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Strategic Fleet Plan for a Sudanese Airline

Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science. (BSc Honor)

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الآيـــــة

قال تعالى :

(اللَّهُ نُورُ السَّمَوَاتِ وَالْأَرْضِ مَثَلُ نُورِهِ كَمِشْكَاةٍ فِيهَا مِصْبَاحٌ الْمِصْبَاحُ فِي
زُجَاجَةٍ الزُّجَاجَةُ كَأَنَّهَا كَوْكَبٌ دُرِّيٌّ يُوقَدُ مِنْ شَجَرَةٍ مُبَارَكَةٍ
زَيْتُونَةٍ لَا شَرْقِيَّةٍ وَلَا غَرْبِيَّةٍ يَكَادُ زَيْتُهَا يُضِيءُ وَلَوْ لَمْ تَمْسَسْهُ نَارٌ نُورٌ عَلَى
نُورٍ يَهْدِي اللَّهُ لِنُورِهِ مَنْ يَشَاءُ وَيَضْرِبُ اللَّهُ الْأَمْثَالَ لِلنَّاسِ وَاللَّهُ بِكُلِّ شَيْءٍ عَلِيمٌ)

سورة النور الأية (٣٥)

Abstract

The problem of how to choose the number and size of aircraft designated airline to perform for years to come that it is a difficult process, needs a lot of knowledge and information and there is a very big risk financially and technically.

In this project Sudanese airline was taken as a case study and given a plan to buy aircrafts needed, historical information has been collected, and the future expectations were estimated based on these information, and identified the growth rate in the movement and compared that figure with the global growth rate predicted by the big companies, also identified the market share of the company placed on the study. From aircrafts statistics found that the Narrow Body Aircrafts, both B737 and A320 is the right aircraft for the lines and in line with the global development, and tested in the lines chosen by the company has been selected A320-200 as well as for the Turboprop aircrafts for domestic flights the Q400 was chosen.

The traditional planning became inadequate and needed to be accompanied by a strategic planning that depends on the ability of planners to deal with the variables. In the end it’s recommended that people to learn the method of strategic planning for the future, and for those who come after to exploit the subject in the best way possible.

التجريد

ان كيفية اختيار عدد وحجم الطائرات لشركة طيران للعمل لسنين عديدة تمثل عملية صعبة، وتحتاج الى علم ومعلومات حيث تشكل مخاطرة مالية وفنية كبيرة جداً.

في هذا المشروع تم اختيار شركة طيران سودانية ووضع خطة لشراء الطائرات التي تحتاج لها، تم جمع المعلومات التاريخية وتم عمل التوقعات المستقبلية على اساس هذه المعلومات وتحديد نسبة النمو في الحركة وتمت مقارنة تلك النسبة مع نسبة النمو العالمي التي توقعتها الشركات الكبري، و تم تحديد نسبة الشركة الموضوعة على الدراسة من السوق. ومن احصائيات الطائرات وجد ان الطائرات Narrow Body Aircrafts بنوعيها B737 و A320 هي الطائرة المناسبة للخطوط ومتماشية مع التطور العالمي، وجربت في الخطوط التي اختارتها الشركة وتم اختيار A320-200 وكذلك بالنسبة للطائرات Turboprop للسفريات الداخلية تم اختيار Q400.

صار التخطيط التقليدي غير كافي ومن اللازم ان يصحبه تخطيط استراتيجي يعتمد على مقدرة المخططين على التعامل مع المتغيرات، لذا توصي الدراسة بتعلم اسلوب التخطيط الاستراتيجي في المستقبل ولمن يأتي بأن يستغل الموضوع بأفضل طريقة ممكنة.

Acknowledgement

Verily all praise is for Allah, we praise him, seek his help and guidance.

We are deeply grateful to many. To our supervisor Associated professor. Elfatih Mekki Marouf for his guidance and support all through this year.

To our parents and family, whose support is abundant, and whose love is nourishing.

Our colleagues, we express appreciation for creativity, discipline, competence and friendship.

Dedication

This research is dedicated to our fathers & mothers who taught us that the best kind of knowledge to have is that which is learned for its own sake.

To our brothers & sisters for their endless support.

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Glossary

Code	Meaning
AAG	Annual Average Growth
ACMI	Aircraft,Crew,Maintenance,Insurens
AUH	Abu Dhabi
CAA	Civil Aviation Authority
CAI	Cairo
DXB	Dubai
EGN	Geneina
ELF	EL Fasher
GDP	Growth Domestic Product
IATA	International Air Transport Agency
IMF	International Monetary Found
ICAO	International Civil Aviation Authority
JED	Jeddah
JUB	Juba
MDGs	Millennium Development Goals
PZU	Port Sudan
RUH	Riyadh
SHJ	Sharjah
UYL	Nyala

1. Chapter One: Introduction

1.1 Overview

Fleet is the total number of aircraft that an airline operates, as well as the specific aircraft types that comprise the total fleet. Fleet composition is critical long-term strategic decision for an airline.[1]

Fleet planning (selecting the „right" aircraft at the „right" time) is one of the most important steps in the airline planning process. Fleet planning, in simple terms, needs to answer two questions: Which aircraft are needed? And: When to acquire them? When answering the "Which"-question an airline needs to consider a number of – partly conflicting – selection criteria, including aircraft economics, technical, operational and environmental performance and cabin comfort. Another important influencing factor is fleet commonality. It describes the number of aircraft of the same type, the same aircraft family or the same manufacturer in a fleet. When answering the "When"-question the airline will take into account the development of demand for transport capacity, the age and cost of its current fleet and the availability of new, more efficient aircraft. Airline fleet planning varies from airline to airline, depending e.g. on the airline's business model and its operating characteristics.[1]

Airline planning and scheduling represents an excellent example of the application of operations research and mathematical modelling to solve complex and real problems.

Each aircraft type has different technical performance characteristics e.g. capacity to carry payload over a maximum flight distance, or "range". It affects financial position, operating costs, and especially the ability to serve specific routes.

Such factors include traffic historical statistical data, traffic forecast, economical and financial forecast for GDP growth rates, inflation rates, currency exchange rates and government policies, national and international political situations, social and ethical factors, competitors and competition laws, demographic and geographic distributions, financial and management capabilities of the proposed airline and many others parameters.

The airline business and the air travel industry in general have experienced a steady growth during the past decades. Although the airline business is more sensitive to changes, but the resilience of the air travel industry sustained all the previous economic crises and returned to its steady growth. In spite of that to enter in the airline business is a risk like any other business.[1]

planning in the past was in a traditional layout, but there is a new concept in the planning, it is of strategic planning, traditional planning does not take into account the changes in the future but strategic planning takes into account the future changes, I mean, for example, instead of buying jets you can go out, or the change in the family happens whole provides strategic planning charter planes both types of wet and dry, wet is renting the aircraft crew, maintenance and insurance, the so-called ACMI, either dry or renting a plane just chose the aircraft maintenance and often going for international airlines to dry lease because it provides a significant cost.[2]

1.2 Objective

To select the suitable mix of airplanes of different types and capacities to cover the operation plan of the airline for short, medium and long range plans.

1.3 Problem statement

The problem facing airlines is what types of aircraft are suitable for their operation and what size and how many of these. How to answer to these questions will tie the airline for many years to come.

1.4 Proposed Solution

The way of choosing the types of aircraft should be subjected to technical performance and economic aspects.

1.5 Methodology

Market research for the different routes was prepared and the share of this market expected to be carried by the airline was established and this share was transferred into seats capacities for each sector, also the business and operation plans were defined.

The performance of each type of aircraft of similar capacity on the routes to be operated was analysed.

Then the aircrafts were grouped according to capacity and performance and sector, and an economic evaluation was carried out and the aircrafts were arranged according to the best economic evaluation.

The technical evaluation was carried out with regard to similarly, maintenance, engine type, fuel consumption, field performance and environmental behaviour, avionics and mechanical systems and technology standard, and then the priorities matrix was rearranged.

Other factors were evaluated such as finance facilities and manufacturer concessions in training and sales promotions and political and trade embargo, and then the priorities matrix was rearranged.

Finally, the best possible aircraft mix and numbers and time of entry to service were selected.

1.6 Thesis Outline

The project consists of five chapters:

Chapter one: is an introductory to this project.

Chapter two: is concerned with a brief introduction to fleet planning and shows historical air traffic data and traffic forecasting.

Chapter three: it contains the aircraft selection based on the business plan and the financial analysis.

Chapter four: is discussing the results obtained in chapter three.

Chapter five: is presenting the conclusion drown from this project and the recommendation for similar future projects.

2. Chapter Two: Literature Review

2.1 History and Background

2.1.1 Fleet Planning

The planning of a fleet of aircraft for an airline is really no different from any other planning activity. It is fraught with complexity, dilemmas and uncertainty. Building a successful fleet plan requires a blend of engineering and commercial know-how, the ability to predict the future, a good deal of intuition, plus a lot of luck.[1].

Fleet planning is the process by which an airline acquires and manages appropriate aircraft capacity in order to serve anticipated markets over a variety of defined periods of time with a view to maximizing corporate wealth. However, a leasing company may well adopt the following attitude; the acquisition of a fleet of aircraft is a means to provide a portfolio of opportunity to profitably rent to organizations requiring flexible solutions to their aircraft capacity needs.

There are three basic attributes to make a good fleet plan:

1. Adaptability

Success in an airline can be measured in many ways, profitability being the most obvious. To achieve a result, the business has to manage both its supply and it demand. Supply decisions ought to be driven by the need to meet objectives and goals, yet circumstances often conspire against the supply conditions that an airline would ideally prefer.

The other side of the equation is equally difficult to control. Target demand is one part of the total air travel demand it has elected or is authorized to satisfy.an airline may not be able to capture all of the target demand, especially if it is in competition with other airlines and sometimes other modes of travel.

2. Flexibility

Flexibility has become the watchword in airline fleet planning. Here are faced once more with resolving the dilemma of matching a physically inflexible aircraft with markets experiencing constant change.

We have already discussed that long-haul aircraft, because they tend to be large and with twin-aisle tend to offer a greater degree of flexibility than small single-aisle aircraft that serve local or regional markets.

3. Continuity

As time marches on, we want to be sure that incremental changes to the amount of capacity in a fleet can be made with minimal disruption to the operation.

Is the product line coherent?

Product coherence can be considered in two ways:

Firstly, we need to judge the degree to which each member of a product line acts as a point reference for the airline. For a supplier to break the monopoly of an aircraft or engine type in an airline is extremely challenging. We can easily expect different philosophies in design and maintenance and different approaches to customer service and management in general.

A second aspect of product coherence concerns the composition of the product line itself. Airframe and engine suppliers have striven to build broad product ranges so that plenty of choice is on offer.

Interaction between schedule and fleet

There is a distinct difference between the allocation of demand onto a network and the optimization of the use of the fleet. Demand allocation is the process of simulating how potential demand gravitates to a set of aircraft capacities and frequencies represented by the schedule, and fleet optimization is concerned with the best assignment of a given fleet to that schedule. Indeed, the schedule is the keystone of an airline's success. [1]

2.1.2 The Sudan Economy

The International Monetary Fund (IMF) report for the year 2010, quote:" Sudan is endowed with rich natural resources, including oil, and has the potential to become a major agricultural producer. And yet it is one of the least developed countries in the world". "Prior to the global financial crisis, the Sudanese economy has been one of the fastest growing in the world in spite of the sanctions." unquote.

The Millennium Development Goals (MDGs) of the UN in their 2010 report described the opportunities in Sudan as its vast areas of agricultural land, extensive water resources and the

River Nile, wealth of livestock of all kinds, mineral and underground resources including oil and gold. The Comprehensive Peace Agreement (CPA) with the South of Sudan and other regional factions at that time.[3]

The real GDP growth rates recorded for the period 2001 to 2007 range between 5.1% and 11.3% (Table 1) due to the revenue generated from oil export. These rates are among the highest recorded rates in the world in spite of the sanctions imposed on the Country since 1996. The first impact on the accelerated economic growth came during the global financial crisis of 2008. The oil prices deteriorated severely affecting the Sudan oil revenue resulting in slowed GDP growth rates of 3.2% to 4.5% for the years 2008 to 2010.

The second impact on the accelerated economic growth came in the aftermath of South Sudan secession on July 9, 2011 according to the CPA signed in January 5, 2005. With the secession 75% of the oil revenues went to the South Sudan. The reported nonoil GDP growth rate for 2011 was 3.4%.[4]

2.1.3 Sudan Historical Passengers Air Traffic 2000 TO 2012

The Sudan Civil Aviation Authority statistics for domestic and international passenger's traffic showed step-up growth during the past two decades. Table (1.1) recorded the passenger's traffic data from the year 2000 to 2012.

Table 1: Relationship of GDP & Traffic

YEARS (1999 BASE)	GDP%	DOMESTIC		INTERNATIONAL		TOTAL	
		Passengers Number	%	Passengers Numbers	%	Passengers Numbers	%
2000	6.8	269,01O	5.3	746895	9.2	1,015,905	8.2
2001	6.2	279,217	3.8	814,146	9.0	1,093,363	7.2
2002	5.4	322,426	15.5	882,364	8.4	1,204,790	10.2
2003	7.1	334,908	3.7	957032	8.5	1,291,940	7.2
2004	5.1	329,238	-1.7	1,004,823	5.0	1,334,061	3.3
2005	6.3	348,992	6.0	1,115,354	11.0	1,464,346	9.8
2006	11.3	502,165	14.0	1124451	11.9	1,626,616	11.1
2007	10.2	686,964	36.8	1,282,331	14.0	1,969,295	21.1
2008	3.2	3672,193	-2.1	1,345,655	4.9	2,017,848	2.5
2009	3.0	726,804	8.1	1,543,529	14.7	2,270,333	12.5
2010	4.5	682972	-6.0	1,745,784	13.1	2,428,756	7.0
2011	3.9	711,485	4.0	1,884,562	7.9	2,506,047	3.2
2012	7.3	782634	10.0	2,110,709	12	2,893,343	15.5

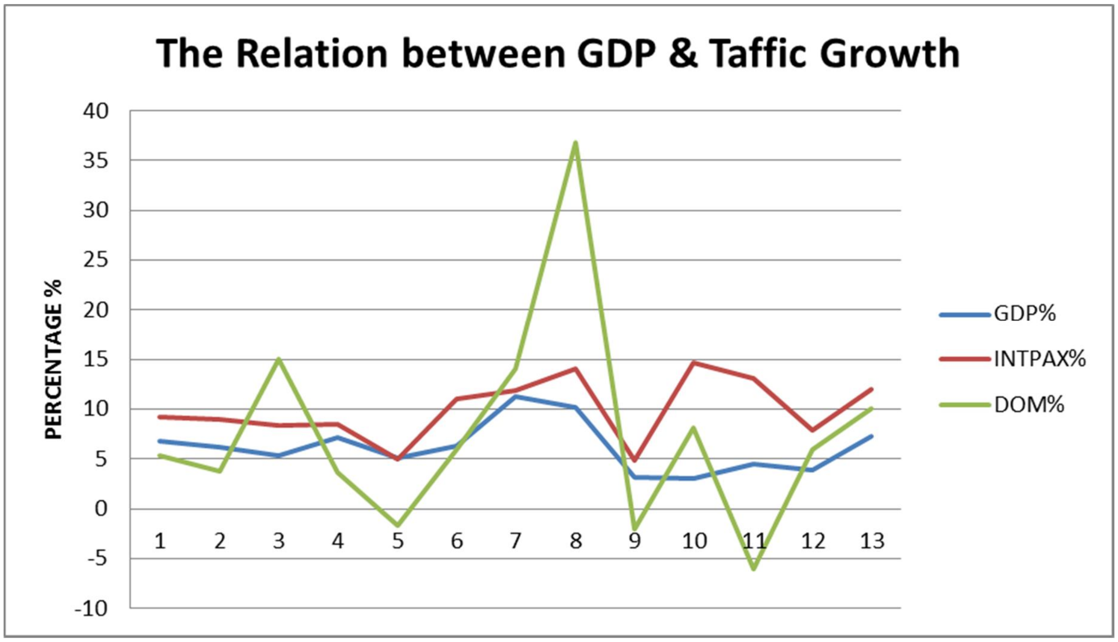

Figure 1: Relationship of GDP & Traffic

Table (1) and Figure (1) above showed the relationship between the yearly traffic growth rates and the corresponding GDP rates. The high GDP rates due to the oil revenue in the years 2005, 2006 and 2007 (6.3, 11.3 and 10.2), corresponding to domestic traffic rates (6, 14 and 36.8) were dropped sharply due to the global financial crisis of the year 2008 (3.2), corresponding to drop in the domestic rate of (-2.1). The international traffic rates of the same period (11, 11.9 and 14) also dropped to (4.9). Before the national economy fully recovered from the recession of 2008 came the effect of the secession of the South of Sudan in 2011. The international traffic recovered quickly from the drop in the GDP in the after math of the secession while the domestic traffic recovery is slow. In spite of these yearly rates fluctuations and the drop in the GDP, the average annual growth (AAG) rate in the passenger's traffic has a positive trend. The domestic passenger traffic increased from (269,010) in 2000 to (782,634) in 2012 representing an (AAG) rate of 16.9%. Similarly the international passenger traffic in 2000 was (746,895) increased to (2,110,709) in 2012 recording an (AAG) rate of 15.4%.

2.1.3.1 The Sudan Historical Freight Traffic 2000 to 2012

The CAA statistics shown in the Table (2) and Figure (2) for the period 2000 to 2012 showed a reduction trend in the international and the domestic freight traffic. The highest figure reached for the domestic freight was 123,470 tons in 2005 going down to 19,980 tons in 2012. This constitutes an annual average reduction rate of 12% of the 2005 base. The CAA

2012 report stated an increase of 18% of the total international and domestic freight in 2012 over the 2011 traffic. The imported goods in 2012 are more than the exported goods. This is an inverted situation in a country with huge natural resources highly needed by the neighbouring countries.

Table 2: Freight Statistics

Year	Domestic		International		Total	
	Tons	Variance %	Tons	Variance %	Tons	Variance%
2000	75,773	-0.3	45,369	+2.0	121,1422	+0.6
2001	119,568	+57.8	45,545	+0.4	165,113	+36.3
2002	124,581	+4.2	45,545	0	168,318	+1.9
2003	90,050	-27.7	36,406	-20.1	126,456	-24.9
2004	113,188	+25.7	49,323	+35.5	162,511	+28.5
2005	123,470	+9.1	52,915	+7.3	176,386	+8.5
2006	77,377	-37.3	78,085	+47.6	155462	-11.9
2007	35,681	-53.9	49,690	-36.4	85,371	-45.1
2008	48,293	+35.3	38,903	-21.7	87,196	+2.1
2009	20,866	-56,8	27,749	-28.7	48,615	-44.2
2010	16000	-2.3	30,000	+8.1	46,000	-5.4
2011	18,403	+15	32,266	+7.6	50,669	+10.1
2012	20,059	+9.0	39,731	+2.3	59,790	+18

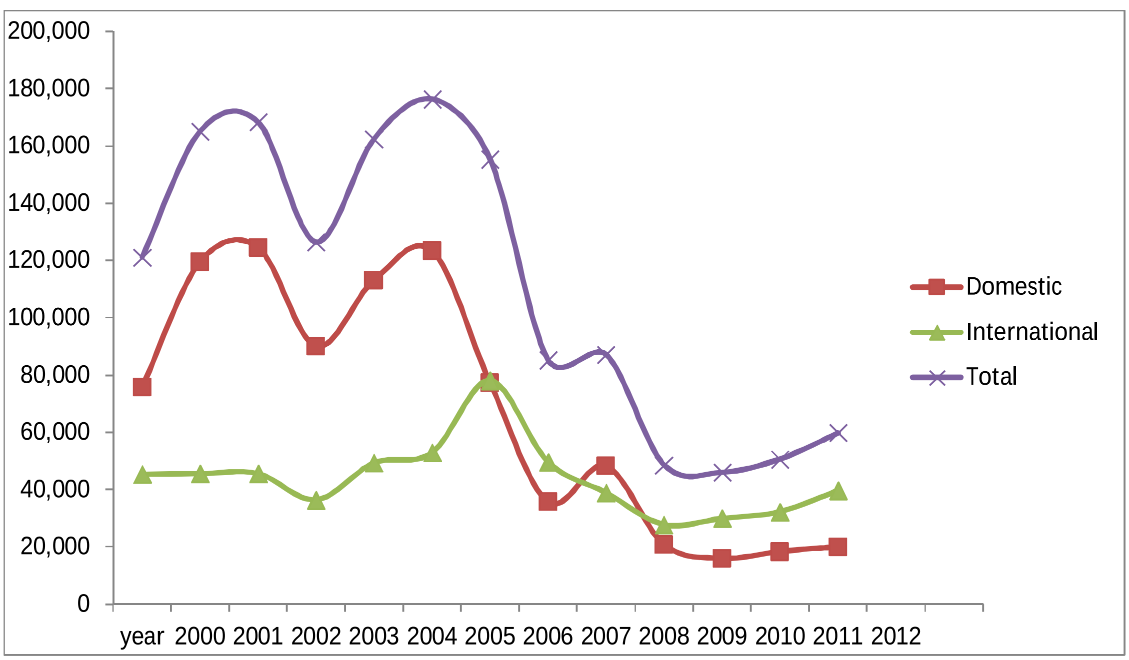

Figure 2: Freight Statistics

2.1.4 The International Forecast for Air Travel

All the forecasts made by Boeing, Airbus, Flight Global, the IATA (International Air Transport Association) and others agreed that the resilience of the industry will ensure the continuation of the 5% growth rate experienced by the industry since 1980 for the period 2013 to 2032 based on an international 3.2% GDP growth rate. They estimated about 35,450 new jet and turboprop aircraft will be delivered for passengers and freight during the coming 20 years. Also about 1,720 of the present passenger aircraft will be modified as freighters while 14,650 passengers' jets and 1,580 turboprop aircraft will be retired from service. All the forecasts expected that about 70% of the future new aircraft by the year 2032 will be from the narrow body airplanes. The effect of the stringent environmental requirement and cost of fuel will redirect the industry towards retrofit of new technology more efficient engines to the basic present narrow body aircraft, mainly the B737 (MAX) and A320 (neo) series. [5]

Figure 3: Airbus Forecast for Air Travel

The forecasts established a strong relationship between the traffic and the GDP growth rates. The Boeing (CMO) estimated for Africa 4.4% annual economic growth rate in GDP by the year 2032; and that Africa will buy 1,170 new airplanes (3.0% of the total new airplanes). The CMO estimated for the Middle East region by 2032 a 3.8% annual GDP growth rate and 2,610 new airplanes (7.4% of the total new airplanes).

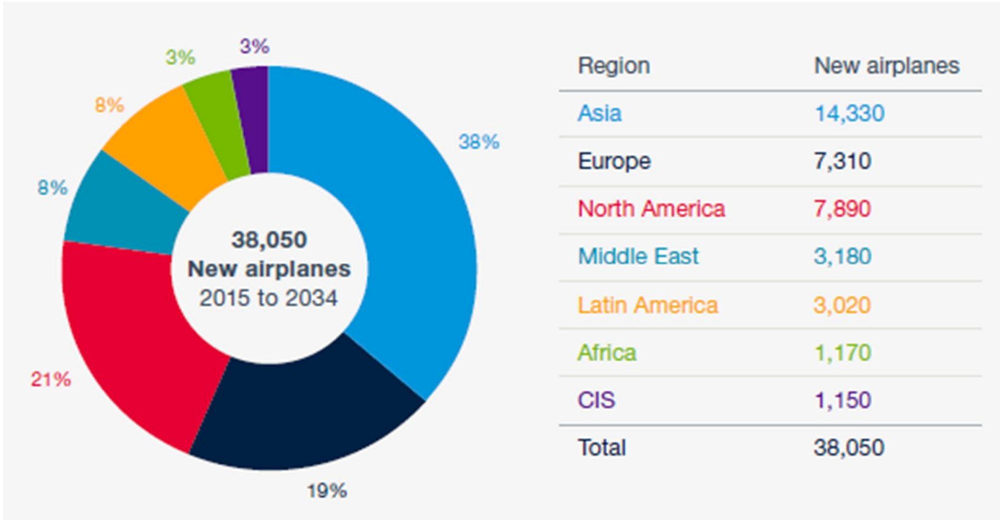

Figure 4: Boeing Forecast for Air Travel

Table 3: Forecast for Air Travel

	New Aircraft	**Single-aisle**			**Twin-aisle**		**Freighter**	
Airbus	NO		NO	%	NO	%	NO	%
	33,070		23,530	71	8,060	24	645	1.9
Boeing	38,050		26,730	70	4,770	13	920	2.42
Flight global	40,955		25,354	62	7,506	18	1,540	2

2.1.5 Sudan Traffic Forecast

As it is known, the traffic growth rates are closely related to the GDP growth rates. The graph with Table (1) above shows that this closely true. In 2008 the GDP dropped from 10.2% of 2007 to 3.2%, while the domestic dropped from 36.8% to -2.1% and the international to 21.1% to +2.5%.The high rates of the GDP before the year 2008 were higher than the international and regional rates and so were the traffic rates. When the GDP rates slowed in the later years they remained within the international figures, but the traffic growth rates were higher than the international and regional figures as shown by the annual average growth (AAG) rates for domestic and international passengers' traffic. The Sudan international AAG rate is almost twice the (6.8%) growth rate estimated by the IATA for the Middle East and 2.5 times the (5.6%) for Africa.[6]

The high AAG rates are indications that the Sudan traffic in general is far below the equalization level on which the real growth rates are to be measured. This means the potential demand is hibernating and needs to be awaked. This demand once stirred will require high capacities. For the new airline proposed, it is important to quantify the traffic to make the Business Plan. The demand will be quantified by forecast of the domestic and the international passengers' traffic based on this assumption of the hibernated demand and the AAG rates.

The forecast method used is a mix of the Time Series and the Judgemental methods. The new proposed airline Business Plan will be made for five years starting from the year 2016 to 2021.

2.1.5.1 Domestic Passengers Forecast

The AAG rate calculated above for the domestic passengers is 16.9%., but for the purpose of this study we assume a sustainable AAG rate of 10.0 % for the forecast of the domestic traffic. Based on this assumption and using the Time Series forecast method for the period 2016 to 2035, the total domestic traffic can be calculated as in Table (4)

Table 4: Domestic Passengers 2016-2035

YEAR	NUMBER OF PASSENGERS
2016	1,145,855
2017	1,260,441
2018	1,386,485
2019	1,525,133.5
2020	1,677,646.85
2021	1,845,411.535
2022	2,029,952.689
2023	2,232,947.957
2024	2,456,242.753
2025	2,701,867.028
2026	2,972,053.731
2027	3,269,259.104
2028	3,596,185.015
2029	3,955,803.516
2030	4,351,383.868
2031	4,786,522.255
2032	5,265,174.48
2033	5,791,691.928
2034	6,370,861.121
2035	7,007,947.233

The assumed AAG rate of 10.0% for the domestic travel forecast instead of the calculated 16.9% AAG rate from the historical trend of AAG rate 16.6% is adopted to minimize the risk of investment in the new company. The domestic demand is easy to satisfy by using the spare capacity of the aircraft used in international flights. This is normally achieved managing the available capacity through better management.

2.1.5.2 International Passengers Forecast

The international passengers' traffic AAG rate calculated above is 15.4%. It was also noticed that, in general the international annual growth rates are less affected by the slowed GDP compared to the domestic traffic. The sharp drop in the international during the 2008 global financial crisis is logical, but the quick recovery enhanced the above assumption of the hibernated demand.

As it is known the international traffic is sensitive to the global economic and political changes, it is important to minimise the risk in investment. As the bulk of the traffic is to Middle East region and to minimise the risk, it is decided to adopt the AAG rate of 6.8% estimated by IATA for Middle East countries instead of the calculated 15.4%.

Based on this 6.8% AAG rate and using the forecast methods above, the total international and regional passengers' traffic for the period 2016 to 2021is shown in Table (5).

Table 5: International and Regional Passengers Traffic 2016-2035

YEAR	TOTAL	SAUDI ARABIA	GULF	EGYPT
2016	2,746,081	700,027	614,514	551905
2017	2,932,815	741,629	656,301	589,435
2018	3,132,246	798,468	700,929	629,517
2019	3,345,238	852,763	748,592	672,324
2020	3,572,714	910,751	799,496	718,042
2021	3,815,659	972,682	853,862	766,869
2022	4,075,124	1,038,825	911,924	819,016
2023	4,352,232	1,109,465	973,935	874,709
2024	4,648,184	1,184,909	1,040,163	934,189
2025	4,964,261	1,265,482	1,110,894	997,714
2026	5,301,831	1,351,535	1,186,435.274	1,065,558
2027	5,662,355	1,443,440	1,267,112.873	1,138,016
2028	6,047,395	1,541,594	1,353,276.548	1,215,402
2029	6,458,618	1,646,422	1,445,299.353	1,298,049
2030	6,897,804	1,758,379	1,543,579.709	1,386,316
2031	7,366,855	1,877,949	1,648,543.129	1,480,586
2032	7,867,801	2,005,649	1,760,644.062	1,581,266
2033	8,402,812	2,142,033	1,880,367.858	1,688,792
2034	8,974,203	2,287,692	2,008,232.873	1,803,630
2035	9,584,449	2,443,255	2,144,792.708	1,926,277

3. Chapter Three: Aircraft Selection

3.1 Business Plan

Business plan based on a target share of the projected market. It was shown that the existing national carrier’s total share of the international passengers market was deteriorating steadily until it reached 12% in the year 2012.

Before the Open Sky policy and under the International Civil Aviation Organization (ICAO) bilateral Air Service Agreements, the national carriers were guaranteed 50% share of the international market and 100% of the domestic market.

The Open Sky policy will impose on the new airline high pressure to fill the gap left by the other national carriers in the regional and international air travel. Hence the Business Plan (BP) of the new airline should be based on the target to fill the gap of the 50% of the national share in the international market.[7]

The Business Plan (BP) normally covers the short, medium and long terms of the airline strategic plan. In this study we shall consider the short term plan for 5 years from 2014 to 2018. In this short term, the new airline should target an aggregate between 20% and 30% of the projected traffic in the international, regional and domestic passengers market according to each region. The 3 main regional markets targeted are Saudi Arabia, Gulf and Egypt.

Table (5) below showed the 20% of the total number of passengers in the international and the percentage for each of Saudi Arabia, Gulf and Egypt market.

Table 6: the Market Share of the International and Regional Passengers

YEAR	TOTAL	0.25	SAUDI ARABIA	0.25	GULF	0.25	EGYPT	0.25
2016	691,020		175,006		153,628		153,628	
2017	783,061		199,716		175,232		157,379	
2018	836,309		213,190		187,148		168,081	
2019	893,178		227,687		213,465		179,510	
2020	953,915		243,170		227,981		191,717	
2021	1,018,781		259,706		243,433		204,754	

3.2 Market Share

3.2.1 The Saudi Market

The Saudi passengers market was reported by Sudan CAA in 2012 to be 538,059 growing by 11% from the 2011 figure excluding the Hajj flights. The main airlines operating in this market are Saudi Arabian Airline and Sudan Airways Airline. The Sudan share was 20% and the Saudi share was 80%. The Saudi Airline operated wide body aircraft. The advantage of the wide body aircraft is its ability to carry more than 20 tons of freight in its belly on top of the passengers' baggage.

The Saudi market has 3 seasons, the Hajj, Ummrah and the summer holidays for the big group of Sudanese nationals working in the Kingdom. The Saudi government directed that the entire government employees are to fly the Saudi Arabia Airline. Since this is an important market, the new airline is targeting 30% of the market in the 5 years short term plan excluding the Hajj and Ummrah flights. To compete in this market it is proposed to operate daily flight to Jeddah and 3 flights per week to Riyadh by wide body aircraft during high season and narrow body in low season.

3.2.2 The Gulf Market

The reported passengers in 2012 in the UAE countries were 472,332 more than 2011 by 16%. The main airlines operating in Gulf are Emirates, Etihad, Arabia, Fly Dubai, Qatar Airways, Gulf Airways and other Emirate States Airlines. The share of Sudan was 7% and the remaining 93% went to the Gulf carriers. The advantage of the Gulf carriers is that they offer more frequencies, points beyond their base utilizing the 6th freedom, new aircraft and government ownership and support.

To compete in this market, the new airline needs to operate at least one frequency daily to Doha and a daily flight to UAE alternating between the three main destinations, Dubai, Sharjah and Abu Dhabi. During the high season will fly 3 flights per week to Muscat and during the low season we connect Muscat with Doha, Abu Dhabi, Dubai or Sharjah. Also during the low season we might join any two destinations together. The Gulf market has high potential for the Sudanese food products and returns flights cargo. This might necessitate use of wide body airplanes.

3.2.3 Egypt Market

This market has high potential, is very sensitive to the political situations between the two countries. In the past the Egyptian authorities restricted the flights to/from Sudan to two frequencies. With the Sudan Open Sky policy, Egypt Air operates 3 frequencies per day to Khartoum with connections to points beyond Cairo. The reported traffic for 2012 was 424,208 passengers representing 9% growth rate over 2011 traffic. The national carriers operating from Sudan are Sudan Airways and Marsland Air. The share of Sudan Airways in 2012 was 16%, Egypt Air 51%, and Kenya Airways, Ethiopian Airways and Eretria Air took the rest of the market through the Open Sky policy of the 5th Freedom.

The new airline should target 25% of the total market during the short term plan 2016/2021. This share is planned to be achieved through daily flights Khartoum/Cairo/Khartoum and 2 flights per week from Port Sudan.

3.3 Airport Data

Table 7: Airports Specifications

Airports	**IATA Code**	**Runway length**	**Distance NAUTICAL MILES**	**Duration Time**
Abu Dhabi	AUH	13452 ft	1352.5	3 hrs 45 mins
Cairo	CAI	10830 ft	885.2	2 hrs, 17
Jeddah	JED	10825 ft	524.4	1 hrs, 27 mins
Riyadh	RUH	13796 ft	966.5	2 hrs, 29 mins
Sharjah	SHJ	13320 ft	1415.1	4hrs, 20 mins
PORT SUDAN	PZU	8202 ft	358.4	1 hrs and 19 min
EL Fasher	ELF	9744 ft	436.74	1 hrs 31 min
Nyala	UYL	9880 ft	491.3	١hrs 38 min
Juba	JUB	7874 ft	642.75	1 hrs 59 min
Dubai	DXB	13124 ft	1409.1	3 hrs, 22 mins
Geneina	EGN	6194 ft	600.24	1 hrs,53 mins

3.3.1 Airports data/Aircraft runway length

Table 8: length of airport/B737-800/A320-200

B737-800	**GEN**	**NYL**	**ELF**	**PZU**	**JUB**	**AUH**	**CAI**	**JED**	**RUH**	**SHJ**	**DXB**
Distance Variance	6194 ft	9880 ft	9744 ft	8202 ft	7874 ft	13452 ft	10830 ft	10825 ft	13796 ft	13320 ft	13124 ft
Take off distance at MTOW	7,874 ft	7,874 ft	7,874 ft	7,874 ft	7,874 ft	7,874 ft	7,874 ft	7,874 ft	7,874 ft	7,874 ft	7,874 ft
A320-200	GEN	NYL	ELF	PZU	JUB	AUH	CAI	JED	RUH	SHJ	DXB
Distance Variance	6194	9880	9744	8202	7874	13452 ft	10830 ft	10825 ft	13796 ft	13320 ft	13124 ft
Take off distance at MTOW	6,860 ft	6,860 ft	6,860 ft	6,860 ft	6,860 ft	6,860 ft	6,860 ft	6,860 ft	6,860 ft	6,860 ft	6,860 ft

Table 9: Airports/Q400/ATR 72-600

Q400	**GEN**	**NYL**	**ELF**	**PZU**	**JUB**	**AUH**	**CAI**	**JED**	**RUH**	**SHJ**	**DXB**
Distance Variant	6194 ft	9880 ft	9744 ft	8202 ft	7874 ft	13452 ft	10830 ft	10825 ft	13796 ft	13320 ft	13124 ft
Take off distance at MTOW	4,675 ft	4,675 ft	4,675 ft	4,675 ft	4,675 ft	4,675 ft	4,675 ft	4,675 ft	4,675 ft	4,675 ft	4,675 ft
ATR 72-600	GEN	NYL	ELF	PZU	JUB	AUH	CAI	JED	RUH	SHJ	

Distance Variant	6194	9880	9744	8202	7874	13452 ft	10830 ft	10825 ft	13796 ft	13320 ft	13124 ft
Take off distance at MTOW	4,373 ft	4,373 ft	4,373 ft	4,373 ft	4,373 ft	4,373 ft	4,373 ft	4,373 ft	4,373 ft	4,373 ft	4,373 ft

3.4 Schedule for First Year of Short Term Plan (2016)

3.4.1 International flights by jet aircraft (460 kts)

Daily KRT/JED/KRT 3X7X52 = 1092 FH/YR

2/W KRT/PZU/JED/PZU/KRT 3.25X2X52 = 328 FH/YR

3/W KRT/RUH/KRT 4.75X3X52 = 741 FH/YR

2/W KRT/DXB/DOH/KRT 8X2X52 = 832 FH/YR

2/W KRT/AUH/MCT/KRT 8X2X52 = 832 FH/YR

2/W KRT/SHJ/DOH/KRT 8X2X52 = 832 FH/YR

KRT/DOH/DXB/KRT 8X1X52 = 416 FH/YR

Daily KRT/CAI/KRT 4.3X7X52 = 1565 FH/YR

2/W KRT/PZU/CAI/PZU/KRT 5.75X2X52 = 598 FH/YR

2/ KRT/NDJ/KRT 5.5X2X52 = 572 FH/YR

2/W KRT/KAN/KRT 7X2 X52 = 728 FH/YR

3/W KRT/JUB/KRT 3.5X3X52 = 546 FH/YR

2/W KRT/JUB/NBO/JUB/KRT 6.25X2X52 = 650 FH/YR

2/W KRT/TIP/KRT 7X2X52 = 728 FH/YR

Sub Total International (jet) = 10,460 FH/YR

3.4.2 International Flights by Turboprop (335 kts)

2/W KRT/ADD/KRT 3.7X2X52 = 356 FH/YR

2/W KRT/ASM/KR 2.7X2X52 = 281 FH/YR

Sub Total International Flights (Turboprop 335 kt) = 637 FH/YR

3.4.3 Domestic Flights by Jet Aircraft

KRT/EBD/UYL/EBD/KRT	3.25X1X52 = 169 FH/YR
KRT/UYL/ELF/KRT	3.75X1X52 = 195 FH/YR
KRT/UYL/EGN/KRT	3.5X1X52 = 182 FH/YR
KRT/ELF/EGN/KRT	3.5X1X52 = 182 FH/YR

Sub Total Domestic (jet) = 728 FH/YR

Total (jet) International + Domestic = 11,188 FH/YR

3.4.4 Domestic Flights by Q400 Aircraft Speed 335 kts)

3/W KRT/PZU/KRT	2.6X3X52 = 406 FH/YR
3/W KRT/DOG/KRT	2X3X52 = 312 FH/YR
2/W KRT/DOG/PZU/KRT	3.78X2X52 = 393 FH/YR
3/W KRT/KDX/KRT	2.37X3X52 = 370 FH/YR
2/ W KRT/RSS/KRT	2.0X2X52 = 208 FH/YR
2/W KRT/EBD/KRT	1.7x2x52 = 177 FH/YR
2/W KRT/KSL/KRT	1.8x2x52 = 187 FR/YR
KRT/ELF/EGN/KRT	5.08X1X52 = 264 FH/YR
3/W KRT/EGN/KRT	4.07X3X52 = 635 FH/YR
3/W KRT/UYL/KRT	3.43X3X52 = 535 FH/YR
KRT/UYL/ELF/KRT	3.82X1X52 = 199 FH/YR
KRT/UYL/EGN/KRT	4.5X1X52 = 234 FH/YR
2/W KRT/ELF/KRT	3.1X2X52 = 322 FH/YR

Sub Total Domestic Flights Turboprop (335 kts) = 4,242 FH/YR

Grand Total Jet Flights = 10,442 FH/YR

Grand Total Turboprop Flights (335 kts) = 4,242 FH/YR

3.5 Aircraft Selection

Aircraft selection is based on many factors such as aircraft performance on the selected routes, airports characteristic, and market demand and operations economics.

3.5.1 International Passengers Aircraft Size and Type

The market demand can be satisfied by aircraft size and or frequency of flights. Each of size and frequency has its cons and pros. Also competition is a driving factor on aircraft size. The traffic type (business, leisure...etc.), seasonality and passengers cargo mix are factors to be considered.

In the strategic plan it was decided to target 25% of the total market depending on the sector selected. The network schedule of the flights is based on the competitor's schedule of daily frequencies minimum. From the targeted share of the market, the frequencies of flights and load factor of 60% to 70%, it is found that the optimum aircraft size for international passengers is 150/160 seats narrow body turbo jet aircraft. The most popular aircraft in this size are the B737 and A320 families. As in the CAA 2012 statistics report 74% of the aircraft used by airlines operating in Sudan flights are the B737 and A320. It is also noted that the future aircraft forecast estimated 75% of the 35,000 new aircraft needed by 2032 will be of the same category.

3.5.2 Aircraft Specifications A320 Family/B737 Family

Table 10: Aircraft Specifications

Specification	A320-200	B 737-800
Cockpit crew	Two	Two
Seating capacity	180 (1-class, maximum) 164 (1-class, typical) 150 (2-class, typical)	189 (1-class, dense) 175 (1-class, typical) 160 (2-class, typical)
Cargo capacity	37.41 m^3 (1,321 cu ft) 7× LD3-46	1,591 ft^3 (45.1 m^3)
Length	37.57 m (123 ft 3 in)	129 ft 6 in (39.5 m)
Wingspan	(35.8 m (117 ft 5 in) with sharklets)	117 ft 5 in (35.7 m)
Wing area	122.6 m^2 (1,320 sq ft)	
Wing sweepback	25 degrees	25.02° (437 mrad)
Tail height	11.76 m (38 ft 7 in)	
Cabin width	3.70 m (12 ft 2 in)	11 ft 7 in (3.54 m)
Fuselage width	3.95 m (13 ft 0 in)	12 ft 4 in (3.76 m)
Fuselage height	4.14 m (13 ft 7 in)	13 ft 2 in (4.01 m)
Operating empty weight (OEW)	42,600 kg (93,900 lb)	91,108 lb (41,413 kg)
Maximum zero-fuel weight (MZFW)	62,500 kg (137,800 lb)	
Maximum landing weight (MLW)	66 t (146,000 lb)	146,300 lb (66,361 kg)
Maximum take-off weight (MTOW)	78 t (172,000 lb)	174,200 lb (79,010 kg)
Cruising speed	Mach 0.78 (828 km/h/511 mph at 11,000 m/36,000 ft)	Mach 0.785 (447 kn, 514 mph, 828 km/h)
Maximum speed	Mach 0.82 (871 km/h/537 mph at 11,000 m/36,000 ft)	Mach 0.82 (475 kn, 544 mph, 876 km/h)
Maximum range, fully loaded	3,100 nmi (5,700 km; 3,600 mi), 3,300 nmi (6,100 km; 3,800 mi) with sharklets	Basic: 3,060 nmi (5,665 km) WL: 3,115 nmi (5,765 km)
Take off distance at MTOW (sea level, ISA)	2,090 m (6,860 ft)	7,874 ft (2,400 m)
Maximum fuel capacity	24,210 L (5,330 imp gal 6,400 US gal) standard 30,190 L (6,640 imp gal 7,980 US gal) optional	Non-ER: 6,875 US gal (26,020 L) ER: 10,707 US gal (40,530 L)
Service ceiling	12,000 m (39,000 ft)	41,000 ft (12,500 m)
Engines (×2)	IAE V2500 series	CFM 56-7B27
Thrust (×2)	111–120 kN (25,000–27,000 lbf)	27,300 lbf (121.4 kN)

Figure 5: B737-800

Figure 6: A320-200

3.5.3 Number of Aircraft

The total block flying hours calculated for international and domestic passenger's flights schedule are 11,188 Block Hours for the first year of the 5 years short term plan. This needs 3 aircraft to operate the suggested international passengers' schedule based on an average 3,729 Block flying Hours per year giving a daily utilization over 350 days per year almost 10.7 hours/day.

3.6 Domestic Passengers Aircraft Size and Type

The majority of the domestic traffic in the last years was directed to the 3 main towns of Darfur States i.e. Nyala, Elfasher and Elgeneina. The suggested schedule follows the same traffic pattern and also connected these towns with each other. The schedule also covers most of the Northern Sudan airports.

The domestic fares are still regulated by the CAA, and are very low compared to the dollar exchange rate. It is found that using jet aircraft in domestic flights will increase the number of the proposed B737-800 which will increase the cost. This necessitates the selection of a turboprop aircraft of higher seat capacity, faster speed and good operating efficiency.

3.6.1 Turboprop Specification Q400/ATR 72-600

Table 11: Aircraft Specifications

Specification	Q400	ATR 72-600
Crew	2	2
Capacity	74	70
Length	107 ft 9 in / 32.8 m	27.17 m (89 ft 2 in)
Wingspan	93 ft 3 in / 28.4 m	27.05 m (88 ft 9 in)
Width	8 ft 10 in / 2.69 m, cabin 8 ft 3 in / 2.52 m	2.57 m (8 ft 5 in)
Wing area	689 ft² / 64 m²	61.00 m2 (656.6 sq ft)
Empty weight	41284 lb / 17819 kg	13,010 kg (28,682 lb)
Max take-off weight	65,200 lb / 29,574 kg	23,000 kg (50,706 lb)
Fuel capacity	1,724 U.S. gal	1,666 US gal
Typical payload	19,112 lb 8,670 kg	7,500 kg (16,500 lb)
Power plant	PW150A	PW127B
	5,071 shp	2,475 shp
Cruise speed	349 kts / 402 mph / 646 km/h	509 km/h; 316 mph (275 kn)
Range	1,114 NM / 1,282 SM / 2,063 km	1,528 km; 949 mi (825 nmi)
Service ceiling	25,000 ft / 7,620 m	7,620 m (25,000 ft)
Take-off Run at MTOW	4,675 ft / 1,425 m	1,333 m (4,373 ft)

Figure 7: Q400

Figure 8: ATR 72-600

3.6.2 Number of Aircrafts

The Block Hours of suggested domestic routes network are 4,242. This requires 2 Q400 aircraft each operating 2121 hours per year and a daily utilization over 350 days per year of just above 6.1 hours per day.

3.7 The New Airline Fleet

The fleet mix needed for the new airline passengers operation in the first year of the short term plan is as follows:

3 B737-800 Turbo Jet Aircraft

2 Q400 Turboprop aircraft

The number of aircraft can be increased according to the market demand.

3.8 Aircraft Acquisition

The required number of aircraft can be obtained through different finance schemes.

Outright purchase (complete ownership)

Finance Lease (lease purchase, limited ownership and the purchaser is responsible for all costs; he will be building equity gradually).

Operation Lease (no ownership)

Wet Lease (Aircraft, crew, Maintenance and Insurance [3] are the responsibility of aircraft owner – the lesser and the lessee is responsible for other costs)

Dry Lease (the lessor is responsible for the aircraft and the lessee is responsible for other costs).

According to the Sudan CAA requirement for obtaining an Air Operator Certificate (AOC), the airline has to register under its name at least 3 aircraft in the CAA aircraft Register. In this case it is recommended to acquire the 5 aircraft either through outright purchase or Finance Lease.

The price of a new B737-800 is between 27M to 30M US dollars, and the price of a new Q400 is between 27M to 30M US dollars.

Due to the embargo imposed on Sudan, it is difficult to buy or finance lease new aircraft. The option available to the new airline is to buy used aircraft of less than 10 years of age. The budgetary price for a less than 10 years old B737-800 is between 30M to 35M US dollars; and a similar Q400 is between 15M to 20M US dollars depending on the number of flying hours and cycles.

3.9 Financial Analysis

3.9.1 Cost Element B737-800

3.9.1.1 B737-800 Aircraft related Cost

Aircraft Acquisition (A)

This includes aircraft depreciation and cost of finance. Based on the budgetary aircraft price of 35 MUSD for B737-800 and 12% cost of finance and 15 years ultimate life (zero residual value), the yearly cost per aircraft will be 2,613,333 USD. The aircraft utilization per year is calculated to be 3,300 hours. The aircraft cost per hour:

(A) = 792 USD 800 USD/HR

Crew (C)

This cost includes the cockpit and cabin crew salaries, training and compensation (allowances, night stop accommodation and after service). Based on 2 sets of cockpit crew (1 captain and 1 first officer) per aircraft plus one set reserve (total 7 sets) plus 7 sets of cabin crew (total 30 persons), the cockpit crew cost (C) per flying hour:

(C) = 300 USD/H

Maintenance Cost (M)

This cost includes the routine schedule checks excluding the major checks and engines overhaul, maintenance reserve for major checks and engines overhaul. The estimated maintenance cost per flying hour (M)

(M) = 1250 USD

Insurance (I)

This cost covers the insurance against aircraft hull, hull war and third party liability. The rates for Sudan are currently high due to high risk rating and the small number of aircraft. The estimated insurance premium is based on 1% of the 125% of the aircraft value. In this case the insurance cost per flying hour (I) is estimated

(I) = 1 the total aircraft related cost referred to as ACMI (Aircraft, Crew, Maintenance and Insurance)

B737-800 ACMI = 2500 USD/H

A320 ACMI32.6 150 USD/H

In the calculation of the revenue, we estimate the load factor (the revenue seat kilometre – RSK divided by the available seats – ASK), the yield (the average tickets value of the first, economy, children and discounted fares). The revenue of cargo or excess baggage is not included as the cargo and the baggage compartments of the B737 or the Q400 are of very limited capacity in passengers' aircraft. The load factors used for the Saudi, gulf and Egypt markets is 75% and for other routes 65%

The calculated revenue is further reduced to 75% to cater for unforeseen costs and to have a safety margin of 25%.

3.9.2 Routes Related Cost

3.9.2.1 Fuel

Fuel is a major cost element for the airlines. In some cases it can reach 60% of the total cost. The aircraft burn more fuel at take-off and manoeuvre. The minimum fuel burn is in cruise. The fuel burn is also affected by weather conditions, airports and airspace congestion's. It is difficult to have a discreet figure for the fuel consumption per hour. Also the price of fuel differs from one airport to another. The average reported fuel consumption for the B737-800 is 2.4 tons per hour which is used in these calculations.

3.9.2.2 Aircraft Handling

This includes passenger and aircraft handling and security checks which differ from one airport to another airport and has then to be calculated for each airport.

3.9.2.3 Airport Charges

This also differs from one airport to another. The difference might be very big and has to be calculated for each airport.

3.9.2.4 Catering

The cost of catering depends on the number of passengers, first or economy class, the duration of the flights and the meals served (hot or cold). It also varies from one airport to another.

The domestic air travel fares are still regulated by the CAA in SDG. This is greatly affected by the official and the black market rates of dollar exchange. It is difficult to be accurate in estimating the yield. The assumptions made in calculating the domestic revenue:

The yield per passenger is 150 USD

The load factor in all sectors is 90%

No cargo or excess baggage revenue

3.9.3 Other Costs

3.9.3.1 Support staff cost

There other staffs in the airline other than the crew and maintenance personnel. They are not related to a particular aircraft or route such as the ticketing, marketing, planning, accounts and finance. It is suggested that most of the functions which can be subcontracted have to be sub contracted.

3.10 COST ELEMENTS Q400 AIRCRAFT

3.10.1 Aircraft Related Costs

As shown with the B737, the aircraft related costs are

3.10.1.1 Aircraft acquisition (A)

3.10.1.2 Crew (C)

3.10.1.3 Maintenance (M)

3.10.1.4 Insurance (I)

The ACMI is estimated at 1500 USD PER HOUR/ATR

This estimate is based on sub-contracting most of the related work.

3.10.2 Route Related costs

3.10.2.1 Fuel Cost

The fuel consumption for this aircraft is estimated to be 971 Kgs per Block Hour at a price of 21 SDG (4 USD) per gallons for domestic flights.

3.10.2.2 Handling Costs

Estimated 500 USD per Block Hour

3.10.2.3 Airports Charges

It is estimated at average 300 USD per Block Hour

3.10.2.4 Catering Cost

The meals served at domestic routes are low compared to regional route. This is estimated 10 USD per passenger.

3.10.3 Other Costs

These are estimated as in the B737 calculations to be 30% of the aircraft and route related. The management of the airline cannot be subcontracted, but may be supported by advisors. Normally such cost is referred to as overhead cost.

In calculating these other costs, it is assumed that the airline will sub contract most of the support work and keep the minimum. It is estimated that this cost will be 30% of the aircraft related and route related costs.

3.11 PROFIT AND LOSS CALCULATIONS

3.11.1Cairo Market

3.11.1.1Cost Elements (USD)

ACMI	2500X1940	=4,850,000
Fuel (3.027 USD)	3.027X1940X2.4X331.2	= 4,667,834
Handling (Cairo)	1500x408	= 612,000
Handling (Khartoum)	1200x468	= 516,600
Handling (Port Sudan)	500X104	= 52,000
Airport charges (Cairo)	250X468	= 117,000
Airport Charges (Khartoum		
And Port Sudan)	500X572	= 286,000
Catering	15X 96,772	= 1,451,580
Sub Total Cost of the Trips		= 12,553,014
Other Costs (30%)		= 3,765,904

Total sector Cost		= 16,318,918

3.11.1.2 Revenue

Yield = 300USD (KRT & PZU)	300X96, 772	= 29,031,600
Modified by 75%		= 21,773,700
Sector Contribution	21,773 – 16,318,918	= 5,454,782

3.11.2 Saudi Market

3.11.2. 1. Costs

ACMI (Jeddah & Riyadh)	2500X1898	= 4,745,000
Fuel (3.5USD)	3.5X331.2X2.4X1898	= 5,280,388
Handling (Jed)	1464X468	= 685,152
Airport Charges (JED)	1064X468	= 497,952
Handling (Riyadh)	2214X156	= 345,384
Airport Charges (Riyadh)	1055X156	= 164,560
Handling (Khartoum)	1200X468	= 561,600
Airport Charges (Khartoum)	500X468	= 234,000
Catering (16USD)	16X164, 110	= 2,625,760
Sub Total Cost of the Trip		= 15,139,796
Other Costs (30%)		= 4,541,939
Total Sector Cost		= 19,681,735

3.11.2.2 Revenue

Yield (Jeddah) =300USD	300x95, 184	=28,555,200
Yield (Port Sudan) =200USD	200x27, 899	=5,579,800
Yield (Riyadh) =400USD	400x41, 028	=16,411,200
Modified by 75%		=37,909,650

Sector contribution		=18,227,915

3.11.3 Gulf Market

3.11.3.1 Cost

ACMI (All Gulf flights)	2500X2912	= 7,280,000
Fuel (5USD)	5X2.4X331.2X2912	= 11,573,452
Handling (Abo Dhabi)	800X104	= 83,000
Handling (Sharjah)	1260X104	= 131,040
Handling (Dubai)	1500X156	= 234,000
Handling (Doha)	1500X260	= 390,000
Handling (Muscat)	1500X104	= 156000
Handling (Khartoum)	1200X364	= 546,000
Airport Charges (Gulf)	400X 1092	= 436,800
Airport Charges (Khartoum)	500X364	= 182,000
Catering	161,265X20	= 3,225,3000
Sub Total Cost		= 24,237,592
Other Costs (30%)		= 7,271,278
Total Trips Costs		= 31,508,870

3.11.3.2 Revenue

Yield = 400 USD	400X161265	= 64,506,000
Modified 75%		= 48,379,500
Sector Contribution		16,870,630

3.11.4 Contributions

Egypt Sector Contribution	= 5,454,782
Saudi Sector contribution	=18,227,915

Gulf Sector Contribution	= 16,870,630
Total International Contribution	= 40,553,327

3.11.5 DOMESTIC FLIGHTS

The domestic flights fares are varying according to the destination. The highest yield comes from the flights to Dar Fur States. For ease of calculation and based on the number of flights, will use average yield of 250 USD per passenger for all flights.

3.11.5.1 Flights with B737

Costs

ACMI	2500X728	= 1,820,000
Fuel (4 USD)	4X2.4X331.2X728	= 2,314,691
Handling	1200X13X52	= 811,200
Airport Charges	500X676	= 338,000
Catering (85% LF)	47,736X10	= 477,360
Sub Total		= 5,761,251
Other Costs 30%		= 1,728,373
Total Cost		= 7,489,626

Revenue

Yield (250 USD)	250X47,730	= 11,933,000
Modified 75%		= 8,950,000
Trips Contribution		= 1,460,374

3.11.6 Flights with Q400

3.11.6.1 Total Cost

ACMI	1500X 4242	= 6,636,000
Fuel (4 USD)	4X4242X331.2X0.971	= 5,456,823
Handling (KRT)	500X1872	= 936,000

Handling (other stations)	250X2244	= 561,000
Airport charges	4,116x300	=1,234,800
Catering (30% of total traffic)	284,100X10	= 2,841,000
Sub Total Cost		=17,665,623
Other Costs (30%)		=5,299,687
Total Cost of the Trips		=22,965,310

3.11.6.2 Revenue

Yield (250 USD)	250x284, 100	= 71,025,000
Modified 75%		= 53,268,750
Trips Contribution		= 30,303,440
Total Domestic Flights Contribution		= 31,763,814
Total International & Domestic Contribution		= 84,839,217

3.11.7 Finance Requirement for 2016

3.11.7.1 Costs

Cost of Aircraft Acquisition	
3 B737 – 800 (35 MUSD/aircraft)	= 105,000,000
2 Q400 (20 MUSD/aircraft)	= 40,000,000
Spare Parts Package (10% of Aircraft cost)	=14,500,000
Total International Cost	= 97,541,997
Total Domestic Cost	= 30,454,936
Sub Total Cost	= 287,496,933
Unforeseen Cost (10%)	= 28,749,693
Total Cost	= 316,246,626

3.11.7.2 Revenue

International Flights	= 150,617,400
Domestic Flights	= 62,218,750
Sub Total Revenue	= 212,836,150
Other Revenue 10% (Cargo)	= 21,283,615
Total Revenue	= 234,119,765

3.11.7.3 Variance

234,119,765 – 316,246,626	= -82,126,861

4. Chapter Four: Results and Discussion

4.1 Results

Table 12: Domestic Passengers Forecasting

YEAR	NUMBER OF PASSENGERS
2016	1,145,855
2017	1,260,441
2018	1,386,485
2019	1,525,133.5c
2020	1,677,646.85
2021	1,845,411.535

The assumed AAG rate of 10.0% for the domestic travel forecast instead of the calculated 16.9% AAG rate from the historical trend of AAG rate 16.6% is adopted to minimize the risk of investment in the new company. The domestic demand is easy to satisfy by using the spare capacity of the aircraft used in international flights. This is normally achieved managing the available capacity through better management. (Table 12)

Table 13: International Passengers Forecasting

YEAR	TOTAL	SAUDI ARABIA	GULF	EGYPT
2016	2,746,081	700,027	614,514	551905
2017	2,932,815	741,629	656,301	589,435
2018	3,132,246	798,468	700,929	629,517
2019	3,345,238	852,763	748,592	672,324
2020	3,572,714	910,751	799,496	718,042
2021	3,815,659	972,682	853,862	766,869

The international passengers' traffic AAG rate calculated above is 15.4%. It was also noticed that, in general the international annual growth rates are less affected by the slowed GDP compared to the domestic traffic. The sharp drop in the international during the 2008 global financial crisis is logical, but the quick recovery enhanced the above assumption of the hibernated demand.

As it is known the international traffic is sensitive to the global economic and political changes, it is important to minimise the risk in investment. As the bulk of the traffic is to

Middle East region and to minimise the risk, it is decided to adopt the AAG rate of 6.8% estimated by IATA for Middle East countries instead of the calculated 15.4%.

Based on this 6.8% AAG rate and using the forecast methods above, the total international and regional passengers' traffic for the period 2014 to 2018 is shown in Table (13).

Table 14: The Market Share

YEAR	**TOTAL**	**0.25**	**SAUDI ARABIA**	**0.25**	**GULF**	**0.25**	**EGYPT**	**0.25**
2016	691,020		175,006		153,628		153,628	
2017	783,061		199,716		175,232		157,379	
2018	836,309		213,190		187,148		168,081	
2019	893,178		227,687		213,465		179,510	
2020	953,915		243,170		227,981		191,717	
2021	1,018,781		259,706		243,433		204,754	

Before the Open Sky policy and under the International Civil Aviation Organization (ICAO) bilateral Air Service Agreements, the national carriers were guaranteed 50% share of the international market and 100% of the domestic market.

The Open Sky policy will impose on the new airline high pressure to fill the gap left by the other national carriers in the regional and international air travel. Hence the Business Plan (BP) of the new airline should be based on the target to fill the gap of the 50% of the national share in the international market.

The Business Plan (BP) normally covers the short, medium and long terms of the airline strategic plan. In this study we shall consider the short term plan for 5 years from 2016 to 2021. In this short term, the new airline should target an aggregate between 20% and 25% of the projected traffic in the international, regional and domestic passengers market according to each region. The 3 main regional markets targeted are Saudi Arabia, Gulf and Egypt.

Table (14) above showed the 25% of the total number of passengers in the international and the percentage for each of Saudi Arabia, Gulf and Egypt market.

Table 15: Aircraft Comparison

	B737-800	A320-200	Variance (%)
Fuel	2,526 kg/h	2500 kg/h	+1.034
Range	3,115 nm	3,300 nm	-5.767
Maintenance	1250	509	+84.25

The result shown in Table (15) compares between the two aircrafts, we clearly see that the A320-200 is the right choice for the airline.

The fleet mix needed for the new airline passengers operation in the first year of the short term plan is as follows:

3 A320-200 Turbo Jet Aircraft

2 Q400 Turboprop aircraft

5. Chapter Five: Conclusion and Recommendation

5.1 Conclusion

The problem of how to choose the number and size of aircraft that it is a difficult process needs a lot of knowledge and information and there is a very big risk financially and technically.

The study came up with strategic planning in short term by basic factors which are adaptability success in an airline can be measured in many ways, profitability being the most obvious.

To achieve a result, the business has to manage both its supply and it demand. Supply decisions ought to be driven by the need to meet objectives and goals, yet circumstances often conspire against the supply conditions that an airline would ideally prefer.

Flexibility has become the watchword in airline fleet planning. Here are faced once more with resolving the dilemma of matching a physically inflexible aircraft with markets experiencing constant change.

Continuity as time marches on, to be sure that incremental changes to the amount of capacity in a fleet can be made with minimal disruption to the operation.

Collected historical data for forecasting international and domestic passenger, selected best type of aircrafts, and calculated airport runway distance, then all of previous

A320-200 aircraft was chosen for international and some domestic flight, also Q400 aircraft for domestic, these aircraft selected according to performance analysis.

Finally the study take into account that any modification on aircraft must be added until it is replaced with another new type in same efficiency or better.

5.2 Recommendations

The traditional planning became inadequate and needed to be accompanied by a strategic planning that depends on the ability of planners to deal with the variables. In the end we recommend people to learn the method of strategic planning for the future, and for those who come after us to exploit the subject in the best way possible.

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