notable airlines such as Ethiopian airline, have made a significant impact in their home countries for instance, Ethiopian Airways has made Addis Ababa Bole Airport an aviation hub and a gateway to Africa (Li, 2017). Kenya Airways has become a springboard for access into eastern, western and central Africa. Li (2017) refers to statistics from the World Bank Report (2016) in which the countries with the biggest Foreign Direct Investment in Africa, South Africa, Egypt and Morocco, have a higher airline carrier network indicating a strong correlation between aviation industry and Foreign Direct Investment.

The African airline industry contributes US\$80.5 billion to the African economy and with the impending increase in air traffic of up to 5.1% per annum, the figure is set to increase (Engineering News, 2016). In order for this growth to last and thus contribute more to the economy of Africa, the industry must invest more in infrastructural development as this would have a significant impact on the airline business in South Africa.

4.6 Impact of the Airline Industry on the Growth of African Economies

The airline industry is key element in the economic development of Africa and has been contributing to its economic growth through many aspects including the, “development of a more diversified export base and increased tourism in Africa” (Cowton, 1998:91). Cowton (1998) allude that “the expansion of air services and other forms of transport infrastructure is expected to contribute to poverty alleviation directly by improving access to services, increasing personal mobility and lowering transport costs, and indirectly through its effects on economic growth, efficiency and employment creation”. Furthermore, the improvements in the airline industry will help raise the living standards through the provision of quality service delivery that includes education, clean water, electricity and health.

An improved airline industry should make air transport more affordable to low income earners, thus giving them the opportunity to take advantage of job opportunities in other parts of their countries and access to basic public facilities. Likewise, an efficient transport network decreases poverty by enabling the movement of food from excess to shortfall areas.

The airline industry is set to support the production sector of African nations as better transport services facilitate interactions between productive activities and the promotion of trade at both a regional and international level. Thus, the development of commercial aviation is instrumental in reducing the cost of trade and movement of goods and people, attracting new investment to locations with good air transport links to the rest of the world.

A good example of this is that of South-East Asia during the last five decades, where the expansion of international trade using an extensive and reliable airline system has fostered economic growth and efficiency. According to de Castro (1996): these countries have based their rapid development on the export of manufactured goods by participating in globally integrated production and assembly chains where air transport plays a vital role”. In this context, “air transport reduces the costs of assembling inputs during the production process and reduces the costs of delivering goods and services and thereby improves a country’s competitiveness. This is particularly important for African economies as the poor transport infrastructure and excessive transport costs often generate more significant barriers to trade than import tariffs and quotas .

Owen (1987) reports “a positive correlation between GNP and the volume of passenger and freight transport. This corroborates the findings of Easterly and Rebelo (1993) who note that the investment in public infrastructure in transport and communications has a significant, positive effect on economic growth. The experience of Latin America serves

to illustrate the potential opportunities for African countries by developing their air infrastructure and deregulating their commercial aviation market . Oxford Economic Forecasting (2003) indicates that “the availability of more efficient, competitive and reliable air transport in Latin America has supported the creation of businesses in the production of goods for new export markets with countries such as Chile and Colombia in the region focusing on an export-oriented strategy as a means of economic growth”.

4.7 Ethiopia

Ethiopia is located on the Horn of Africa and shares borders with Eritrea to the north and northeast, Djibouti and Somalia to the east, Sudan and South Sudan to the west, and Kenya to the south. Ethiopia is the most populous, landlocked country in the world with over 102 million inhabitants; it is also the second most populous country in Africa (Wikipedia, 2018). The country occupies a total area of 1,100,000 square kilometres and its capital and largest city is Addis Ababa .

Ethiopia boasts a rich culture and is the site where the fossils of one of the first early humans were discovered. At the end of the 19th century, Ethiopia attained its independence from and eventually was nominated as the headquarters of the African Union hence it automatically became the capital of most of the Pan-African organisations.

4.8 Economy of Ethiopia

According to the IMF, “Ethiopia was one of the fastest growing economies in the world, registering over 10% economic growth” for the period between 2004 and 2009 (Wikipedia, 2018). In 2015, the World Bank highlighted that Ethiopia had witnessed rapid economic growth with GDP growth averaging 10.9% between 2004 and 2014. Despite the high inflation and the difficult balance of payment, Ethiopia continues to experience significant economic growth .

The economy of Ethiopia, according to IMF (2016): is a mixed and transition economy with a large public sector. While the Ethiopian government is in the process of privatizing many of the state-owned businesses and moving toward a market economy, the banking, telecommunication and transportation sectors of the economy are still dominated by government-owned companies.

Berhanu and Poulton (2014) observe that: Ethiopia is still reliant heavily on agriculture with agriculture accounting for almost 40.5% of GDP, 81% of exports, and 85% of the labour force. Therefore, most of the exports are almost entirely agricultural commodities, with coffee as the largest foreign exchange earner, and its flower industry becoming a new source of revenue for 2005-2006... other economic activities that are depend on agriculture, including marketing, processing, and export of agricultural products. The principal crops that are cultivated are coffee, pulses (e.g. beans), oilseeds, cereals, potatoes, sugarcane and vegetables. Ethiopia's coffee exports represented 0.9% of the world exports, and oilseeds and flowers each representing 0.5%. Ethiopia is Africa's second biggest maize producer. Ethiopia's livestock contributes significantly the economy, constituting 9% of total GDP.

The other sector of the economy that plays a significant role is the mining sector. The country boasts vast mineral resources that include iron ore, soda ash, coal, opal, gemstones, tantalum and gold. The country derives most of its power from a hydro power plant and is therefore reliant on rainfall. Recently, the country has been focusing on investing in public infrastructure and industry parks to try and address the structural problems such as the very low GDP per capita, with many of its people still living in poverty despite the economy improving.

4.9 Historical Background of the Ethiopian Airline Industry

The history of aviation in Ethiopia dates back to 1929 when: a French airplane named Potez under the pilot Andre Milet landed in the western side of Addis Ababa enroute from Djibouti. In 1930 the government purchased five sweater airplanes like Farman-192 and others for use for postal, security and government services between the towns of Dire Dawa, Djibouti, Debremarkos and Gondar. From 1926-1936 new domestic routes were opened to Gefersa, Bishoftu, Janmeda and Kaki, and the country had also acquired twenty airplanes until the occupation of Italy (IATA, 2014).

There was little progress in the airline industry until 1945 when Ethiopian Airlines was formed.

According to Ethiopian Airlines (2018): the first scheduled flight for the airline took place to Cairo via Asmara in the first months of setting up of the airline. However, Ethiopian Air

Lines was a joint venture between Ethiopian government and the American airline, TWA (Trans World Airlines, 2017). Five US Government Surplus C-47 aircraft were purchased as part of the joint venture initiation. Following the successful inaugural flight to Cairo, a regular weekly service was established. Then afterwards, weekly services to Djibouti and Aden followed, as well as a domestic service to Jimma. After these maiden trips and many other successive successful trips, the demands for additional services increased such that towards the end of 1946, four more C-47 Skytrains aircrafts were purchased.

Over the years, Ethiopian Airlines has progressively increased its fleet as it has been experiencing significant growth. It has received awards and accolades for its outstanding performances (Ethiopian Airways, 2018). The progression of Ethiopian Airlines is shown in Table 4.1 below.

Table 4.1: Chronological development of Ethiopian Airlines (Airbus, 2016; IATA, 2014)

Key Dates	Activities
1945	Ethiopian Airlines established as 'Ethiopian Air Lines
1946	First scheduled flights to Cairo via Asmara
1957	Network stretches north to Hamburg, Germany
1961	A new East-West service was inaugurated, linking Addis Ababa with Monrovia
1962	Boeing 720B, the first aircraft in Africa, was ordered
1963	The airline inaugurated its first jet service, from Bole to Nairobi
1965	The company changed its legal status from a corporation to share company and changed its name from Ethiopian Air Lines to Ethiopian Airlines
1975	Introduces first direct flights between African and China
1998	Launches a twice-weekly service to Washington and New York
2003	Construction begins on new cargo terminal and maintenance hangar
2008	The airlines entered a code-share agreement with Lufthansa
2010	Ethiopian Airlines entered a code-share agreement with Scandinavian Airlines
2011	Ethiopian Airlines joined Star Alliance. The airline signed code-share with Singapore Airlines and Asiana Airlines
2012	Established its second hub in Lomé, Togo
2014	Signed code-share with ANA, Japan's Airline, United Airlines and Austrian Airlines

2015	Signed a code-share agreement with TAP Portugal (Portugal's leading airline)
2016	Ethiopian Airlines launches Africa's first Airbus A350

4.10 Ethiopian Airline Industry and Market

Ethiopia is one of the four airlines in Africa with more than 5 million travellers every year. It is likewise one of the four groups of carriers with a fleet of more than 50 aircraft. Traveller traffic achieved 6 million in 2014, driven by yearly growth of 15%. Passenger traffic more than doubled since fiscal 2009 and has grown at a double-digit rate in the last nine years. Ethiopia airline currently provides services in Beijing, Guangzhou and Shanghai; the three destinations now have daily non-stop flights. Hong Kong currently receives three non-stop weekly flights and a weekly frequency through Bangkok, according to the OAG.

Ethiopia continued its expansion in Asia in 2015 with the addition of Tokyo and the resumption of Singapore. Tokyo was initially being served with three 787-8 weekly flights through Hong Kong as of April 20.

With the launch of the new Tokyo route, Hong Kong was changed to a daily nonstop service. The Ethiopian airlines also started sharing codes with All Nippon Airways in October 2014, a sensible move in view of the launch of services in the Japanese market. Ethiopian airlines have partnered with Star members since joining the alliance at the end of 2011. In Asia, Ethiopia airlines also shares agreements with Asiana and Air India.

4.11 Major Trends in the Ethiopian Airline Industry

The Ethiopian aviation industry, to ensure competitiveness, has encouraged private carriers and private aviation service providers (Mulisa, 2017). The same writer maintains that due to the fact that: the aviation industry by nature a capital-intensive industry which requires high skilled human resource the Ethiopian government has allowed private airline operators to import aircraft from abroad through a purchase-lease modality. In addition to this they are entitled to duty free spare parts and related utilities for their service. However, the private aviation ownership is only open to Ethiopian nationals only . The Ethiopian Civil Aviation Authority has been playing a commendable role in advancing the nation's

aviation industry though there is still knowledge gap that needs to be filled if the sector is to make significant impacts.

4.12 Economic Performance of the Ethiopian Airline Business

Over the past decade, Ethiopian Airlines has been among the top performers, mirroring the country's growth of the economy, and actively contributing to it. Ethiopian Airways has defied odds by recording a significant profit of \$US148 million in 2015, making it the best airline in Africa.

4.13 Competitiveness of Ethiopian Airline Industry

As noted by EAL (2017): Ethiopian Airlines serves 97 international destinations, of which 55 passenger destinations are in Africa, 18 destinations are in Europe and America, and 24 destinations are towards Gulf, Middle East and Asia. The airline is also operating a cargo network of 30 destinations in Africa, the Middle East, Asia and Europe using six B777 and two B757 freighters. The Airline also carries freight in the belly of wide – body passenger aircraft to 92 destinations across the globe (EAL, 2016). Currently, Ethiopia has 2 airports of which 4 international airports (Addis Ababa Bole, Dire Dawa, Mekelle, and Bahir Dar).

According to Meichsner *et al.* (2018), “Ethiopia Airlines has thrived in the air transport services market, while numerous other African airlines have struggled or failed. In terms of revenue passenger kilometers (RPKs), EAL is Africa’s largest and most profitable airline, earning more than its rivals on the continent combined”.

Ethiopian Airline is the major airline in the country and has strong support through subsidies from the government. The airline has been performing well and has received various awards including the “African Renaissance Award from the President of the Federal Democratic Republic of Ethiopia” (Ethiopian Airways, 2018). Ethiopian Airlines additionally won the SKYTRAX World Airline Award for Best Airline Staff Service in Africa for its excellent customer service as well as “Africa's Best Business Class Airline” awarded by Chinese travelers. The airline has likewise been acknowledged for its staff who have won different awards including the "Traveler Choice Awards for Best Regional Airline in

Africa", "African Business of the Year Award", double awards for the "African Airline of the Year" and "Best Cabin Crew in Africa".

4.14 Factors Affecting the Ethiopian Airline Market

Africa's aviation industry is still hampered by government protectionism and high taxes. The Ethiopian air industry, though to a lesser extent, is not exempt. According to Doganis (2017), "state-owned airlines may often suffer from interference from certain government departments that do not make profitability a priority".

Looking ahead, many challenges face Ethiopian Airlines. Airline industry competition in and out of Africa is intensifying, for instance, other African airlines are seeking to imitate the success of Ethiopian Airlines, major European airlines are making inroads in Africa, while liquidity-rich airlines from the Middle East are flooding the African market with and low fares.

Other problems include rising fuel costs, wellbeing and protection, worldwide and regional instability, limitations on traffic rights, poor infrastructure, the devaluation of currencies in some African countries as well as natural disasters. However, perhaps the biggest challenge for the Ethiopian Airlines in the immediate future is to increase its access to the airline markets of Africa and the world. This can only be achieved by joining mutually beneficial alliances and cooperation agreements with similar African and international airlines. Ethiopian Airlines recognises the fundamental importance of this and is working towards achieving that goal.

4.15 Sustainability Performance Measurement in the Ethiopian Airline Industry

Despite the availability of economic performance indicators, there are no measurements related to social and environmental performance. However, there is an operational practice related to the social and environmental responsibility of Ethiopian Airlines . According to the Ethiopian Airlines Environmental Policy, Ethiopia is committed to integrating environmental issues into its activities to ensure sustainable development and address its social and environmental responsibilities by implementing the following policy requirements:

Compliance: Ethiopian commits to comply with applicable national and international laws, ECAA, ICAO, FAA, EASA etc. and other requirements and industry best practices, (IATA, Star Alliance, etc.) through implementing ISO 14001:2004.

Pollution Prevention: The Airline limits waste discharges to the air, soil, and water through decrease of waste at the source and utilization of environment well-disposed aircrafts and advances by executing green obtainment, more secure and appropriate use and transfer of synthetic substances.

Communication: Ethiopian Airlines is committed to communicate its environmental commitment to the public, its employees, customers, stakeholders and all concerned as part of its environmental responsibility.

Risk Reduction and Emergency Preparedness: Ethiopian is committed to meeting all applicable government and industry standards to consistently reduce environmental risks. Ethiopian is therefore committed to reducing environmental risks and demonstrate its emergency preparedness in connection with its existing response plan.

Resource Management: The airline is committed to managing resources such as water, energy and land in an environmentally sensitive way.

Continual Improvement: Ethiopian is committed to continual improvement through measuring its environmental performance at planned intervals, reviews and acts on improvement areas and reports same to all concerned bodies.

4.16 Conclusion

The chapter examined the African airline industry, its policy objectives, the importance of aircraft industry, the impact of the airline industry on Africa's economic growth, Africa's economy as well as the historical background of Africa's airline industry. The chapter provided a closer look at the Ethiopian airline industry which is the quickest developing carrier in Africa.

4.17 Lessons learned

Challenges still face the aviation sector in Africa. There has been significant development in the airline industry in the area of regulation and infrastructure. Africa has around 3% of

the world air transport market. Taking into account that Africa is home to 15% of the total population and represents 20% of the world's landmass, this suggests that Africa has enormous future potential for the airline industry.



CHAPTER 5

AIRLINE INDUSTRY FROM A SOUTH AFRICAN PERSPECTIVE

5.1 Introduction

South Africa is situated within the Southern Africa region and has a well-developed and modern airline industry. Its air networks are regarded as the largest on the continent and its airline industry is regarded as a key contributor to South Africa's competitiveness in regional and global markets. Currently, OR Tambo International Airport is regarded as the busiest airport in Southern Africa. The airport handles over 98% of the nation's commercial traffic, with approximately 200 000 aircraft touchdowns and over 10million departing travellers annually (Teravaninthorn & Raballand, 2009).

5.2 Overview of the South African Airline Industry

Deregulation of the airline industry in any nation will, in general, have a far-reaching impact on its market structure, traffic streams, number of travellers and competition. In the South African aircraft industry, the period following deregulation brought about a progression of airline entry and exits. After the entry of the main minimal effort aircraft in 2001, the structure of the business changed altogether, with ease carriers appearing to have the impact of animating the business and making a development in the quantity of travellers.

This likewise prompts increased usage of Lanseria Airport as an alternative terminal to the OR Tambo International Airport (ORTIA) (Mantey *et al.*, 2017).

5.3 Industry Structure

5.3.1 South African Airways

South African Airways (SAA) provides services in the domestic market after deregulation, however, it faced the intense competition from a new competitor, Flitestar, as well as competition from an existing operator, Comair. At the end of 1993, a three-tier alliance was established between SAA and two new entrants, SA Airlink and SA Express. This allowed airlines to operate under the same livery (Smith 1998) and to offer a wider range

of services. These airlines met, among other things, feeder and distribution services for SAA that served in the main commercial centres of the country with larger airplanes .

5.3.2 FliteStar

Flitestar was the first privately owned airline to enter the South African market after deregulation. It started operations in 1991 with the new rented Airbus 320s. Initially it concentrated on the Johannesburg-Cape Town route, followed by the Johannesburg-Durban-Port Elizabeth routes soon after. The completion of the Golden Triangle was achieved in 1992 with the commencement of the Durban-Cape Town route. In 1994, the airline stopped operating after only 30 months of activity, mainly due to the high costs linked to negative exchange rate and the fact that the aircraft lease contract was settled in US dollars (Smith, 1998).

5.3.3 Comair

According to Africa News Service (2000): Comair is the oldest private, domestic owned, airline in South Africa and has been operating charter services and low-density route services in South Africa since 1946. After deregulation, it started operating on the main national routes on August 3, 1992 with a service between Cape Town and Johannesburg followed by the Johannesburg-Durban route in September 1993. In October 1996, the airline became a British Airways franchise and became it was then referred to as British Airways Comair (BA "Comair). The franchise agreement permitted it to use the British Airways livery. It was included in the Johannesburg Stock Exchange in 1998 (Imara 1998). At the beginning of 2000, British Airways Plc acquired a minority stake in Comair.

5.3.4 Airways of Phoenix

Smith (1998) explains that: The airline began operating in December 1994 and focused on the Johannesburg, Cape Town and Durban routes. It operated 4 Boeing 727 aircraft, which demonstrated to be very uneconomical when fuel costs increased significantly due to the rand's weakness thereby inflating the maintenance bill. It also had to face strong competition from Sun Air and Comair. The airline ceased operations in 1995.

5.3.5 SA Air-link

Airlink (2013) notes that: SA Airlink began operating in 1992 after the collapse of an alliance between City Air, Magnum Airlines and Border Air, which operated as Link Airways, due to financial problems (Smith 1998). The airline still manages the supply routes to the main centres in South Africa and the regional air services.

5.3.6 SA Express

SA Express (SAX) was established at the end of 1993 and started operating in 1994 (SA Express, 2013). Initially, SAA owned 20% of SAX, but thereafter, the entire stake was taken over by Transnet, which at that time was the holding company of SAA (Smith, 1998). In 2007, this was transferred from Transnet to the Department of Public Enterprises (Department of Public Enterprises, 2007). SAX still manages low density national routes (for example, Bloemfontein, East London, Kimberley) and regional routes (SA Express, 2013).

5.3.7 Sun Air

Smith (1998) explains that: Sun Air began operating in 1994 with DC9 aircraft and engaged most of the former FliteStar personnel. It worked on the main national routes of South Africa and expanded its services until 1999, when SAA announced the takeover of the airline and consequently closed it.

The first ten years after deregulation were characterised by: a series of newcomers to the market; many of which failed in their original form. The only reconfigured or new airlines that were still in operation at the end of this period were BA Comair, SA Express and SA Airlink. Therefore, it was a turbulent time for the air traveller, since the market was characterised by substantial instability.

However, Sun Air maintained domestic market dominance and even strengthening it through the alliance with SA Airlink and SA Express.

5.4 Policy Objectives for the Airline Industry

According to Mhlanga *et al.* (2018) the South African policy objectives for the airline industry include:

- Increase commitment to air terminals that are safe and efficient;
- Enhance participation among all elements of the airline business and partners, as with different governments and international associations; and
- Increase collaboration between air terminals.

5.5 The Importance of the Airline Industry

The South African airline industry has three economic benefits, namely, (i) its contribution to GDP, (ii) job creation and (iii) tax revenue generated by the sector and its supply chain. The economic value created by the industry is significant. The main benefits of the airline industry are : created for its clients who include passengers and shippers who use the air transport service. In addition, the connections created between cities and markets represent an important infrastructural resource that generates benefits through the activation of foreign direct investment, business clusters, specialisation and other spill over impacts on the productive capacity of an economy.

The importance of the airline industry ranges from simple visits of friends and family to the shipping of high-value goods. Each year, 21 million passengers and more than 240,000 tons of goods are transported to, from and within South Africa. More than 52,500 scheduled international flights depart every year from southern Africa to 77 airports in over 51 nations. Nationwide, over 156,000 flights provide passengers with more than 17 million seats per year, destined to 17 airports.

Passengers living in South Africa include around 10.5 million travellers altogether. For the 21 million flights, foreigners pay ZAR 118.7 billion (charges included) while South African passengers pay around ZAR 54.4 billion. Air transport is essential for the transport of high value goods. Although it represents only 0.5% of world trade tonnage, in terms of value it represents about 34.6% of the total.

Carriers pay the airlines ZAR 6600 million every year to transport more than 240,000 tons of items from and inside South Africa. The preferred standpoint for shippers, over these costs, is evaluated at ZAR 2.8 billion.

5.6 Impact of the Airline Industry on South Africa's Economic Growth

5.6.1 Benefits to the GDP of South Africa

The aircraft industry contributes ZAR 50.9 billion (2.1%) to South Africa's GDP. This includes:

- ZAR 20,100 million contributed directly by the airline industry (airlines, airports, aerospace and ground services);
- ZAR 21 million indirectly contributed through the aircraft business production network;
- ZAR 9.8 billion contributed through employee spending in the aircraft business and its production network; and
- ZAR 23.4 billion in benefits through the travel industry, which contribute ZAR 74.7 billion or 3.1% of GDP.

5.6.2 Employment

The airline industry supports 227,000 jobs in South Africa. This includes:

- 56,000 jobs created by the airline industry;
- 116,000 jobs opportunities supported through the aircraft business' production network;
- 54,000 jobs through the spending of workers in the aircraft business and its supply network; and
- There are also another 116,000 people employed through the catalytic (tourism) effects of the airline industry

5.6.3 Jobs with High Productivity

Employees of air the transport industry create ZAR721.132 in yearly gross added value (GVA).

5.6.4 Contribution to Public Finances

According to Mhlanga and Steyn (2016): The airline industry pays almost ZAR 6.0 billion in taxes. Taxes paid by airline industry companies and employees contribute approximately ZAR3.5 billion to this figure, while passenger departure taxes, including VAT, contribute an additional ZAR2.4 billion. It is estimated that another ZAR5 billion of government

revenues is generated through the airline industry supply chain and ZAR2.3 billion through the taxation of activities supported by employee spending in both the airline industry and its chain of supply.

5.6.5 Airline Industry Manufacturing Benefits

South Africa has an important airline industry manufacturing sector, which generates ZAR1, 800 million direct, ZAR 4,600 million indirect and ZAR 800 million in induced benefits to GDP. The aircraft industry directly employs 7,000 individuals. The production network supports another 25,000 employees, with 4,000 extra occupations. In total, the aircraft business supports 37,000 jobs and contributes ZAR7.1 billion to South African GDP.

5.7 South African's Economy

South Africa's economy had: a good start in 2018, with recent data published by Stats SA indicating to a more encouraging momentum in the economy than formerly believed. The country's economy expanded by 1.3% in 2017, surpassing the consensus of economists, and the revised figures no longer registers a technical recession at the beginning of the year.

Driven by: greater confidence and much more favourable inflation, South Africa's growth is expected to accelerate. Therefore, several economists, including those of the World Bank, have revised their growth forecasts upwards. In its latest publication, the eleventh edition of the South African Economic Update, the Bank expects growth of 1.4% in 2018 and 1.8% in 2019 (previous estimates were 1.1% and 1.7%). However, these estimates are conservative" (Fine, 2018). According to Fine (2018), "this is largely due to the fact that trust has not yet translated into consumer spending, which can be affected by the income measures of the 2018 budget and the investment.

According to Haggard and Kaufman (2018), the outlook for the growth of the South African economy: has improved in recent months, after a year marked by recession and political uncertainty. GDP growth of 1% is projected for 2018, compared to the forecast of 0.7% in the medium-term budget policy statement of 2017 (MTBPS), and is expected to reach 2.1% in 2020. The improved outlook results from strong agriculture growth, higher prices of commodities and an incipient recovery of investor sentiment. While global risk factors remain high, the global economy continues to provide a platform for South African support

to expand trade and investment. Global economic growth has been at its highest level since 2014 and continues to grow. GDP growth is increasing in all major economies. The International Monetary Fund (IMF) expects global growth of 3.7% in 2017 and 3.9% in 2018.

To create employment, build the economy reduce inequality, South Africa needs a solid and continued development.

5.8 Historical Background of the South African Airline Industry

According to Lyth (1997): South Africa as a signatory (as part of the British Empire) of the 1919 Paris Convention, its regulatory environment of the air transport was based on the principle of air sovereignty". "South African Airways (SAA), a government-owned airline operating national, regional and international routes, was established on February 1, 1934, when the Government of the Union of South Africa took over the activities and assets of the Union Airways.

International Air Services (1949) states that: as a flagship carrier, SAA has been protected from competition for more than 40 years after the enactment of the International Air Services Act, also known as the Air Services Act, no. 51 of 1949 (International Air Services 1949). At that time, SAA was the only service provider on all the main national routes. Airlines that wanted to compete with SAA had to demonstrate, among other things, that there was a need and that the airline was not providing an adequate service. These requirements were detailed in section 20 of the Act and were practically impossible to comply with because of SAA domination. The result saw SAA having a total monopoly on high density routes and private sector airlines being consigned to feeder routes.

Before the deregulation of the airline industry, the domestic market had only four airlines:

- Airways of South Africa, since 1934 (main routes and airports);
- Comair, since 1945 (secondary routes);
- Link Airways (later known as SA Airlink) since 1978 (secondary routes); and
- Bop Air (later identified as Sun Air) since 1979 (Smith, 1998).

According to Margo (1984): the first major study on the reorganisation of the national aviation industry began in 1979 when the government appointed a commission, the Margo commission, to investigate civil aviation in South Africa. This led to a Report of the Commission of Inquiry on Civil Aviation in South Africa". "The National Transport Policy Study (NTPS) followed in 1985 (Behrens and Wilkinson 2001), which concentrated on several of the same policy issues (Smith 1998). However, the NTPS study did not focus extensively on the airline industry because, at that time, the Department of Transportation thought that Margo's Commission of Inquiry was still too soon.

In 1988, the General Directorate: Civil Aviation of the Department of Transportation conducted a study on the state of the national aircraft industry. The goal was to audit the International Air Services Act of 1949 and adjust it to the administration's monetary approach. The outcome of this investigation resulted in the distribution of the 1990 Domestic Air Transport arrangement, which filled in as the reason for the deregulation of national carrier industry in South Africa (Department of Transport, 1990).

After the acknowledgment of the approach, the legislature sanctioned the Air Services Licensing Act, Act No. 115 of 1990, which changed the national aircraft industry in 1991. As stipulated by the Act, which became effective in July 1991, "the aircraft business was totally deregulated by disposing of confinements on the passage and exit of the carrier business, taxes, frequencies and limit" (ICAO Secretariat, 2008).

5.9 South African Airline Industry and Market

According to Mhlanga *et al.* (2018): after the liberalization of the aviation industry in 1991, the survival rate of the new competitors in the national airlines was low. Two new operators have launched services in South Africa, a trend that will continue as new companies try to capture a part of the growth of air passengers that is expected to increase by more than 5% per year until 2032. It led to a decline in early 2015, but operators have to deal with reduced margins and a difficult operating environment... There are around 17 million people who fly to South Africa every year; the market is served by nine domestic airlines, which are many more per person than in the United States, Europe or China. New entrants have helped add some additional internal traffic, but the number of passengers does not grow as fast. This will result in carriers that eat each other's market share.

5.10 South African Airline Industry Major Trends

Since 2001: The South African national air transport environment has been characterized by the entry of low-cost carriers. The entry of low-cost companies has led to a significant change in the functioning of the domestic market, mainly due to the growth these operators have achieved. This is shown and discussed in the sections to follow.

According to FlightSite (2013): the first low-cost carrier to enter the market was kulula.com, when BA “Comair established the first low-cost airline in South Africa. Kulula.com began operations in August 2001. In 2006, kulula.com also began offering services from Lanseria, a secondary airport outside of Johannesburg, to Durban and Cape Town (kulula.com 2006). The entry of kulula.com was followed shortly after by the entry of the 1Time in 2004 (2013) and the launch of Mango (a wholly-owned subsidiary of SAA) in October 2006.

Travelstart (2012) states that: 1time also offered services for short-term from the Lanseria airport (from March 5 to June 2, 2012) (Lanseria International Airport 2012a, 2012b). 1Time suspended all services on November 2, 2012 (CH-aviation, 2012). In March 2011, a new airline, Velvet Sky, started operating from Johannesburg to Cape Town. The Durban airline started operating between Johannesburg and Durban shortly after, followed by flights to other destinations. It quickly encountered financial difficulties when it could not pay for technical services and fuel costs; finally, it was liquidated in June 2012” (South Africa, 2012). The first Mango flight was on November 15, 2006 (Gotravel24 2013). As in the case of other low-cost airlines, “it focused its operations on the Golden Triangle (Cape Town-Johannesburg-Durban) and subsequently extended its services to the Lanseria airport (in June 2011) with regular flights to Durban and Cape Town.

Orlek (2010) points out that: a characteristic of low-cost carriers is that they focus mainly on the high-density domestic golden triangle. Kulula.com also operates in Port Elizabeth and Mango in Bloemfontein . South African Airways has traditionally dominated the Golden Triangle, although it has recently lost part of its market share, largely due to aggressive competition from low-cost carriers and the potential to operate its aircraft more effectively in other markets. In 2010, it was announced that it was withdrawing from the Durban-Cape Town route in favour of a code-share agreement with Mango, often sliding off to only two of the legs of the Triangle of Gold, that is, Johannesburg-Cape Town.

5.11 Economic Performance of the South African Airline Industry

Aviation supports: 490,000 jobs and contributes \$US 12 billion (roughly R154.8billion) to South Africa's gross domestic product (GDP), according to a report released by the International Air Transport Association (IATA). Oxford Economics undertook a study on IATA behalf. Europe and Asia-Pacific are the main sources of arrivals in South Africa after the rest of Africa. In 2014, 3.3 million passengers arrived from Europe (16.3% of the total) and 1.3 million passengers from Asia-Pacific (6.5%). Airlines, airport operators, airport companies (for example, restaurants and stores), aircraft manufacturers and air navigation service providers employed 70,000 people in South Africa in 2014.

According to the Oxford Economics report: in addition to the above, when buying goods and services from local suppliers, the sector has supported another 130,000 jobs, and it is estimated that the sector has supported another 57,000 jobs by paying salaries to its employees, some or all of them subsequently spent on assets and consumer services.

In addition, it is estimated that: foreign tourists arriving by air in South Africa, who spend their money in the local economy, have supported another 230,000 jobs in 2014. In the same year, foreign tourists spent \$ 9.2 billion on SA, supported restaurants, hotels, transportation service providers and others that serve tourists, according to the report. This means that 3.5% of the GDP of the SA is supported by the air transport sector and by foreign tourists arriving by air, according to the report.

The Oxford Economics study confirms that the “vital role of air transport to facilitate more than \$ 110 billion in exports, about \$ 140 billion in foreign direct investment and about \$ 9.2 billion in receptive tourism and business tourism for SA”. According to this report “comfortable, safe and reliable air transport is key to economic growth, promotes skill development and catalyses jobs, and the SA government is urged to eliminate all obstacles, including unnecessary procedures and policies that prevent air connectivity and trade, investment, tourism and job opportunities that facilitate and stimulate”.

5.12 Competitiveness of the South Africa Airline Industry

Roughly 390,000 airplanes land and take off every year from one of South Africa's chief air terminals. OR Tambo International Airport in Johannesburg is the busiest in the nation, with more than 18.5 million passengers passing through the air terminal in 2014. SA is positioned 19th out of 37 African nations for the receptiveness of visas and 17th out of 37 for expenses in the transport area, in view of charges on air tickets, airplane terminal duties and VAT.

Infrastructure, ease of travel and cost competitiveness is vital. According to the executives interviewed by the World Economic Forum for the study, the quality score of the transport infrastructure of SA places the country in the first place among the 37 African countries surveyed and the 48th in the world. The report also notes that the capacity of the aviation industry to link SAs with emerging countries and fast-growing cities can help boost economic growth. For example, there are four direct flight destinations among the ten fastest growing countries in the world, measured by GDP growth and eight direct flight destinations among the 20 fastest growing countries. There are 20 direct weekly flights among the ten fastest growing cities in the world, measured by GDP growth and 43 direct weekly flights among the 100 fastest growing cities.

5.13 Factors Affecting the South African Airline Industry

Ssamula (2014) comments that “due to political interference, SAA has a history of nominating inefficient managers, so the airline has not been able to achieve operational efficiency and profitability”. Maqutu (2015) adds that “political interference has continued, creating instability and making it impossible for the airline to turn the corner on profitability”.

5.14 Sustainability Performance Measurement in the South African Airline Industry

According to Denga (2017): based on the significant amount of entries and exits of low-cost airlines in the commercial airline industry within South Africa, this brought on the question of whether such business models are sustainable in an emerging market.

Incidents such as the exits of 1time and Velvet Sky brought about a high degree of concern.

Analysts have suggested that the main reasons for airlines departing are the global financial crisis in 2007-2008, which led to a decrease in passenger numbers, a drop in market size, the volatility of the fuel price, route density on major routes and currency risk (1time Holdings, 2010; South African Airways, 2014; Comair Limited, 2014; Hedley, 2012). These factors are all external and indicate possible reasons for low-cost airline market exits. However, the business model of the airline is not considered as a possible reason for a low-cost airline's exit from a market. Johnson et al (2008) state that "the business model has four key components and, when these components are combined, they deliver value. These components are customer value proposition, profit formula, key resources, and key processes".

5.15 Conclusion

This chapter examined the South Africa airline industry, its structure, policy objectives, the importance of aircraft industry, the impact of the airline industry on South Africa's economic growth, South African's economy as well as historical background of the South African airline industry.

5.16 Lessons learned

The deregulation and progression of air transport in South Africa has affected the local aircraft industry, with the impacts running from incentives to changes in the structure of the business.



CHAPTER 6

RESEARCH METHODOLOGY

6.1 Introduction

This chapter explains the data collection techniques, the target population and the sample. The chapter also discusses the research methodology focusing on research design, units of analysis, data collection instruments, validity and reliability, stages of data collection and data analysis .

6.2 Rationale of the Study

The rationale of the study is to contribute to the body of knowledge on the subject of sustainability in the aviation industry. This is achieved by identifying the indicators of sustainable development that can promote sustainable aviation practices in the South African aviation industry .

6.3 Research Approach and Design

This study utilised more than one approach. According to Creswell, (2013: 4): mixed methods involve the collection and 'mixing' or integration of both quantitative and qualitative data in a study. Mixed methods research has increased in popularity in the recent years. The core assumption of this form of inquiry is that the combination of qualitative and quantitative approaches provides a more complete understanding of a research problem than either approach alone.

A mixed methods approach was therefore deemed suitable for this study. Mixed methodology allows combining multiple approaches (both qualitative and quantitative) to embrace the strengths of each methodological approach and mitigate the weakness of the other. A mixed methods approach was popularised by Creswell (2003) and Tashakkori and Teddlie (2003). Similarly, Johnson and Onwuegbuzie (2004) and Sullivan (2006) suggest a paradigm shift to mixed methods. Mason (2006) and Creswell and Plano Clark (2003) highlight the methodological strengths of using multiple approaches in research.

The scholarship of mixed methodology cannot be complete without mentioning contemporary philosophical views on the added value of mixed methods (Greene, 2008; Almaki, 2016; Creswell, 2013). Etymologically, mixed methods have their origins in the work of Campbell and Fiske (1959) focusing on construct validity known as the Multitrait-Multimethod-Matrix (MTMM). In 1973, Siebel combined the use of surveys and interviews while Jack (1979) looked at triangulation of qualitative and quantitative data.

According to Creswell and Plano Clark (2007), the period 1985 to 1997 centred on paradigm debate of mixed methods based on the work of several authors (Rossman&Wilson, 1985; Bryman, 1988). Similarly, Reichardt and Rallis (1994) and Greene and Caracelli (1997) mention the methodological 'paradigm war' that took place in the 1970s and 1980s by positivist and social scientists. Creswell and Plano Clark (2007:5) add that mixed methods are "a research design with philosophical assumptions just as quantitative and qualitative techniques", hence its usefulness in social science research. In any case, the main benefit of mixed methods design is its capacity to take on the qualities of both qualitative and quantitative methodologies, there by leading to a better understanding of the phenomenon under investigation than either approach alone (Creswell &Plano Clark, 2007).

6.3.1 Quantitative Approach

The quantitative approach is utilised in natural disciplines which make use of statistical data which is evaluated by observation and measurement. In terms of analysis, it uses statistics, the identification of variables and constant patterns. Its method of reasoning is deductive and it uses the sample representatives under study (McCusker & Gunaydin, 2015).

6.3.2 Qualitative Approach

The qualitative approach is used in the field of social and human sciences. It centres on each of those viewpoints that cannot be measured, that is, its outcomes are not transferable to science. It is therefore an interpretive, emotional strategy, unlike the quantitative system (Lewis, 2015). This strategy is inductive: it goes from the specific to the all-inclusive. The researcher arrives at information through observation, meetings or

archives. This study uses a subjective research procedure, in accordance with the interpretivist worldview position.

According to Yin (2015), qualitative research is: studying reality in its natural context, as it happens, trying to make sense of, or interpret the phenomena according to the meanings the people involved have. Qualitative research involves the use and collection of a wide variety of materials, interview, personal experience, life stories, observations, historical texts, images, sounds that describe routine and problematic situations and meanings in people's lives.

6.3.3 *Mixed Methods Approach*

Mixed methods involve: the collection and mixing or integration of both quantitative and qualitative data in a study... Mixed methods research has increased in popularity in the recent years. The core assumption of this form of inquiry is that the combination of qualitative and quantitative approaches provides a more complete understanding of a research problem than either approach alone (Creswell, (2013:4).

The reason this study uses this methodology is on the grounds that the researcher tries to establish the connections between sustainable development and civil aviation, with the particular point of the exploration being to determine indicators of sustainable development in civil aviation. Subsequently, the selection of mixed approach looks into worldview in this examination.

6.4 Research Design

Research design is a technique used to address the research questions. According to Creswell (2017), a “research design is the systematic procedure adopted that allows the researcher to reach a definitive conclusion”. The intention of a research design is to provide a clear plan of action and how to obtain answers for questions. This relates to the techniques used to access data, sampling and analysis. Huysamen (2001) points out that a research design is an outline according to which data is to be collected to answers research questions in the most cost-effective manner.

Therefore, to achieve the objectives of this study, firstly a systematic literature review was conducted, and secondly a mixed-model research design was applied. A literature review collects and critically analyses multiple studies on the relevant topic while a mixed method approach is the incorporation of both the qualitative and quantitative research methods (Johnson & Christensen, 2008; Johnson & Onwuegbuzie, 2004). In the context of this research, a case study was selected together with a descriptive survey approach.

6.5 Case Study

A case study can be referred to as “a research strategy which focuses on understanding the dynamics present within single settings” (Eisenhardt 1989:534). This method is particularly suited to the management sciences since it typically involves interaction with practitioners in organisational settings to investigate the phenomenon in its natural context (Pettigrew, 1985; Amabile *et al.*, 2001). Further, case studies can include qualitative and quantitative data, and various levels of analysis (Yin, 2017). Therefore, case studies can be conducted with many different motives: to explain or describe a phenomenon, test theory, generate theory and seek answers to the types of research questions which ask “how” or “why” (Eisenhardt, 1989; Yin, 2010). This study was built on a case study mode of enquiry. This approach facilitates examining and exposing the phenomenon within its natural context.

Case studies permit more data to be gathered than would normally be obtained by other research approaches. The data gathered is richer and of greater depth than detail gathered through other investigational designs (Gerring, 2006). It is against this background that the study focuses on the airline industry in South Africa.

6.6 Research Area

The study was carried out in South Africa, in the Gauteng Province. This province was selected because it is the most populous, the biggest contributor to national GDP and home to major aviation activities, professional bodies and stakeholders (Government of South Africa, 2016).

6.7 Target Population

As indicated by Stake (2010), “population, in research, is viewed as the totality of individuals, occasions, hierarchical units, case registers or other examining units that identifies with the examination issue. A population, in this manner, is a gathering of individuals from whom people are picked for the examination”. The population in this study comprised all the individuals from the different stakeholders of the South Africa airline industry.

Several studies recommend that expert opinions should be sought from involved stakeholders (Griggs and Howarth, 2016). In the airline industry, Caves (2003) offer a broader view of stakeholders:

- The system component owners;
- The system component operators;
- The system component suppliers;
- Operators;
- Supervisors; and
- Those affected by the system.

The scope of these categories identified by Caves (2003) is global but following a case study mode of enquiry adopted by this study as well as reasons of accessibility and scale, this study is limited to the airline industry in South Africa. However, it would have impractical to attempt full coverage of all stakeholders. Therefore, the selected organisations were chosen to represent the main role players in the sector, based on:

- Stakeholder groups
- Specific organisations
- Individual within each organisation.

6.8 Sampling and Sample

Sampling is “the process of selecting an appropriate unit of a population of interest to the study sample in a manner that the results could be generalized to the population from which they were chosen” (Saunders, Lewis & Thornhill, 2009). The authors add that: sampling is divided into probability sampling and non-probability sampling. Probability

sampling is a sampling technique, in which the subjects of the population have the same opportunity to be selected as a representative sample. Non-probabilistic sampling is a sampling method in which it is not known which individual in the population will be selected as a sample.

In terms of the sampling method, the study utilised a probabilistic sampling procedure known as the simple random sampling technique. To ensure the validity of the data and to avoid bias, a simple random sampling technique was utilised.

According to Draugalis and Plaza (2009): probability sampling is probabilistic sampling to select the respondents. With this method, each element of a population had the same possibilities of inclusion in the sample. The rationale for choosing this approach is that each sampling unit had the same chances to be included in the sample, since the researcher can collect data from respondents who are willing to provide data relevant to the study.

This was implemented in order to extract more factual data from credible sources so that the research questions could be properly addressed and answered.

This study utilised a sample of 80 respondents to collect data. This figure was decided upon by considering the resources accessible for the investigation, including cost and time. This sample size was a sub-set of the entire population. Table 6.1 shows the different stakeholder groups and their sample size.

Table 6.1 Airline Industry Stakeholder Groups (<https://www.globalaviationgroup.com/>)

Groups	Included	Not Included	Sample Size
Operators	Airlines, airports, air traffic, trade unions		15
Suppliers	Airframe manufacturers, engine manufacturers, fuel suppliers	Sub-contractors to manufacturers, Construction industry, Automotive industry, Service suppliers	15
Users	Passengers, freight consigners	Trade bodies	15
Regulators	National government, statutory bodies, local government, parliamentarians		15

Those Affected	Local community, environmental groups, sustainable development groups		10
Others		Airport consultative committees, academic institutions, general aviation, recreational groups, enthusiasts' groups	10

6.9 Sources of Data

The sources of data that the study used were both primary and secondary. According to Yin (2017:44), primary data is “collected directly from the sampled respondents to get first-hand information, whereas the secondary data are those that have been compiled or written by others and are usually useful for other purposes or for a particular course of study”.

6.9.1 Primary Data Sources

Anfara *et al.* (2002) observe that “primary data is generally collected for a particular task at hand; what makes the researcher consistent and objective”. The study used a questionnaire as the primary source of data collection. Primary data in this study included responses acquired through questionnaires administered to the target respondents from various stakeholder groups in the South Africa airline industry. The primary data gathered in this way provided direct responses from respondents thereby eliminating bias.

6.9.2 Secondary Data Sources

Cowton (1998) indicates that: in research, secondary data is generally considered as useful information already available prepared by an individual, a group of people or an institution that is available for the researcher to facilitate data collection. Secondary data has been sorted and analyzed already making it more authentic than primary data .

The secondary source of data included reports from organisations, journal publications, textbooks, websites, articles, airline industry data publications and other sources relevant to the study.

6.10 Research Instrument

A questionnaire was selected as the research instrument for collecting primary data. According to Zohrabi (2013), “a questionnaire is a structured list of questions selected and developed with the purpose of extracting reliable answers from the chosen sample. Descriptive quantitative survey designs require questionnaires as a method for collecting data”.

Babbie (2007) explains that: a questionnaire is an instrument explicitly intended to get valuable data for analysis. The questionnaire is the primary research instrument utilized for this investigation. The questionnaires were distributed to examine respondents to get information for the investigation. Altogether, 80 questionnaires were directed to all respondents. Respondents were required to respond to questions or express their perspectives or assessments on a few inquiries identifying with the examination.

6.10.1 Questionnaire Design

There are many recommendations in the literature on how to structure the questions in a questionnaire (Griggs and Howarth, 2016; Atkinson, 1995). These guidelines assist with structuring the questions and the wording of the questions.

The questions that should be formulated by the researcher must not include statements that are outlined below by Bryman (2001: 149) :

- Avoid vague terms in the questions that can confuse the respondents
- Eliminate unnecessarily long questions
- Double-barrelled questions must be avoided
- Generalised questions must be avoided
- Leading questions must be avoided
- Questions that ask two questions must be eliminated
- Questions that include negatives must be eliminated
- Technical terms must be eliminated

- The researcher must verify if the respondent has the necessary knowledge
- The researcher must ensure that there is a balance between a closed question and its answers .

The above criteria make common sense. For instance, avoiding the use of technical jargon would be suitable for a non-specialised audience; the “purpose is to come up with questions in the questionnaire that shows information that directly and precisely respond to the research question”. In addition, the questions must reflect the methods and analysis of the information and mirror the objectives of the research.

For each question, the accompanying information and data should be recorded:

- Relate questionnaire questions to research questions
- Variables and measures
- Questions
- Target recipients
- Analysis and visualisation

Relate questionnaire questions to research questions

Several authors (Bouma&Atkinson, 1995; Frankfort-Nachmias&Nachmias,2000; Bryman 2001) emphasise: the need to relate the questions of the questionnaire with the research question, and therefore with the objectives, hypotheses or propositions. The relationship between the research question and the research proposition and the objectives of the research is restated here to ensure the pre-eminence of the relationship.

Variables and measures

Questions can be broken down into factors, as defined by Bouma and Atkinson (1995: 51): What is a variable? A variable is a concept that varies in amount or kind. A variable is a concept of which it is possible to have more or less, or different kinds. The variables that interest us are variables which not only vary in amount or kind but are also measurable.

The importance of estimation is stressed by different writers (Frankfort-Nachmias&Nachmias, 2000; Czaja&Blair, 1996). according to Arnstein (1969): the approach adopted specifically identifies the variables necessary to answer the research question, the scope and scale with which these variables differ. When the measure is qualitative, the choice of scale can present some difficulties. In this case, it may be useful to consider how the results are displayed for illustration of the original objective; the

display mechanism can help clarify the scales that are used. Others may come from specialized measurement scales, usually an ordinal scale, relevant to the survey area, scale of citizen participation, and a spectrum of sustainability.

The construction of questions is largely influenced by the measurements and scales.

Questions

Questions ought to be designed in such a way as to answer the research questions (Bouma & Atkinson, 1995; Czaja & Blair, 1996; Bryman, 2001): In each question, the use of open or closed questions is determined by taking into consideration the nature of the variables and the best way to obtain the necessary information. Many of the questions in the questionnaire are developed using lists of specific aspects of airline industry or sustainable development, for example, problems, actions, specific tools for change. For each aspect, the source and reason for inclusion are documented.

6.10.2 Pilot Study

According to De Vaus (2013): the questionnaire was exposed to a pre-test to decide its validity and dependability to accomplish the investigation targets before conveying them to the respondents. A couple of respondents had the chance to stamp the most suitable response to a thing and, at times, request that they compose their perspectives on specific components. The components of the questionnaire incorporated the important areas of examination to get all the essential responses to the research questions.

6.10.3 Administration of Questionnaires

The questionnaires were self-administered and were distributed to the respondents directly by the researcher. De Vaus (2013) state that: a self-administered questionnaire (SAQ) refers to a questionnaire that has been specifically designed to be completed by a respondent without the intervention of the researcher. A SAQ questionnaire is usually an independent questionnaire, although it can also be used in conjunction with other data collection methods, which was not the case in this study. Traditionally, the SAQ questionnaire was distributed by mail or in person to large groups, and for the purposes of convenience in this study it was distributed in person by the researcher. Particular

attention was paid to the way in which the questions were formulated and how the questionnaire was formatted so as to avoid response errors.

6.10.4 Collection of Questionnaires

The researcher collected the questionnaires from the respondents at their various work stations within the workplace. Due diligence was carried out in terms of verifying that all the questions were answered and whether the respondents had any difficulties in relation to filling in the questionnaire .

6.11 Analysis of Data

Analysis of data, according to Wellman *et.al.* (2005): involves the extracting, assorting and modelling data so as to obtain processed information used to reach conclusions, predict results and supporting decision making. The excel spread sheet was used to store and analyse all the data and information collected from the questionnaires. In addition, the Statistical Package for Social Sciences was also used for the analysis of quantitative data.

Krivtsov (2009) states that SPSS is a software package widely used for quantitative and qualitative data analysis. Descriptive statistics were also used in the study for the analysis of data. Descriptive statistics refers to “graphical displays and frequency distributions involved in calculating the incidence or the number of periods that a particular phenomenon occurs and presenting the data in a chart or graphical way”. The study lastly used the statistics summary which involves defining the spread of the statistics, using measures of central tendency. Three measures of central inclination were used, namely, the average median and mode (Krivtsov, 2009) .

6.12 Content Analysis

Content analysis refers to any methodological measurement applied to text (or other symbolic materials) for social science purposes (Shapiro&Markoff, 1997) . This method is

simple and easy in terms of analysis of numerical data and may involve analytical approaches such as deductive and inductive reasoning (Rosengren, 1981).

The qualitative technique in content analysis looks at language to order large amounts of “content into a proficient number of classes that speak to comparative implications” (Weber, 1990). Qualitative content analysis centres on the attributes of language, specifically, its substance or relevance (Krippendorff, 2004). This methodical conceptualisation also involves categorisation ((Griggs and Howarth, 2016). Thus, qualitative content analysis can be characterised as research methods for the translation of the “substance of content information through the precise arrangement procedure of coding and distinguishing topics or examples” (Hsieh & Shannon, 2005: 1278).

6.13 Applications of Qualitative Content Analysis

There are three different techniques involved in qualitative content analysis - conventional, directed and summative (Hsieh & Shannon, 2005). The key difference between these three approaches is the process of category identification to better understand the phenomenon (Griggs and Howarth, 2016). In conventional content analysis, researchers avoid applying preconceived categories to texts and derive category descriptions directly from the data (Weber, 1990). Also described as the inductive approach to category development, categories are thus extracted through an iterative process of reading, testing and revising the data (Eisenhardt 1989; Mayring, 2000).

Under an inductive methodology, information investigation begins with the researcher rereading and re-reading all the information to familiarise themselves with the data and to gain general impression (Tesch, 1990; Kvale, 2007). As this process continues, initial thoughts emerge which then become the initial coding scheme. The process continues until these emergent coding schemes become meaningful clusters or coding categories (Krippendorff, 2004).

Coordinated content analysis is a more organised procedure than the inductive methodology (Hickey & Kipping, 1996). In coordinated content analysis, researchers use existing hypotheses to identify the underlying categories. Any content that cannot be arranged under the underlying categories is given another code. This is referred to as a deductive approach to category development (Eisenhardt 1989; Mayring, 2000). Another

strategy in the deductive approach is to initiate coding categories with the predetermined codes at once. In summative content analysis, researchers first identify and quantify the frequency of specific words by hand or through software. These words are then interpreted to discover underlying meanings (Babbie, 2004).

6.14 Validity and Reliability

Reliability refers to the repeatability of results. If the study were to be conducted a second time, would it have the same results? If yes, the data is reliable. Reliability is the degree to which an evaluation tool produces stable and consistent findings. If more than one person is observing the behaviour or event, all observers should agree on what is recorded to state that the data is reliable. The way in which the questionnaire was structured and the responses from the respondents indicated reliability .

Validity refers to the believability or credibility of the investigation. Are the results genuine? The results of this study were genuine as reflected by the consistency in responses and the assurance that respondents did not ask third parties to answer for them. The positivist philosophy adopted by this study ensured reliability .

6.15 Bias Elimination

To ensure that there was no bias, researcher thoroughly prepared the questionnaires. Sound practices were followed in the construction of the questionnaires, pilot testing the questionnaire. The researcher ensured that there were no leading questions and any questions which could implicate the respondents were avoided

6.16 Peer review

Peer review refers to evaluation of research work by other people working in the same field. It involves submitting the academic work to the examination of other experts to verify its validity. This study was reviewed by colleagues in the Department, including the supervisor.

6.17 Ethical Considerations

Ethical concerns must always be addressed in the data collection process. Creswell (2005:88) stated that “the researcher must align the study with ethical guidelines of conducting research. Ethics denotes identifying what is right or wrong in the study” Therefore, Houser (2012: 50) points out that: ethics were always observed when conducting this study. Three basic ethical considerations voluntary participation, informed consent, and confidentiality were always respected by the researcher during the data conduct of the study. The respondents participated voluntarily. Anonymity and privacy were strictly observed, and no names were used to identify respondents. The informed consent form followed the informed consent principle that is; it gives information about the project, purpose of the study, selection criteria, as well as the researcher’s identity.

This study involved human subjects, hence it was fundamental for the researcher to be aware of the moral and ethical principles of directing research. The respondents were advised on the reason for conducting the research and the intended use of the information. Ethical clearance was obtained from the University of Johannesburg before information gathering.

6.17.1 Confidentiality and privacy

Schi and Tao (2008) explain that “respondents’ personal names may not be published yet their collective contributions to the study form the larger part of the findings of a study without implicating them in any way”. The researcher explained to the participants how confidentiality would be addressed in the study, including that they could either opt out of the study or seek clarity where they felt that the confidentiality of their responses and/or identity would be compromised .

6.18 Conclusion

This chapter outlined the research method used in the study, describing how the data would be collected. The chapter clearly articulated how the researcher collected, analysed and interpreted the data. This was followed by an in-depth discussion of the research design, data collection methods, sampling techniques and methods of analysis. The

chapter highlighted the validity and reliability of the descriptive survey methodology in this type of study .



CHAPTER 7

FINDINGS AND ANALYSIS

7.1 Introduction

This chapter presents the results of the data obtained from the structured questionnaires which were circulated to the research respondents, namely, pilots, ground floor supervisors, human resource officers, operations managers, air hostesses and project managers involved in the airline industry. The data was obtained from the questionnaires which served as the basis of the quantitative analysis. The questionnaire comprised five sections with ten questions under each section. All questions were answered, 100 questionnaires were distributed and 80 responses received, hence the analysis is based on the 80 that responded. This reflects an 80% response rate. The first section elicited background information on the respondents; the second section looked at the purpose of sustainable development, the third section looked at barriers; the fourth section looked at issues that may be relevant to sustainable development; and the fifth section listed the possible policy actions that could be taken to support the sustainable development of aviation .

7.2 Data Analysis

The questionnaire contained statements on the different variables being investigated. Responses were in the form of a five-point Likert scale, where 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree and 5 = Strongly Agree. The completed questionnaires were collected from the respondents and checked to ensure they were usable before being processed further. Since the quantitative data was pre-coded by listing different numerical codes against different responses, transforming the data format from textual to numerical format was done by coding and inputting data on SPSS for analysis using the relevant statistical techniques (Green and Salkind, 2016).

The five-point scale was transformed to Mean Item Score (MIS) for each of the factors as assessed by the respondents. The indices were then used to determine the rank of each item. Following the mathematical computations, the criteria was then ranked in descending order of importance (from the highest to the lowest) .

7.2.1 Distribution of Sample According to Gender

It can be observed from Figure 7.1 that out of the 80 respondents, 47% were male, while 33% were female.

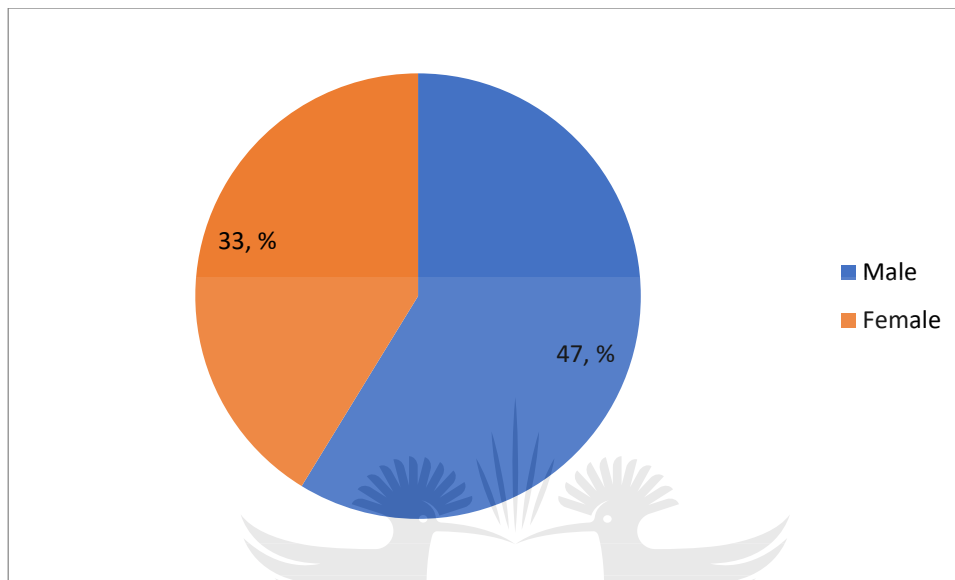


Figure 7.1: Respondents' Gender

7.2.2 Distribution of Sample According to Age Group

Figure 7.2 below shows the respondents' age group with 20% between 20-25 years, 40% between 26-35 years, 28% between 36-45 years, 9% between 46-55 and lastly a mere 3% above 50 years of age which was 56-65.

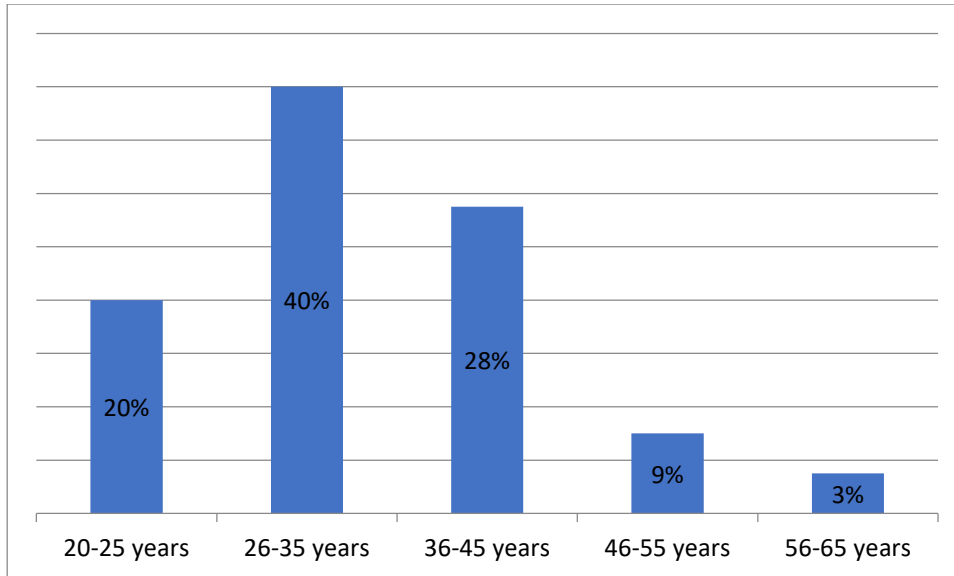


Figure 7.2: Respondents' age group

7.2.3 Distribution of Sample According to Educational Qualification

Figure 7.3 below illustrates the respondents' educational background: 31% had a diploma, 29% had Bachelor's degree, 24% an Honours degree, 6% a Master's degree. A PhD was slightly higher than Master's at 7% and lastly, 3% had certificates.

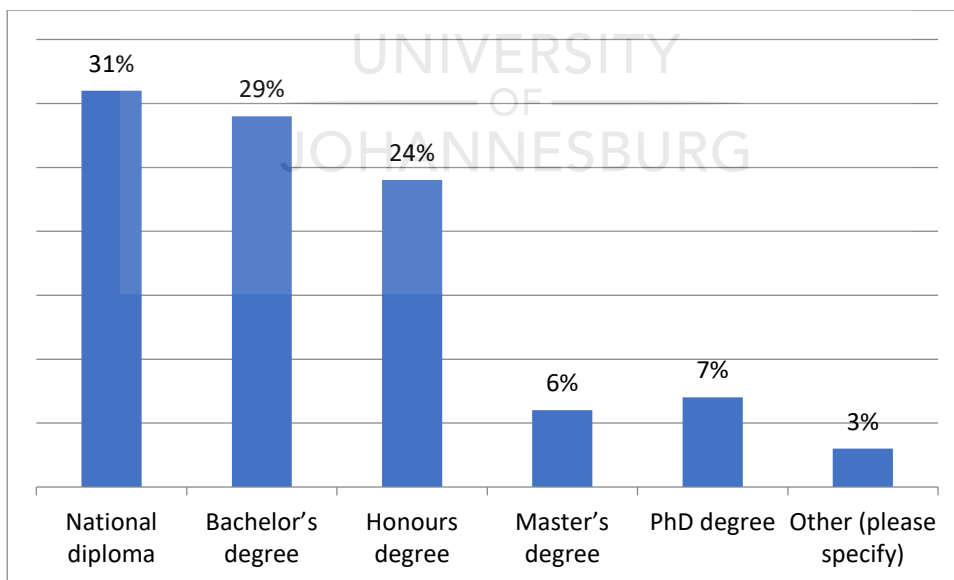


Figure 7.3: Respondents' educational qualification

7.2.4 Distribution of Sample According to Years of Professional Practice

Findings in Figure 7.4 below illustrate how long the respondents were in professional practice. It was revealed that 11% had one year of experience of no experience at all; 26% had less than two years; 46% had two to five years' experience and 17% had five years or more in the practice.

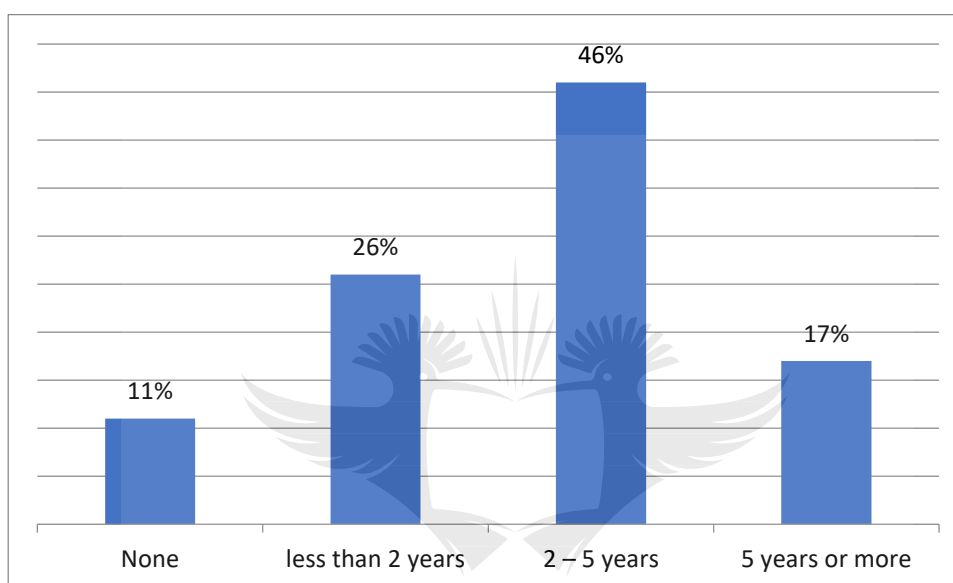


Figure 7.4: Respondents' professional practice years

7.3 Section B: Purpose of Sustainable Development

This section provides the results of Section B of the questionnaire which explored the purpose of sustainable development indicators in civil aviation.

Exploratory factor analysis

Exploratory factor analysis (EFA) is often adopted in the primary phases of study in order to gather information pertaining to inter-relationships between a set of variables (Pallant, 2007). As Pallant (2007) states: EFA was assumed using version 21.0 of the SPSS software. The essential tests were done to define the appropriateness of the sample size for factor analysis to continue. To define the factorability of the correlation matrix, the correlation matrix must show some correlations of $r = 0.3$ or above; Bartlett's test of

sphericity must be statistically significant at $p < 0.5$ and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy value should be 0.6 or above .

The data was subjected to principal component analysis (PCA) with varimax rotation. To demonstrate the number of (factors) to extract Kaiser's criterion, the total number of components that had an eigenvalue of 1 or more were determined and accepted. The eigenvalue was designated as a scientific property of a matrix adopted both as a criterion of founding the number of factors to extract as well as a quantity of variance accounted for by an assumed dimension (Dainty *et al.*, 2003; Ahadzie *et al.*, 2008). Furthermore, the graphical scree test was used to eliminate factors by means of the scree plot representing the cut-off point at which the eigenvalues leveled off (Dainty *et al.*, 2003).

This study used principal axis factoring as the extraction technique for the data. Both first degree factor analysis and second degree factor analysis were conducted. The rotation technique used for the first degree factor analysis was varimax with Kaiser normalisation whereas Oblimin with Kaiser normalization were used for the second degree factor analysis.

7.3.1 Results from Frequencies and Descriptive Factor Analysis

Table 7.1: Outcome of the purpose of sustainable development indicators

Item Statistics				
Statements	Mean	Std. Deviation	Rank	
Effect of programs for change	4.19	0.713	1	P1
Inform the decisions of airline and airport managers	3.98	0.636	2	
Inform the decisions of air transport consumers-freight users and passengers	3.93	0.652	3	
Inform the decisions of local government policy makers	3.80	0.683	4	
Provide public information	3.80	0.719	5	
Inform the decisions of national government policy makers	3.79	0.706	6	
Environmental aspects	3.53	0.656	7	
Social and economic aspects	3.46	0.594	8	
Public participation	3.45	0.884	9	
Regulatory arrangements	3.33	0.632	10	

Table 7.1 above shows the respondents' ranking of the purpose of sustainable development indicators in South African aviation. The responses indicate that effect of

programs for change was ranked first with a mean score of 4.19 and a standard deviation (SD) of 0.713. Second was to inform the decisions of airline and airport managers with a mean score of 3.98 and an SD of 0.6363, third was informing the decisions of air transport consumer-freight users and passengers with a mean score of 3.93 and SD of 0.652. Ranked fourth was to inform the decisions of local government policymakers with a mean score of 3.80 and an SD of 0.683, the fifth factor was to provide public information with a mean score of 3.80 and an SD of 0.719 .

The sixth purpose was to inform the decisions of national government policymakers with a mean score of 3.79 and SD of 0.706, the seventh purpose was environmental aspects with a mean score of 3.53 and SD of 0.656, the eighth purpose was social and economic aspects with a mean score of 3.46 and SD of 0.594, on the ninth ranking was public participation with a mean score of 3.45 and SD 0.884 and lastly ranked tenth was regulatory arrangements with a mean score of 3.33 and SD of 0.632 .

In order to define the factorability of the correlation matrix, it must show some correlations of $r = 0.3$ or above. Bartlett's test of sphericity must be statistically significant at $p < 0.5$ and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy value should be 0.6 or above. Before performing the principal component analysis (PCA), the suitability of the information for factor analysis was assessed. The correlation matrix revealed the presence of 46 coefficients of above 0.3, as shown in Table 7.2 between P2 and P5 .

Table 7.2: Correlation Matrix

Factor Analysis of Correlation Matrix											
Correlation Matrix											
		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Correlation	P1	1.000	0.988	0.073	-0.118	0.040	0.117	0.025	0.094	0.213	0.005
	P2	0.988	1.000	0.076	-0.120	0.046	0.137	0.040	0.109	0.241	0.026
	P3	0.073	0.076	1.000	-0.157	-0.150	0.165	0.062	0.178	0.241	0.038
	P4	-0.118	-0.120	-0.157	1.000	0.238	0.025	0.093	-0.051	0.060	0.112

P5	0.040	0.046	- 0.150	0.238	1.000	0.338	0.279	0.263	0.033	0.198
P6	0.117	0.137	0.165	0.025	0.338	1.000	0.474	0.273	0.134	0.032
P7	0.025	0.040	0.062	0.093	0.279	0.474	1.000	0.286	0.133	0.139
P8	0.094	0.109	0.178	-0.051	0.263	0.273	0.286	1.000	0.324	0.125
P9	0.213	0.241	0.241	0.060	0.033	0.134	0.133	0.324	1.000	-0.053
P10	0.005	0.026	0.038	0.112	0.198	0.032	0.139	0.125	- 0.053	1.000

As shown in Table 7.3 below, the KMO measure of sampling adequacy achieved a value of 0.552, not exceeding the recommended minimum value of 0.6 whereas Bartlett's test of sphericity was also statistically insignificant (less than 0.05). Thus the factorability of the correlation matrix was not supported.

Table 7.3: KMO and Bartlett's test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.552
Bartlett's Test of Sphericity	Approx. Chi-Square	363.561
	df	45
	Sig.	0.000

The information was exposed to PCA (with varimax rotation). The eigenvalue was set at conventional high values of 1.0. As shown in Table 7.4, three factors with eigenvalues exceeding 1.0 were extracted. The scree plot presented in Figure 7.5 also revealed the excluded factors by indicating the cut-off point at which the eigenvalues levelled off. The total variance explained by each of the extracted factors is as follows: Factor 1 (24.126%), Factor 2 (18.825%) and Factor 3 (13.350%). This is shown in Table 7.5. Thus, the final statistics of the PCA and the extracted factors accounted for approximately 54% of the total cumulative variance.

Table 7.4 Rotated factor matrix

	Factor		
	1	2	3
Effect of programs for change	0.760		
"Inform the decisions of airline and airport managers"	0.440		

“Inform the decisions of air transport consumers-freight users and passengers”	0.779		
“Inform the decisions of local Government policy makers”	0.548		
Provide public information	0.438		
“Inform the decisions of national Government policy makers”	0.489		
Environmental aspects		0.713	
Social and economic aspects		0.780	
Public participation			0.640
Regulatory arrangements			0.893
“Extraction Method: Principal Axis Factoring”.			
“Rotation Method: Varimax with Kaiser Normalization”. ^a			

Figure 7.5 below revealed the excluded factors by indicating the cut-off point at which the eigenvalues levelled off.

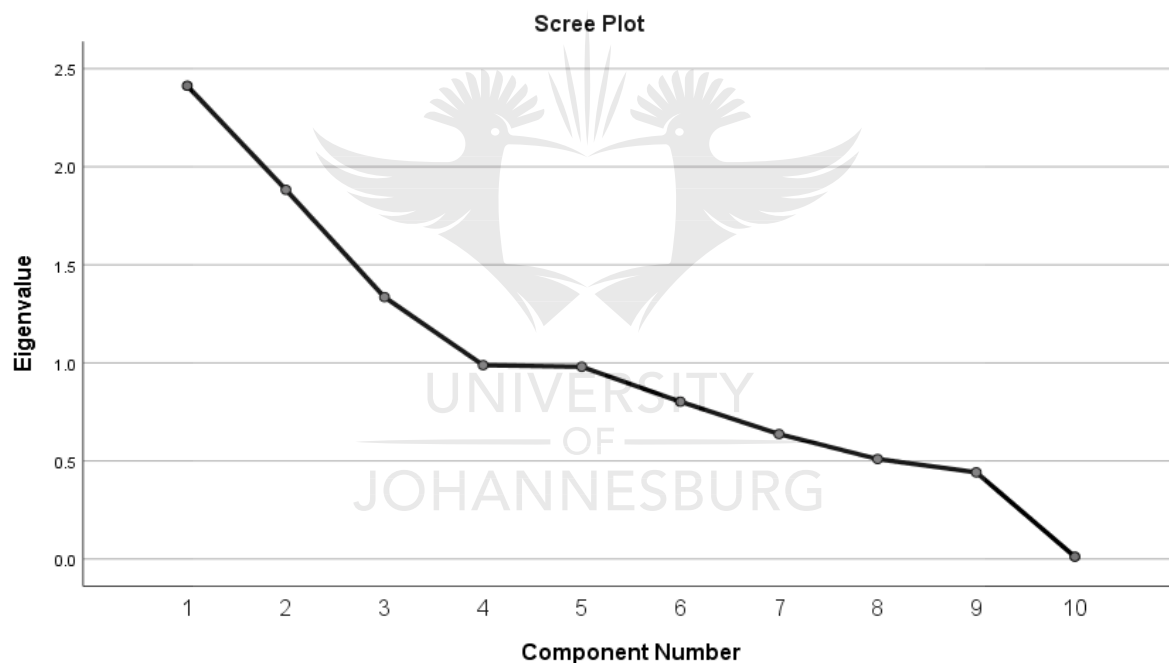


Figure 7.5: Scree Plot

Table 7.5: Explanation of total variance

Total Variance Explained							
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total

1	2.413	24.126	24.126	2.413	24.126	24.126	2.077
2	1.882	18.825	42.951	1.882	18.825	42.951	2.113
3	1.335	13.350	56.301	1.335	13.350	56.301	1.628
4	0.988	9.882	66.183				
5	0.980	9.798	75.981				
6	0.802	8.021	84.002				
7	0.637	6.369	90.371				
8	0.510	5.097	95.468				
9	0.442	4.417	99.885				
10	0.011	0.115	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Principal axis factoring showed the presence of three factors with eigenvalues above 1 as illustrated in Table 7.4. Based on the associations between the variables under each factor, the subsequent explanations were established by describing each factor.

7.3.2 Factor 1: Internal decision making

As shown in Table 7.4, the three factors that affected sustainable development were extracted and can be explained as follows: Effect of programs for change at 76%, Inform the decisions of airline and airport managers 44%, Inform the decisions of air transport consumers-freight users and passengers 77%, Inform the decisions of local Government policymakers 54%, Provide public information 43% and lastly Inform the decisions of national Government policymakers 48%.

7.3.3 Factor 2: Wider impact

As shown in Table 7.4, the two factors that affected sustainable development were extracted and can be explained as follows: Environmental aspects 71%, Social and economic aspects.

7.3.4 Factor 3: National and local government

As shown in Table 7.4, the two factors that affected sustainable development were extracted and can be explained as follows: Public participation 64%, Regulatory arrangements 89%.

7.4 Reliability Test Analysis

The data was tested for reliability, normality and correlation to make a valid prediction about the population. The internal consistency of the data on the purpose of sustainable development indicators was measured by calculating the Cronbach's alpha coefficient on Importance of information, Social Environment and Public Regulation. Table 7.6 below presents the reliability statistics for the above-mentioned factors.

Table 7.6: Reliability analysis for the purpose of sustainable development

Reliability Statistics			
Statement	Cronbach's Alpha	"Cronbach's Alpha Based on Standardized Items"	N of Items
Internal decision making	-0.373	0.994	6
Wider impact	0.632	0.652	2
National and local government	0.993	0.994	2

One of the most commonly used indicators of internal consistency is Cronbach's alpha co-efficient values. Ideally, the co-efficient of a scale should be above 0.7. However, these values are sensitive to the number of items in the scale. Pallant (2007) explains that with short scales (e.g. scales with fewer than 10 items) it is common to experience fairly low Cronbach values (e.g. less than 0.5). In this circumstance, it would be important to report the mean inter-item correlation for the items (Briggs & Cheek, 1986), recommended an optimal range for the inter-item correlation of 0.2 - 0.4 .

Table 7.6 above illustrates the results of the scale factors affecting the purpose of sustainable development. The Cronbach's alpha was low at -0.373, which is not a good value. This led to determining the internal consistency using the column of the corrected Item-Total correlation means. This column contained the values below the range of 0.2-0.4. This was not unexpected given the wide scope of the themes. Factor analysis results

were used to determine sub-themes within each overarching theme. The items that were less than 0.2 were discarded.

The results were negative for the first factor (internal decision-making) because it was not possible to obtain internal consistency between the statements from the respondents. This indicated that the statements needed to be treated separately. In other words, it was not possible to combine strategies into one single strategy or smaller strategies to obtain reliable results. This was not, however, cause for concern.

7.5 Normality Test

To test the supposition that the data followed a normal distribution (Razali&Wah, 2011) and to clarify that the sample was taken from a population that followed a normal distribution, a normality test was conducted on internal decision making, wider impact and national and local government.

7.5.1 Normality Test on the Purpose of Sustainable Development

The Kolmogorov-Smirnov test results should show that each of the p-values should be higher than 0.05. According to Ghasemi and Zahediasi (2012), if the p-value is higher than 0.05, then it is an indication of normal distribution. In this study, however, this was not the case.

The Shapiro-Wilk test results state that all the values presented should fall between 0 and 1. The values of a normal distribution on a Shapiro-Wilk test fall between 0 and 1 (Razali&Wah, 2011). Each of the p-values presented should be higher than 0.05. According to Ghasemi and Zahediasi (2012), if the p-value is higher than 0.05 then it is an indication of normal distribution. Here, this was not the case as the values had negatives on them. This was not, however, cause for concern; it simply means strategies could not be grouped together because correlations between the items were low and diagnostics from factor analysis were also too low to be presented as a group as per correlations and KMO indicate.

Factor analysis indicated that strategies would not be used as a group. It was not possible to combine strategies into smaller group of strategies. This had implications for reliability because there was no internal consistency between the statements. This indicated that

the statements needed to be treated as a separate strategy and it was not possible to combine the strategies into a single strategy or smaller strategies.

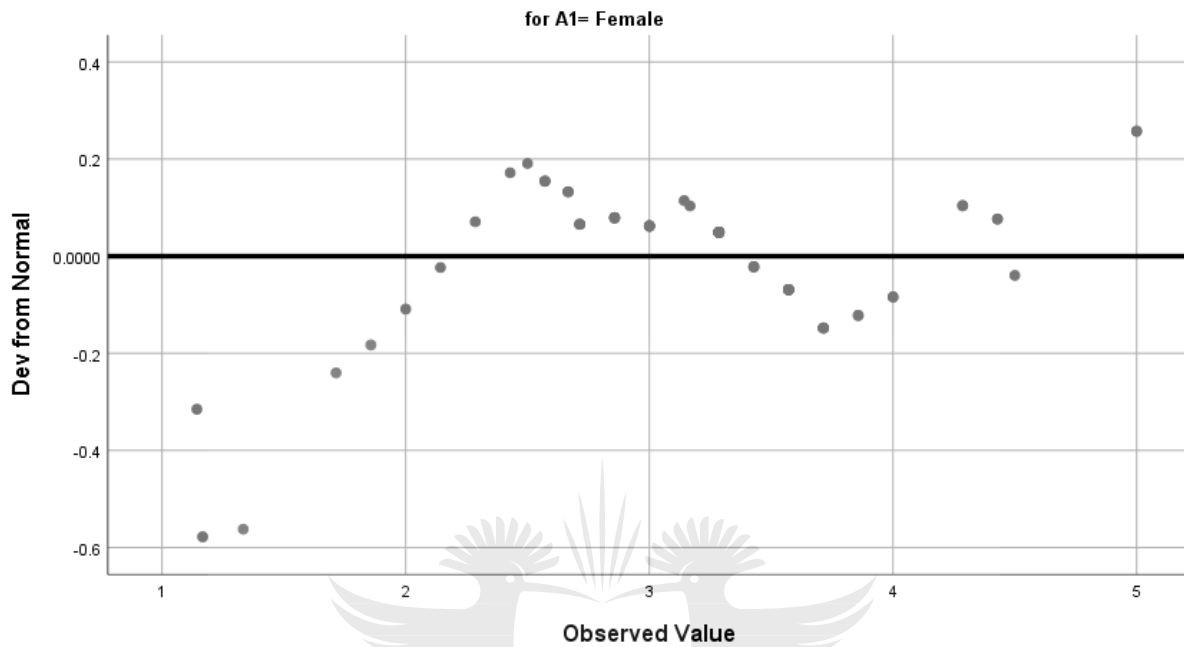


Figure 7.6: Detrended Normal Plot - Females

Figure 7.6 above illustrates the inconsistent responses from female respondents. It shows that almost 2% was on -0.6, while 1% was above 1 with regards to positive responses.

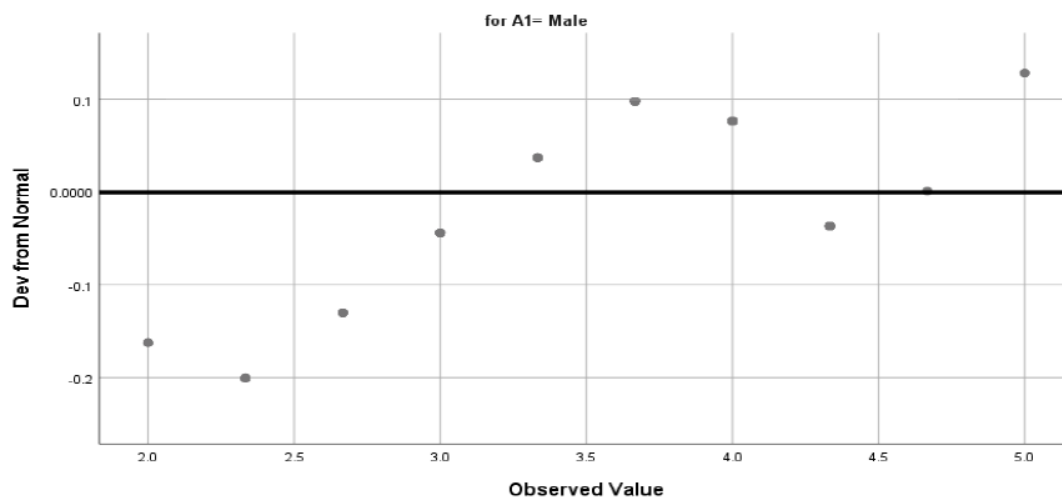


Figure 7.7 Detrended Normal Plot - Males

Figure 7.7 above also demonstrates similar inconsistencies when it came to male respondents with 0.2% of negative responses, and 0.2 positive responses.

7.6 Section C: Main Barriers to Sustainable Development

This section describes the results of Section C of the questionnaire which explored barriers to the introduction of sustainability approaches in the airline industry.

Exploratory Factor Analysis

Exploratory factor analysis (EFA) is often adopted “in the primary phases of study in order to gather information pertaining to inter-relationships between a set of variables (Pallant, 2007). The EFA was assumed using version 21.0 of the SPSS software. The essential tests were done to define the appropriateness of the sample size for factor analysis to continue. As recommended by Pallant (2007), to define the factorability of the correlation matrix, the correlation matrix must show some correlations of $r = 0.3$ or above; Bartlett’s test of sphericity must be statistically significant at $p < 0.5$ and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy value should be 0.6 or above”.

The data was exposed “to principal component analysis (PCA) with varimax rotation. To demonstrate the number of (factors) to extract using Kaiser’s criterion, the total number of components that have an eigenvalue of 1 or more are determined and accepted”. The eigenvalue is designated as a scientific property of a matrix adopted both as a criterion of founding the number of factors to extract as well as as a quantity of variance accounted for by an assumed dimension (Dainty et al., 2003:212; Ahadzie et al., 2008:681). Furthermore, the graphical scree test is used to eliminate factors by means of the scree plot representing “the cut-off point at which the eigenvalues leveled off” (Dainty et al., 2003:212).

This investigation study assumed principal axis factoring as the extraction technique used for the data. The data did both the 1st-degree factor analysis and 2nd-degree factor analysis. Nevertheless, the rotation technique deployed for the 1st-degree factor analysis was varimax with Kaiser Normalisation whereas Oblimin with Kaiser Normalisation was used for the and 2nd-degree factor analysis.

7.6.1 Results from Frequencies and Descriptive Factor Analysis

Table 7.7: Outcome of Barriers to Sustainable Development

Item Statistics			
Statement	Mean	Std. Deviation	Rank
Lack of financial incentives	4.44	0.812	1
Corruption and lack of transparency	4.37	0.542	2
Leadership and management issues-lack of management commitment	3.98	0.662	3
Lack of awareness to sustainability issues	3.96	0.691	4
Organisation culture	3.89	0.733	5
Lack of implementation framework for sustainability systems	3.83	0.711	6
Lack of legislative framework and strict sustainability policies	3.66	0.687	7
Insufficient drivers and motivations for sustainability practices	3.57	0.582	8
Insufficient technology	3.50	0.784	9
Lack of skilled human resources and experienced workers in sustainability	3.44	0.655	10

Table 7.7 above shows respondents' ranking of barriers to sustainable development in South African airlines. The table indicates that Lack of financial incentives was ranked first with a mean score of 4.44 and standard deviation (SD) of 0.812, second was Corruption and lack of transparency with a mean score of 4.37 and SD of 0.542, ranked third was Leadership and management issues-lack of management commitment with a mean score of 3.98 and SD of 0.662. Ranked fourth was Lack of awareness to sustainability issues with a mean score of 3.96 and an SD of 0.691. The fifth factor that was ranked was organizational culture with a mean score of 3.89 and SD of 0.733 .

The sixth barrier was lack of implementation framework for sustainability systems with a mean score of 3.83 and SD of 0.711, the seventh barrier was Lack of legislative framework and strict sustainability policies with a mean score of 3.66 and SD of 0.687, the eighth barrier was Insufficient drivers and motivations for sustainability practices with a mean

score of 3.57 and SD of 0.585, the ninth ranked barrier was Insufficient technology with a mean score of 3.50 and SD 0.784 and lastly, ranked tenth, was Lack of skilled human resources and experienced workers in sustainability with a mean score of 3.44 and SD of 0.655 .

In order to define the factorability of the correlation matrix, the correlation matrix must show some correlations of $r = 0.3$ or above; Bartlett's test of sphericity must be statistically significant at $p < 0.5$ and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy value should be 0.6 or above. Before performing the principal component analysis (PCA), the suitability of the information for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of 46 coefficients of above 0.3 as presented in Table 7.8 .

Table 7.8: Factor Analysis of Correlation Matrix

Correlation Matrix										
		P1	P2	P3	P4	P5	P6	P7	P8	P9
Correlation	P1	1.000	0.988	0.073	-0.118	0.040	0.117	0.025	0.094	0.213
	P2	0.988	1.000	0.076	-0.120	0.046	0.137	0.040	0.109	0.241
	P3	0.073	0.076	1.000	-0.157	-	0.165	0.062	0.178	0.241
	P4	-	-	-	1.000	0.238	0.025	0.093	-	0.060
	0.118	0.120	0.157					0.051		
	P5	0.040	0.046	-	0.238	1.000	0.338	0.279	0.263	0.033
			0.150							
	P6	0.117	0.137	0.165	0.025	0.338	1.000	0.474	0.273	0.134
	P7	0.025	0.040	0.062	0.093	0.279	0.474	1.000	0.286	0.133
P8	0.094	0.109	0.178	-0.051	0.263	0.273	0.286	1.000	0.324	
P9	0.213	0.241	0.241	0.060	0.033	0.134	0.133	0.324	1.000	

As shown in Table 7.9 below, the KMO measure of sampling adequacy achieved a value of 0.569, not exceeding the recommended minimum value of 0.6 and Bartlett's test of sphericity was also statistically insignificant (less than 0.05), thus not supporting the factorability of the correlation matrix .

Table 7.9: KMO and Bartlett's test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.569
Bartlett's Test of Sphericity	Approx. Chi-Square	356.918
	df	36
	Sig.	0.000

The information was exposed to PCA (with varimax rotation). The eigenvalue was set at conventional high values of 1.0. As shown in Table 7.10, three factors with eigenvalues exceeding 1.0 were extracted. The scree plot presented in Figure 7.8 also revealed the excluded factors by indicating the cut-off point at which the eigenvalues levelled off. The total variance explained by each of the extracted factors was as follows: Factor 1 (26.638%), Factor 2 (20.422%) and Factor 3 (14.628%). This is shown in Table 7.11. Thus, the final statistics of the PCA and the extracted factors accounted for approximately 61% of the total cumulative variance .

Table 7.10: Rotated factor matrix

	Factor		
	1	2	3
Insufficient drivers and motivations for sustainability practices	0.680		
Insufficient technology	0.520		
Lack of legislative framework and strict sustainability policies	0.881		
Insufficient drivers and motivations for sustainability practices	0.660		
Lack of financial incentives		0.531	
Corruption and lack of transparency		0.488	
Leadership and management issues-lack of management commitment		0.758	
Lack of awareness to sustainability issues		0.689	
Organisation culture			0.642
Lack of implementation framework for sustainability systems			0.792
Extraction Method: Principal Axis Factoring . Rotation Method: Varimax with Kaiser Normalization. ^a			

Figure 7.8 also revealed the excluded factors by indicating the cut-off point at which the eigenvalues levelled off.

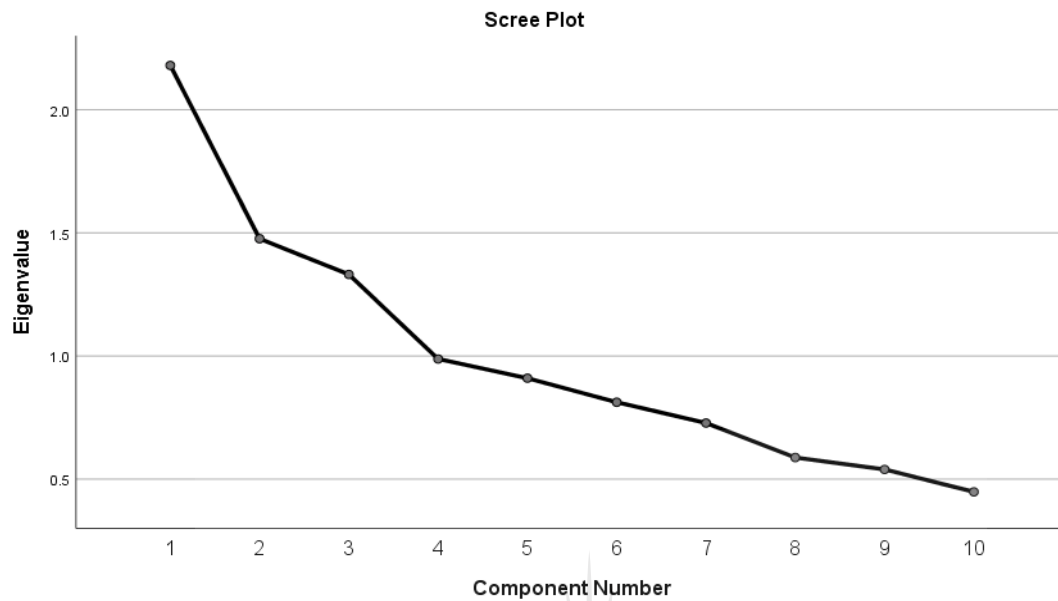


Figure 7.8: Scree plot of barriers to sustainable development

Table 7.11: Explanation of total variance

Total Variance Explained							
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
	1	2.397	26.638	26.638	2.397	26.638	26.638
2	1.838	20.422	47.061	1.838	20.422	47.061	2.120
3	1.317	14.628	61.689	1.317	14.628	61.689	1.443
4	0.988	10.977	72.666				
5	0.803	8.926	81.592				
6	0.652	7.248	88.839				
7	0.536	5.958	94.797				

8	0.456	5.072	99.869				
9	0.012	0.131	100.000				
"Extraction Method: Principal Component Analysis".							
a." When components are correlated, sums of squared loadings cannot be added to obtain a total variance".							

Principal axis factoring showed the presence of three factors with eigenvalues above 1 as illustrated in Table 7.10. Based on the associations between the variables under each factor, the subsequent explanations were established by discussing each factor below.

7.6.2 Factor 1: Framework and resources

As displayed in Table 7.10, the three factors that affected barriers to sustainable development were extracted and explained as follows: Insufficient drivers and motivations for sustainability practices at 68%, Insufficient technology 52%, Lack of legislative framework and strict sustainability policies 88%, Insufficient drivers and motivations for sustainability practices at 66% .

7.6.3 Factor 2: Motivation

As displayed in Table 7.10, the three factors that affected barriers to sustainable development were extracted and explained as follows: Lack of financial incentives 53%, Corruption and lack of transparency 48%, Leadership and management issues-lack of management commitment 75%, Lack of awareness to sustainability issues 68% .

7.6.4 Factor 3: Related emissions

As displayed in Table 7.10, the three factors that affect barriers to sustainable development were extracted and explained as follows: Organisation culture 64%, Lack of implementation framework for sustainability systems 79% .

7.7 Reliability Test Analysis

The data was tested for reliability, normality, correlation and to enable the researcher to make a prediction about the population. The internal consistency of the data collected on the purpose of sustainable development indicators was measured by calculating the Cronbach's alpha coefficient on Importance of information, Social Environment, and Public Regulation. Table 7.12 below presents the reliability statistics for the above-mentioned factors.

Table 7.12: Reliability analysis for barriers to sustainable development

Statement	Reliability Statistics		
	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Framework and resources	0.400	0.384	4
Motivation etc	-0.370	0.447	4
Related emissions	0.588	0.358	2

One of “the most normally used indicators of internal consistency is Cronbach alpha coefficient values, ideally, the co-efficient of a scale should be above 0.7. However, these values are sensitive to the number of items in the scale”.

Pallant 2007, “with short scales (e.g. scales with fewer than 10 items) it is common to experience fairly low Cronbach value (e.g. less than .5), in this circumstance, it might be imperative to report the mean inter-item correlation for the items, (Briggs and Cheek, 1986), recommended an optimal range for the inter-item correlation of 0.2 - 0.4”.

Table 7.12 above illustrates the results of scale factors of barriers to sustainable development. The Cronbach's alpha was low at 0.400. In this column, we have values that are below the range of 0.2-0.4. This was not unexpected given the wide scope of the themes. Factor analysis results were used to determine sub-themes within each theme. The items that were less than 0.2 were removed.

The results were negative for the second factor (motivation) because it was not possible to get internal consistency between the responses. This indicated that the responses needed to be treated as a separate strategy. This simply means that was not possible to combine strategies into a single strategy or smaller strategies to get reliable results. This however was not cause for concern.

7.8 Normality test

To test that the data followed a normal distribution (Razali&Wah, 2011) and to clarify that the sample was taken from a population that followed a normal distribution, a normality test was conducted on internal decision making, wider impact and national and local government.

7.8.1 Normality Test on the Purpose of Sustainable Development

The Kolmogorov-Smirnov test results states that each of the p-values presented should be higher than 0.05. According to Ghasemi and Zahediasi (2012), if the p-value is higher than 0.05 then it is an indication of normal distribution, which in this case it's **Not**. The Shapiro-Wilk test, as described above, were conducted. results state that all the values presented should fall between 0 and 1. The values of a normal distribution on a Shapiro-Wilk test fall between 0 and 1 (Razali&Wah, 2011). Each of the p-values presented should be higher than 0.05. According to Ghasemi and Zahediasi (2012), if the p-value is higher than 0.05 then it is an indication of normal distribution which in this case it's **Not as** values have negatives on them.

This however is not course for concern, it simply means strategies cannot be grouped together because correlations between the items were low and diagnostics from factor analysis is way too low to be presented as a group as per Correlations and KMO indicate. Factor analysis indicate that strategies will not be used as a group. It's not possible to combine strategies into smaller group of strategies, this will I also imply with reliability because you not getting internal consistencies between the statements and that indicate that the statements need to be treated as a separate strategy. This simply means that it's not possible to combine strategies into single strategy or smaller strategies.

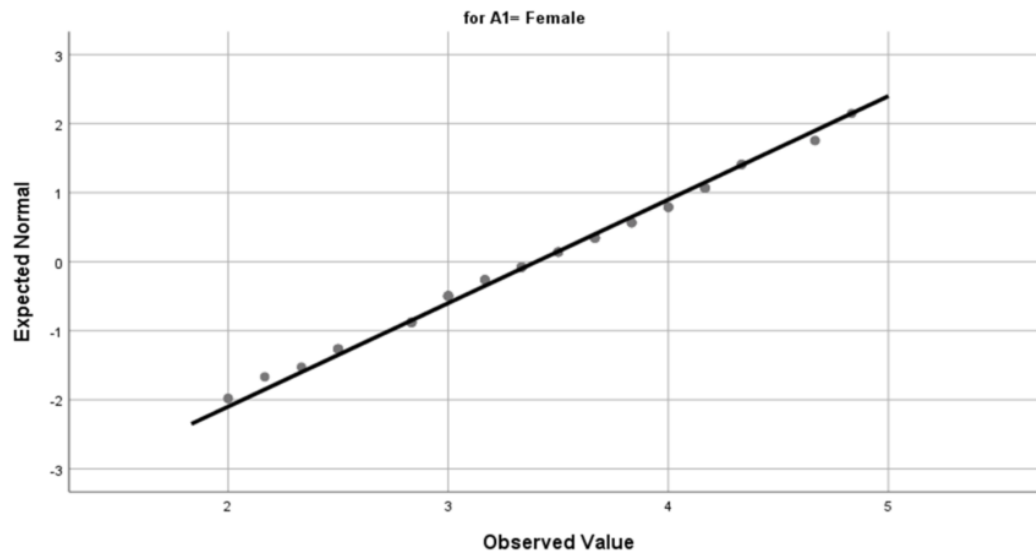


Figure 7.9: Normal plot- Females

Figure 7.9 above illustrates the inconsistent responses from female respondents. It shows that almost 4% was on -0.2 as per the graph, while almost 6% was above 1 with regards to positive response.

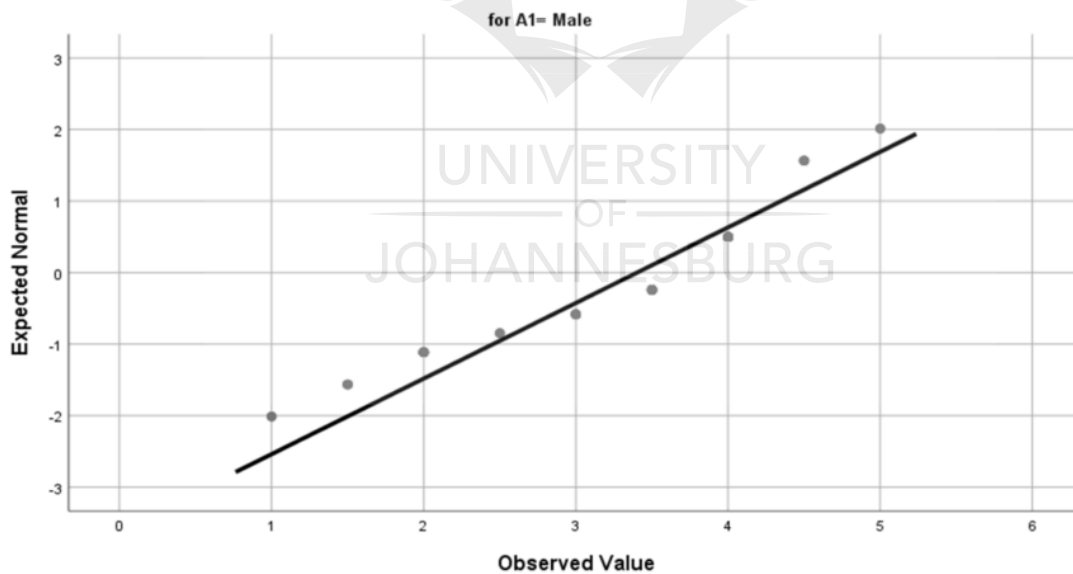


Figure 7.10: Normal plot - Males

Figure 7.10 above demonstrates similar inconsistencies when it came to male respondents with almost 3% reaching -0.2 percent of negative responses, with 0.3 above for positive responses.

7.9 Section D: Relevant issues to sustainable development

This section presents the outcomes of Section D of the questionnaire which explored the issues that may be relevant to sustainable development of the civil aviation industry.

7.9.1 Results from Frequencies and Descriptive Factor Analysis

Table 7.13: Outcome of relevant issues to sustainable development

Item Statistics			
Statement	Mean	Std. Deviation	Rank
Improved fuel efficiency of new aircraft	5.33	0.722	1
Payment of full external environmental costs	4.77	0.686	2
Effective environmental legislation	4.58	0.852	3
Community participation in airport environmental decisions	4.01	0.652	4
Spreading benefits of aviation to socially deprived areas and unemployed people	3.98	0.723	5
Development of renewable fuel for aviation	3.69	0.761	6
Environmental impact assessment for all civil aviation activities	3.63	0.674	7
Public education on sustainability of air transport	3.44	0.563	8
Limitation of greenhouse gas emissions	3.29	0.932	9
Integration of environment and development in civil aviation policy making	3.18	0.737	10

Table 7.13 above shows respondents ranking relevant issues to sustainable development in South African aviation. It shows that Improved fuel efficiency of new aircraft was ranked first with a mean score of 5.33 and SD 0.722, second was Payment of full external environmental costs with a mean score of 4.77 and SD of 0.686, third was Effective environmental legislation with a mean score of 4.58 and SD of 0.852. Fourth was Community participation in airport environmental decisions with a mean score of 4.01 and standard deviation of 0.652, the fifth factor was Spreading benefits of aviation to socially deprived areas and unemployed people with a mean score of 3.98 and SD of 0.723. The sixth issue was Development of renewable fuel for aviation with a mean score of 3.69 and SD of 0.761, the seventh issue was Environmental impact assessment for all civil aviation activities with a mean score of 3.63 and SD of 0.674, the eighth issue was Public

education on sustainability of air transport with a mean score of 3.44 and SD of 0.563, the ninth ranking was Limitation of greenhouse gas emissions with a mean score of 3.29 and SD 0.932 and lastly, ranked tenth, was Integration of environment and development in civil aviation policy making with a mean score of 3.18 and SD of 0.737 .

Inspection of the correlation matrix revealed the presence of 61 coefficients of above 0.3 as presented in Table 7.14.

Table 7.14 Correlation matrix for relevant issues

Correlation Matrix											
		PA1 I	PA2	PA3	PA4	PA5	PA6	PA7	PA8	PA9	PA10
Correlation	PA1	1.000	0.288	0.446	0.024	0.059	0.027	0.058	0.024	0.322	0.292
	PA2	0.288	1.000	0.377	0.178	0.052	0.001	0.011	-0.129	0.256	0.111
	PA3	0.446	0.377	1.000	0.338	-0.069	-0.026	0.076	-0.135	0.400	0.335
	PA4	0.024	0.178	0.338	1.000	-0.036	0.236	-0.244	-0.174	0.187	0.137
	PA5	0.059	0.052	-0.069	-0.036	1.000	0.213	0.042	-0.187	0.011	-0.048
	PA6	0.027	0.001	-0.026	0.236	0.213	1.000	0.036	-0.184	0.047	0.014
	PA7	0.058	0.011	0.076	-0.244	-0.042	0.036	1.000	0.051	0.166	0.172
	PA8	0.024	-0.129	-0.135	-0.174	-0.187	-0.184	0.051	1.000	-0.162	-0.051
	PA9	0.322	0.256	0.400	0.187	0.011	0.047	0.166	-0.162	1.000	0.215
	PA10	0.292	0.111	0.335	0.137	-0.048	0.014	0.172	-0.051	0.215	1.000

As shown in Table 7.14, the KMO measure of sampling adequacy achieved a value of 0.627, exceeding the recommended minimum value of 0.6 and Bartlett's test of sphericity was also statistically significant (less than 0.05), thus supporting the factorability of the correlation matrix .

Table 7.15 KMO and Bartlett's test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.627
Bartlett's Test of Sphericity	Approx. Chi-Square	103.384
	df	45

	Sig.	0.000
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The information was exposed to PCA (with varimax rotation). The eigenvalue was set at conventional high values of 1.0. As shown in Table 7.16, two factors with eigenvalues exceeding 1.0 were extracted. The scree plot presented in Figure 7.11 also revealed the excluded factors by indicating the cut-off point at which the eigenvalues levelled off. The total variance explained by each of the extracted factors was as follows: Factor 1 (24.289%) and Factor 2 (14.725%). This is shown in Table 7.17. Thus, the final statistics of the PCA and the extracted factors accounted for approximately 51% of the total cumulative variance .

Table 7.16: Rotated factor matrix

	Factor	
	1	2
Environmental impact assessment for all civil aviation activities	0.737	
Public education on sustainability of air transport	0.662	
Limitation of greenhouse gas emissions	0.771	
Integration of environment and development in civil aviation policy making	0.651	
Improve fuel efficiency of new aircraft		0.611
Payment of full external environmental costs		0.633
Effective environmental legislation		0.711
Community participation in airport environmental decisions		0.627
Spreading benefits of aviation to socially deprived areas and unemployed people		0.533
4Development of renewable fuel for aviation		0.611
Extraction Method: Principal Axis Factoring.		
Rotation Method: Varimax with Kaiser Normalization. ^a		

Figure 7.11 below also revealed the excluded factors by indicating the cut-off point at which the eigenvalues levelled off.

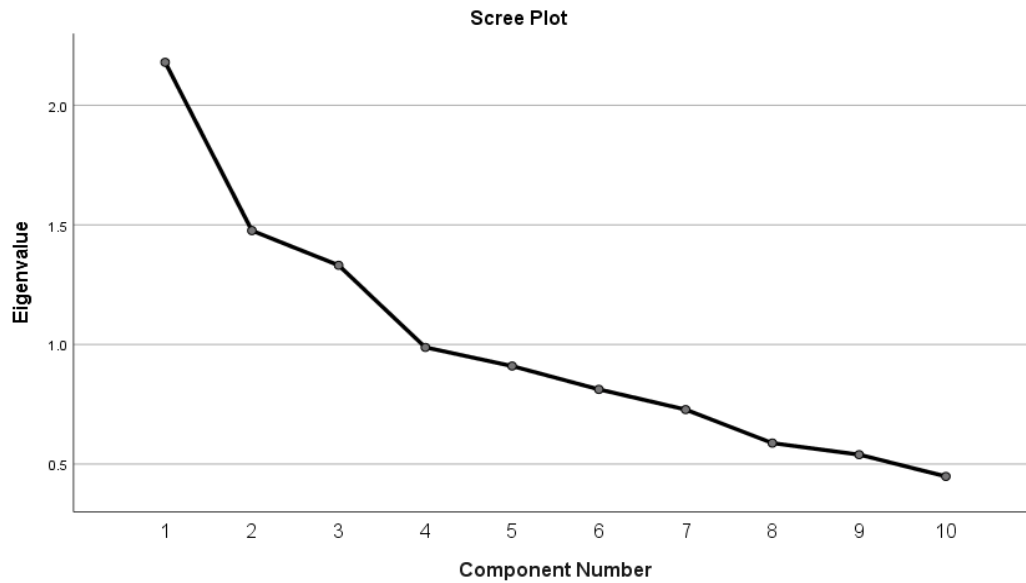


Figure 7.11: Scree plot of issues to sustainable development

Table 7.17: Explanation of total variance of issues to sustainable development

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.429	24.289	24.289	2.429	24.289	24.289	2.386
2	1.473	14.725	39.014	1.473	14.725	39.014	1.474
3	1.256	12.556	51.571	1.256	12.556	51.571	1.368
4	0.972	9.720	61.291				
5	0.869	8.692	69.983				
6	0.783	7.833	77.816				
7	0.694	6.937	84.753				
8	0.629	6.288	91.041				
9	0.531	5.310	96.351				
10	0.365	3.649	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Principal axis factoring showed the presence of two factors with eigenvalues above 1 as illustrated in Table 7.16. Based on the associations between the variables under each factor, the subsequent explanations were established as discussed below.

7.9.2 Factor 1: Environmental impact

As displayed in Table 7.16, the two factors of relevant issues to sustainable development were extracted and explained as follows: Environmental impact assessment for all civil aviation activities was at 73%, Public education on sustainability of air transport was 66%, Limitation of greenhouse gas emissions was 77%, Integration of environment and development in civil aviation policy making was at 65%.

7.9.3 Factor 2: Aviation decisions

As displayed in Table 7.16, the two factors of relevant issues to sustainable development were extracted and explained as follows: Improved fuel efficiency of new aircraft 61%, Payment of full external environmental costs 63%, Effective environmental legislation 71%, Community participation in airport environmental decisions at 62%, Spreading benefits of aviation to socially deprived areas and unemployed people at 53% and Development of renewable fuel for aviation 61%.

7.10 Reliability Test Analysis

The data was tested for reliability, normality, correlation and to make a prediction about the population. The internal consistency of the data on the purpose of sustainable development indicators was measured by calculating the Cronbach's alpha coefficient on Importance of information, Social Environment, and Public Regulation. Table 7.18 below presents the reliability statistics for the above-mentioned factors.

Table 7.18: Reliability analysis for barriers to sustainable development

Statement	Reliability Statistics		
	Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	N of Items
Environmental impact	-0.381	0.234	4

Aviation decisions	-0.381	0.540	6
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One “of the most normally used indicators of internal consistency is Cronbach alpha co-efficient values, ideally, the co-efficient of a scale should be above 0.7. However, these values are sensitive to the number of items in the scale”.

Pallant 2007, “with short scales (e.g. scales with fewer than 10 items) it is common to experience fairly low Cronbach value (e.g. less than .5), in this circumstance, it might be imperative to report the mean inter-item correlation for the items, (Briggs and Cheek, 1986), recommended an optimal range for the inter-item correlation of 0.2 - 0.4”.

Table 7.18 above illustrates the results scale of issues relevant to sustainable development. The Cronbach's alpha was low at -0.381 for the first factor, which was not a good value, implying that the internal consistency using the column of corrected Item-Total correlation means. In this column, we have values that are below the range of 0.2-0.4. This was not unexpected given the wide scope of the themes. Factor analysis results were used to determine sub-themes within each theme. The items that were less than 0.2 were removed.

The results were negative for the second factor as well (aviation decisions) because it was not possible to obtain internal consistency between the statements from respondents. This indicates that the statements needed to be treated as a separate strategy and that it was not possible to combine strategies into single strategy or smaller strategies to get reliable results. This however, was not cause for concern.

7.11 Normality Test

To test that the data followed a normal distribution (Razali&Wah, 2011) and to clarify that the sample was taken from a population that followed a normal distribution, a normality test was conducted on internal decision making, wider impact and national and local government.

7.11.1 Normality Test on the Purpose of Sustainable Development

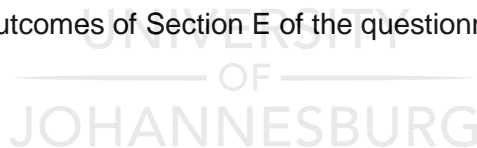
The Kolmogorov-Smirnov and the Shapiro-Wilk test results state that all the values presented should fall between 0 and 1. The values of a normal distribution on a Shapiro-Wilk test fall between 0 and 1 (Razali&Wah, 2011). Each of the p-values presented should be higher than 0.05. According to Ghasemi and Zahediasi (2012), if the p-value is higher than 0.05 then it is an indication of normal distribution which in this case it's **Not** as values have negatives on them.

This however is not course for concern, it simply means strategies cannot be grouped together because correlations between the items were low and diagnostics from factor analysis is way too low to be presented as a group as per Correlations and KMO indicate. Factor analysis indicate that strategies will not be used as a group. It's not possible to combine strategies into smaller group of strategies, this will I also imply with reliability because you not getting internal consistencies between the statements and that indicate that the statements need to be treated as a separate strategy. This simply means that it's not possible to combine strategies into single strategy or smaller strategies.



7.12 Section E: Policy Actions to Support the Sustainable Development of Aviation

This section presents the outcomes of Section E of the questionnaire on sustainable development of aviation.



7.12.1 Results from Frequencies and Descriptive Factor Analysis

Table 7.19: Outcome of factors that support the sustainable development of aviation

Item Statistics			
Statement	Mean	Std. Deviation	Rank
Aircraft fuel efficiency	5.99	0.611	1
Civil aviation contribution to poverty reduction	5.80	0.663	2
Land use for airport construction	4.88	0.713	3
Number of flights	4.76	0.675	4
Aircraft noise	3.41	0.781	5

Emissions from surface transport to airports	3.96	0.561	6
Local air pollution from airports	3.77	0.619	7
Use of aviation fuel	3.48	0.712	8
Emissions from airport sites	3.45	0.666	9
Aircraft greenhouse gas emissions	3.30	0.591	10

Table 7.19 above shows respondents ranking factors that support the sustainable development of aviation. It shows that Aircraft fuel efficiency was ranked first with a mean score of 5.99 and SD 0.611, second was civil aviation contribution to poverty reduction with a mean score of 5.80 and SD of 0.663, third was Land use for airport construction with a mean score of 4.88 and SD of 0.713. Fourth was Number of flights with a mean score of 4.76 and standard deviation of 0.675, the fifth factor was Aircraft noise with a mean score of 3.41 and SD of 0.781. The sixth factor was Emissions from surface transport to airports with a mean score of 3.96 and SD of 0.561, the seventh issue was Local air pollution from airports with a mean score of 3.77 and SD of 0.619, the eighth factor was Use of aviation fuel with a mean score of 3.48 and SD of 0.712, the ninth ranking was Emissions from airport sites with a mean score of 3.45 and SD 0.666 and lastly, ranked tenth, was Aircraft greenhouse gas emissions with a mean score of 3.30 and SD of 0.59 .

In order to define the factorability of the correlation matrix, the correlation matrix must show some correlations of $r = 0.3$ or above; Bartlett's test of sphericity must be statistically significant at $p < 0.5$ and the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy value should be 0.6 or above. Before performing the principal component analysis (PCA), the suitability of the information for factor analysis was assessed. Inspection of the correlation matrix revealed the presence of 59 coefficients of above 0.3 as presented in Table 7.20 .

Table 7.20: Correlation matrix for factors supporting sustainable development

Correlation Matrix											
		IR1	IR2	IR3	IR4	IR5	IR6	IR7	IR8	IR9	IR10
Correlation	IR1	1.000	0.092	0.230	0.079	0.164	0.059	0.085	0.277	0.163	0.272
	IR2	0.092	1.000	0.187	0.049	0.195	- 0.032	0.093	0.021	0.053	0.128
	IR3	0.230	0.187	1.000	0.236	0.153	- 0.128	0.238	0.148	0.214	0.012
	IR4	0.079	0.049	0.236	1.000	0.397	0.011	0.117	0.118	0.204	0.192

	IR5	0.164	0.195	0.153	0.397	1.000	0.054	0.026	-	0.002	0.003
	IR6	0.059	-	-	0.011	0.054	1.000	-	-	-	-
	IR7	0.085	0.093	0.238	0.117	0.026	-	1.000	0.218	0.254	0.268
	IR8	0.277	0.021	0.148	0.118	-	-	0.218	1.000	0.212	0.227
	IR9	0.163	0.053	0.214	0.204	0.002	-	0.254	0.212	1.000	0.248
	IR10	0.272	0.128	0.012	0.192	0.003	-	0.268	0.227	0.248	1.000

As shown in Table 7.21 below, the KMO measure of sampling adequacy achieved a value of 0.580, not exceeding the recommended minimum value of 0.6. Bartlett's test of sphericity was also statistically insignificant (less than 0.05), thus not supporting the factorability of the correlation matrix .

Table 7.21: KMO and Bartlett's test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.580
Bartlett's Test of Sphericity	Approx. Chi-Square	102.239
	df	45
	Sig.	0.000

The information was exposed to PCA (with varimax rotation). The eigenvalue was set at conventional high values of 1.0. As shown in Table 7.22, three factors with eigenvalues exceeding 1.0 were extracted. The scree plot presented in Figure 7.12 also revealed the excluded factors by indicating the cut-off point at which the eigenvalues levelled off. The total variance explained by each of the extracted factors was as follows: Factor 1 (23.935%), Factor 2 (15.432%) and Factor 3 (11.310%). This is shown in Table 7.23, the final statistics of the PCA and the extracted factors accounted for approximately 50% of the total cumulative variance .

Table 7.22: Rotated factor matrix

	Factor		
	1	2	3

Use of aviation fuel	0.774		
Emissions from airport sites	0.566		
Aircraft greenhouse gas emissions	0.811		
Number of flights		0.885	
Aircraft noise		0.555	
Emissions from surface transport to airports		0.520	
Local air pollution from airports			0.441
Use of aviation fuel			0.635
Emissions from airport sites			0.752
Aircraft greenhouse gas emissions			0.841
Extraction Method: Principal Axis Factoring.			
Rotation Method: Varimax with Kaiser Normalization. ^a			

Figure 7.12 also revealed the excluded factors by indicating the cut-off point at which the eigenvalues levelled off.

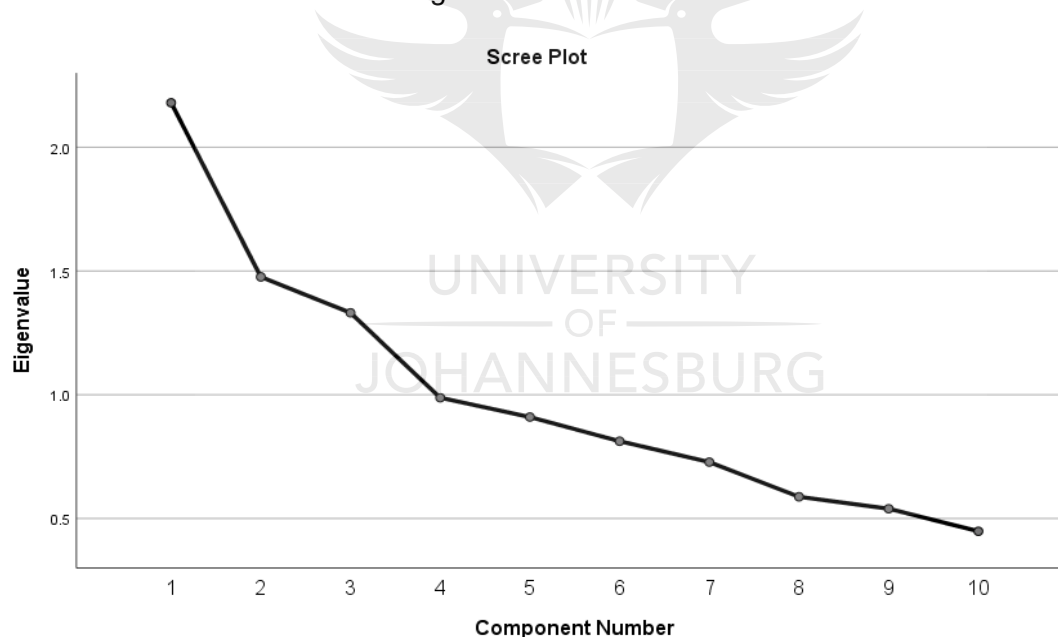


Figure 7.12: Scree plot of factors that support sustainable development

Table 7.23: Explanation of total variance of factors supporting sustainable development

Total Variance Explained			
Component	Initial Eigenvalues	Extraction Sums of Squared Loadings	Rotation Sums of

							Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	2.393	23.935	23.935	2.393	23.935	23.935	1.913
2	1.543	15.432	39.366	1.543	15.432	39.366	1.772
3	1.131	11.310	50.677	1.131	11.310	50.677	1.812
4	0.994	9.939	60.616				
5	0.932	9.324	69.940				
6	0.770	7.695	77.636				
7	0.716	7.162	84.797				
8	0.664	6.638	91.436				
9	0.486	4.856	96.291				
10	0.371	3.709	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Principal axis factoring showed the presence of three factors with eigenvalues above 1 as illustrated in Table 7.22. Based on the associations between the variables under each factor, the subsequent explanations are provided below.

7.12.2 Factor 1: Related emissions

As shown in Table 7.22, the three factors that support the sustainable development were extracted and explained as follows: Use of aviation fuel at 77%, Emissions from airport sites 56%, Aircraft greenhouse gas emissions 81%.

7.12.3 Factor 2: Flights

As shown in Table 7.22, the three factors that support the sustainable development were extracted and explained as follows: Number of flights 88%, Aircraft noise 55%, Emissions from surface transport to airports 52%.

7.12.4 Factor 3: Fuel related

As shown in Table 7.22, the three factors that support the sustainable development were extracted and explained as follows: Local air pollution from airports 44%, Use of aviation fuel 63%, Emissions from airport sites 75%, Aircraft greenhouse gas emissions, 84%.

7.13 Reliability Test Analysis

The data was tested for reliability, normality, correlation and to make a prediction about the population. The internal consistency of the data was measured by calculating the Cronbach's alpha coefficient on Importance of information, Social Environment, and Public Regulation. Table 7.24 below presents the reliability statistics for the above-mentioned factors.

Table 7.24: Reliability analysis for barriers to sustainable development

	Reliability Statistics		
Statement	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Related emissions	-0.353	0.321	3
Flights	-0.325	0.483	3
Fuel related	0.455	0.311	4

One “of the most normally used indicators of internal consistency is Cronbach alpha coefficient values, ideally, the co-efficient of a scale should be above 0.7. However, these values are sensitive to the number of items in the scale”.

Pallant 2007, “with short scales (e.g. scales with fewer than 10 items) it is common to experience fairly low Cronbach value (e.g. less than .5), in this circumstance, it might be imperative to report the mean inter-item correlation for the items, (Briggs and Cheek, 1986), recommended an optimal range for the inter-item correlation of 0.2 - 0.4”.

Table 7.24 above presents the result scale factors that support sustainable development. The Cronbach's alpha was low at -0.353 for the first factor, which is not a good value, implying that internal consistency to be determined using the column of corrected Item-Total correlation means. In this column, we have values that were below the range of 0.2-0.4. This was not unexpected given the wide scope of the themes. Factor analysis results were used to determine sub-themes within each theme. The items that were less than 0.2 were removed.

The results were negative for the second factor as well (flights) because it was not possible to obtain internal consistency between the statements from respondents. This indicates that the statements needed to be treated as a separate strategy. The third factor was not a negative but was still less than the required value of at least 0.7, sitting at 0.445. This simply means that it was not possible to combine strategies into single strategy or smaller strategies to get reliable results. This, however, was not cause for concern.

7.14 Normality test

To test that the data followed a normal distribution (Razali&Wah, 2011) and to clarify that the sample was taken from a population that followed a normal distribution, a normality test was conducted on internal decision making, wider impact and national and local government.

7.14.1 Normality Test on the Purpose of Sustainable Development

The Kolmogorov-Smirnov test results states that each of the p-values presented should be higher than 0.05. According to Ghasemi and Zahediasi (2012), if the p-value is higher than 0.05 then it is an indication of normal distribution, which in this case it's **Not**.

The Shapiro-Wilk test results state that all the values presented should fall between 0 and 1. The values of a normal distribution on a Shapiro-Wilk test fall between 0 and 1 (Razali&Wah, 2011). Each of the p-values presented should be higher than 0.05. According to Ghasemi and Zahediasi (2012), if the p-value is higher than 0.05 then it is an indication of normal distribution which in this case it's **Not** as values have negatives on them.

This however is not course for concern, it simply means strategies cannot be grouped together because correlations between the items were low and diagnostics from factor analysis is way too low to be presented as a group as per Correlations and KMO indicate. Factor analysis indicate that strategies will not be used as a group. It's not possible to combine strategies into smaller group of strategies, this will I also imply with reliability because you not getting internal consistencies between the statements and that indicate that the statements need to be treated as a separate strategy. This simply means that it's not possible to combine strategies into single strategy or smaller strategies.

CHAPTER 8

CONCLUSIONS AND RECOMMENDATIONS

8.1 Introduction

This chapter discusses the conclusions and recommendations of the study in relation to the research objectives. The aim of this research was to develop indicators of sustainable development in South African airline industry and consequently minimise the negative impact on the environment. The research objectives were as follows:

- To establish a civil aviation sustainable development model;
- To provide a definition of sustainable development in the airline industry;
- To recommend a set of sustainable development indicators in civil aviation.

8.2 Research Objective 1

- To establish a civil aviation sustainable development model

To achieve this objective, a critical appraisal was conducted of previous studies on sustainable development within South African airline industry as well as the international airline industry. It emerged that although various studies have been conducted on sustainability within the airline sector over the past two decades, few have focused on indicators especially, in the context of South Africa. In light of this, the present study bridged this gap by conceptualising sustainability factors that can improve environmental concerns in the area of aviation. The literature also revealed that indicators provide early warning of a problem before it becomes critical and helps to determine what needs to be done to solve it. The indicators of a sustainable community indicate links between the economy and the environment. According to literature, it can be concluded that developing indicators for sustainable development is critical to the South African airline industry .

8.3 Research Objective 2

- To provide a definition of sustainable development in the airline industry

Based on exploratory factor analysis, it was demonstrated that the respondents' ranking of relevant factors that support sustainable development in aviation were as follows: Aircraft fuel efficiency was ranked first with a mean score of 5.99 and standard deviation of (SD) 0.611, second was civil aviation contribution to poverty reduction with a mean score of 5.80 and SD of 0.663, third was Land use for airport construction with a mean score of 4.88 and SD of 0.713, fourth was Number of flights with a mean score of 4.76 and SD of 0.675, fifth was Aircraft noise with a mean score of 3.41 and SD of 0.78. The sixth factor was Emissions from surface transport to airports with a mean score of 3.96 and SD of 0.561, the seventh issue was Local air pollution from airports with a mean score of 3.77 and SD of 0.619, the eighth factor was Use of aviation fuel with a mean score of 3.48 and SD of 0.712, on the ninth ranking is Emissions from airport sites with a mean score of 3.45 and SD 0.666 and lastly, ranked tenth, is Aircraft greenhouse gas emissions with a mean score of 3.30 and SD of 0.59 .

The Kolmogorov-Smirnov test results on sustainable development advantages were as follows; internal decision making 0.670, positive wider impact 0.632, national and local government support 0.993. The Shapiro-Wilk test results indicated the following benefits: decision making benefits 0.994, wider impact 0.652, government support 0.9994. According to the literature, it was concluded that introducing robust key indicators would benefit the airline industry.

8.4 Research Objective 3

- To recommend a set of sustainable development indicators in civil aviation.

As per the frequency and factor analysis, respondents ranked the purpose of sustainable development indicators for South African airlines. The results show that the Effect of programmes for change was ranked first with a mean score of 4.19 and SD of 0.713, second was to Inform the decisions of airline and airport managers with a mean score of 3.98 and SD of 0.6363, third was Informing the decisions of air transport consumer-freight users and passengers with a mean score of 3.93 and SD of 0.652, fourth was to Inform the decisions of local government policymakers with a mean score of 3.80 and SD of 0.683,

fifth was to Provide public information with a mean score of 3.80 and SD of 0.719, sixth was to Inform the decisions of national government policymakers with a mean score of 3.79 and SD of 0.706, seventh was Environmental aspects with a mean score of 3.53 and SD of 0.656, eighth was Social and economic aspects with a mean score of 3.46 and SD of 0.594, ninth was Public participation with a mean score of 3.45 and SD 0.884 and lastly, ranked tenth, was regulatory arrangements with a mean score of 3.33 and SD of 0.632 .

In conclusion, if sustainable development indicators (SDI) are of value if effectively managed and if critical tasks are assigned to the right staff through an internet or a computer-aided application (van Berg, 2012).

8.5 Recommendations

It is recommended that sustainable development indicators be formulated to address the concerns regarding future operational capacity. Environmental governance supports sustainability as the key consideration in the management of all human, political, social and economic activities.

8.6 Recommendations for Future Research

Some participants failed to complete the questionnaire or participate in the interview despite previously agreeing to help. Moreover, only staff at OR Tambo were interviewed. Thus the scope of future studies could be broadened to include other airports to obtain a deeper understanding of sustainability indicators.

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10. APPENDIXES

Study Questionnaire

An Assessment of Measuring Key Indicators of Sustainable Development in South African Airline Industry



Dear Sir / Madam,

I, Sabina Valentina De Gove am undertaking a research project that aims at developing indicators of sustainable development in the South African airline industry, with the general aim to explore relationships between sustainable development principles and civil aviation. I will first give a brief description of the term 'sustainable development'.

Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs

I therefore, kindly request that you complete the following short questionnaire as comprehensively as possible. The survey consists of 10 questions and should take no longer than 20 minutes to complete. Please read each question carefully and tick a relevant box to indicate your answer. The information collected in this project is strictly confidential and the identity of participants will be protected. Hence, **DO NOT** write your surname and name on this form.

I thank you so much in advance for your time and cooperation in this matter. Should you require more information on the project do not hesitate to contact me telephonically at 0633410921 or e-mail me at sabinavalentina@hotmail.com.

Yours sincerely,

Sabina Valentina De Gove

Please answer the following questions by crossing (X) the relevant block or writing down your answer in the space provided.

EXAMPLE of how to complete this questionnaire:

Please indicate your gender.

If you are female:

Male	1
Female	2

SECTION A: Background information

This section of the questionnaire refers to background or biographical information. Although we are aware of the sensitivity of the questions in this section, the information will allow us to compare groups of respondents. Once again, we assure you that your response will remain anonymous. Your co-operation is appreciated.

1. Sector “department represented by your organisation

Airline	1
Production “ Manufacturing “ Operations	2
Human Resources “ Training “ University	3
Logistics” Distribution “ Procurement	4
Engineering “ Technical “ Maintenance	5
Marketing “ Sales	6
Banking and insurance	7
CEO”General Management	8
Finance “ Administration	9
Human health and social work	10
Information Technology	11
Governmental Organisation	12
Other (Please specify)	13

2. Please indicate the number of years of practical experience “involvement you have with the aviation industry

None	1
<2 years	2
2 – 5 years	3

>5 years	4
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3. In which age group are you

20-25	1
26-35	2
36-45	3
46-55	4
56-65	5
66-75+	6

4. Gender

Male	1
Female	2

5. Please specify which of the following is the highest educational or professional qualification you have obtained (if still studying, select the highest qualification received so far).

National diploma	1
Bachelor's degree	2
Honours degree	3
Master's degree	4
PhD degree	5
Other (please specify)	6

SECTION B: Purpose

This section explores the purpose of sustainable development indicator for civil aviation. Kindly indicate how strongly you agree or disagree that sustainable development for airline industry should be designed.

	Purpose	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
P1	Inform the decisions of national Government policy makers	1	2	3	4	5
P2	Inform the decisions of local Government policy makers	1	2	3	4	5
P3	Inform the decisions of airline and airport managers	1	2	3	4	5
P4	Inform the decisions of air transport consumers-freight users and passengers	1	2	3	4	5
P5	Provide public information	1	2	3	4	5
P6	Social and economic aspects	1	2	3	4	5
P7	Environmental aspects	1	2	3	4	5
P8	Public participation	1	2	3	4	5
P9	Regulatory arrangements	1	2	3	4	5
P10	Effect of programmes for change	1	2	3	4	5

SECTION C: Main Barriers

The following are assumed to be the barriers to the introduction of sustainability approaches in the airline industry. Kindly indicate how strongly you agree or disagree with each statement.

	Barriers	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
MB1	Leadership and management issues-lack of management commitment	1	2	3	4	5
MB2	Lack of awareness to sustainability issues	1	2	3	4	5
MB3	Organisation culture	1	2	3	4	5
MB4	Lack of implementation framework for sustainability systems	1	2	3	4	5
MB5	Insufficient technology	1	2	3	4	5
MB6	Lack of skilled human resources and experienced workers in sustainability	1	2	3	4	5
MB7	Lack of financial incentives	1	2	3	4	5
MB8	Lack of legislative framework and strict sustainability policies	1	2	3	4	5
MB9	Insufficient drivers and motivations for sustainability practices	1	2	3	4	5
MB10	Corruption and lack of transparency	1	2	3	4	5

SECTION D: Relevant Issues

The following is a list of issues that may be relevant to sustainable development of the civil aviation industry. Indicate how important each of the following points is for the sustainable development of civil aviation:

	Issue	Very Unimportant	Unimportant	Neither Important or Unimportant	Very Important	Extremely Important
IR1	Aircraft fuel efficiency	1	2	3	4	5
IR2	Civil aviation contribution to poverty reduction	1	2	3	4	5
IR3	Land use for airport construction	1	2	3	4	5
IR4	Number of flights	1	2	3	4	5
IR5	Aircraft noise	1	2	3	4	5
IR6	Emissions from surface transport to airports	1	2	3	4	5
IR7	Local air pollution from airports	1	2	3	4	5
IR8	Use of aviation fuel	1	2	3	4	5
IR9	Emissions from airport sites	1	2	3	4	5
IR10	Aircraft greenhouse gas emissions	1	2	3	4	5

SECTION

E: Policy Actions

The following is a list of possible policy actions that could be taken to support the sustainable development of aviation. Some are not the direct responsibility of the civil aviation sector, so you should give your opinion about the importance of policy.

	Policy	Very Unimportant	Unimportant	Neither Important or Unimportant	Very Important	Extremely Important
PA1	Improve fuel efficiency of new aircraft	1	2	3	4	5
PA2	Payment of full external environmental costs	1	2	3	4	5
PA3	Effective environmental legislation	1	2	3	4	5
PA4	Community participation in airport environmental decisions	1	2	3	4	5
PA5	Spreading benefits of aviation to socially deprived areas and unemployed people	1	2	3	4	5
PA6	4Development of renewable fuel for aviation	1	2	3	4	5
PA7	Environmental impact assessment for all civil aviation activities	1	2	3	4	5
PA8	Public education on sustainability of air transport	1	2	3	4	5
PA9	Limitation of greenhouse gas emissions	1	2	3	4	5
PA10	Integration of environment and development in civil aviation policy making	1	2	3	4	5

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THANK YOU