The Future for African Air Transport: Learning from Ethiopian Airlines

Nadine Meichsner[1], John F. O'Connell[1,2,*], David Warnock-Smith[3]

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Abstract

The African air transport market has been a laggard in development, remaining encircled by a plethora of problematic issues that curtailed its expansion and prosperity for decades. Regulatory restrictions, protectionism, inadequate infrastructure and prolonged loss making periods are regularly correlated with the plights of African carriers. Ethiopian Airlines is disrupting this negative manifestation and is exponentially expanding its African and international network footprint, enshrined in continuously profitability. The research quantifies that it is Africa's most successful airline through a POA analysis by aggregating a series of pertinent airline indices to derive its prominence from amongst its peers. Three key pillars were deduced that specifically correlated with Ethiopian Airlines' continued prosperity and can be used as template, which included a large intra-African network, a strong hub with multiple wave permutations for onward connecting traffic and forging a deep strategic partnership with a regional based African carrier.

1. Introduction

Africa covers more than 30 million square kilometres and is home to more than a billion people. The continent has the largest number of countries in the world (54 countries) with a considerable proportion of remote communities, indicating a natural need for air transport (Chingosho, 2009). In an aging world, Africa has the advantage of a young and growing population and will soon have the fastest urbanisation rate in the world. Half of Africa's population live on the continent's 10 richest countries (Oxford Economics, 2016). McKinsey (2016) forecasts that the region is expected to have a larger workforce than either China or India by 2034, while spending by consumers and businesses today totals $4 trillion. The World Bank (2016) is predicting that GDP in Sub-Saharan Africa will remain above 3% over the coming years citing stronger trends in goods traded including minerals and metals, rising oil prices and supportive global financing conditions. In fact 5 of the world's 10 fastest growing economies in terms of GDP are sub-Saharan countries (Trading Economics, 2016). IATA (2015a) has forecast that Africa's passenger growth will average 4.4% over the next twenty years. Euromonitor International (2014) depicted that the African sub-Sahara tourism industry is among the fastest growing in the world which is evident as the number of international arrivals doubled between 1999 and 2013 reaching 36 million by 2013 – tourism contributes around 2.6% of GDP in sub-Saharan Africa. The continent has great potential to develop into a rapidly growing air transport market. However, apart from Ethiopian Airlines, the most profitable, largest and fastest growing African airline, most carriers on the continent are struggling to survive (Bekele, 2016a). According to the wider literature, three parameters are essential for a company to be successful: understanding the operating environment; having the right business model in place; and executing the right strategy (Chandler, 1990; Kay, 1993; Seddon et al., 2003). Evaluating Ethiopian Airlines success factors were therefore crafted on these three parameters, which will form the building blocks in developing a template into how African carriers can be successful. The paper will be broken down as follows: section 2 consists of an introduction to the African market, section 3 outlines the research methodology, sections 4 and 5 present the secondary and primary data results and cluster analysis, including a Product and Organizational Architecture (POA) analysis, section 6 hones in on Ethiopian Airlines as a benchmark case analysis and section 7 concludes.

2. Understanding the African market

The African air transport market is different compared to any other air transport market in the world. Even though there is a natural need for air transport in Africa, the global passenger traffic share is only 2.3% (ATAG, 2014). Nevertheless, intra-African air travel has increased over the past decade. This has been influenced by: consolidation; building of hubs; increased frequency and seat capacity; evolution of Low Cost Carriers; together with the attraction of private investors (Njoya, 2016). Boeing's Forecast 2015-2034 for Africa predicted a high future growth rate in many aviation metrics including 5.7% gain in air traffic, 6.9% in cargo traffic and 4.5% hike in the fleet (Boeing, 2015). However the African environment is characterised by relatively weak demand, extensive government regulation, inadequate infrastructure, low aircraft utilisation, safety and security challenges, low internet penetration, low load factors, skill shortages, high airport charges, overstaffing, strong travel agencies that take high commissions together with high fuel prices, fees, taxes and corruption (Heinz and O'Connell, 2013; Button et al. 2015; Heinz and O'Connell 2018). A summary of the needs, potential and challenges of Africa's air transport market is shown in Fig. 1.

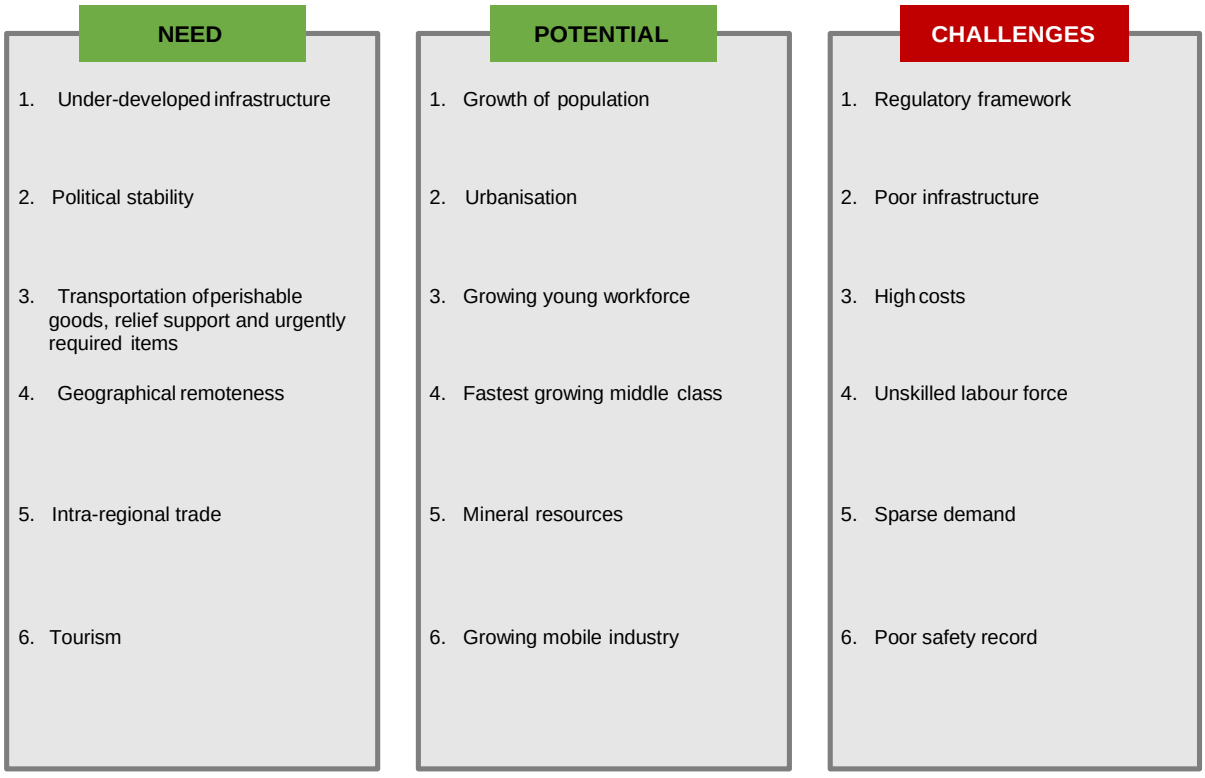

Fig. 1. Summary of need, potential and challenges in Africa (2016)

Source: Authors based on: Bofinger, 2008; Chingosho, 2009; UNECA, 2009; Deloitte, 2011; Heinz, 2011; AfDB, 2012; The Economist, 2012; Heinz and O'Connell, 2013; AfDB, 2014; AFRAA, 2014; CAPA, 2014; UNECOSOC, 2014; AfDB 2015; Boeing, 2015; Button et al. 2015; GSMA, 2015; Heinz, 2015; IATA, 2015b; InfrastructureAfrica, 2015; Internet World Stats, 2015; UN, 2015; SITA, 2015; Tyler, 2015; AfDB and McKinsey, 2016; CIA, 2016; ICA, 2016; IATA, 2016; Njoya, 2016; Heinz and O'Connell, 2018.

The development of commercial aviation in Africa is tied with the continent's historical, political and economical background. More specifically, the role played by former colonial powers such as France and the United Kingdom had a strong influence on the development of the air transport industry. At the end of the colonisation era, the close links between newly independent countries and their former colonies led to the appearance of state-owned airlines supervised by their European counterparts, such as Air Afrique or East African Airways. These carriers were essentially a political tool to reflect the national pride of new independent countries. They consequently followed strategies that reflected that desire as they were initially established on highly profitable intercontinental routes to connect their capitals with the European hubs (Peltre, 1963). This paradigm shifted in the late 1990s towards global airline alliances. Currently, just four African carriers are members the three international airline alliances (Oneworld, Star and SkyTeam) whose global aggregated sum controls over 63% of the global air traffic (Njoya, 2016; Airline Business, 2016). The African air transport market has embraced strategic partnerships through equity investment, while Amankwah-Amoah and Debrah (2011) emphasised that cooperation and collaboration are essential for African carriers due to their limited resources and weakened competitive positions. Therefore, strategic partnerships are fast evolving between non-African and African carriers as shown in Table 1. Ethiopian Airlines CEO, GebreMariam (2016) stated that an alarming 80% of traffic from Africa to other parts of the world is carried by non-African airlines as carriers such as Turkish Airlines and the Gulf carriers have rapidly expanded into the African market with Emirates serving 22 destinations in Africa by 2016, while Turkish Airlines served the continent with 43 destinations (OAG, 2016). Data extracted from MIDT reveals that around 90 million international passengers visited the continent in 2015 while over one-third of these passengers transited via a foreign hub to get to Africa. Button et al. (2015) and Otiso et al. (2011) reinforce that a major issue is the lack of genuine interconnectivity within the African air transportation network despite efforts over the years to improve it.

Table 1
Cooperative relationships in Africa (2016).
Source: Modified Cox, 2016; Flightglobal 2016

Ownership/Partner/ Alliance	Assets/Partner/ Alliance Members	Country Asset/Partner	% Stake	Acquisition date
IAG (British Airways)	Comair Limited	South Africa	18.00%	October 1996
IAG (Iberia)	Royal Air Maroc	Morocco	0.98%	not available
KLM	Kenya Airways	Kenya	13.70%	January 1977
Air France	Air Cote d'Ivoire	Cote d'Ivoire	20.00%	November 11
Air France	Tunisair	Tunis	5.58%	October 1948
Air France	Royal Air Maroc	Morocco	2.72%	January 2000
Air France	Air Mauritius	Mauritius	2.78%	January 1967
Air France	Air Madagascar	Madagascar	3.17%	January 1963
Ethiopian Airlines	ASKY	Multi-National (Africa)	40.00%	June 2008
Ethiopian Airlines	Malawian Airlines	Malawi	49.00%	July 2013
Qatar Airways	Royal Air Maroc	Qatar	Joint Venture	September 2015
Star Alliance	Egypt Air	Egypt	Alliance Member	July 2008
Star Alliance	Ethiopian Airlines	Ethiopia	Alliance Member	December 2011
Star Alliance	South African Airways	South Africa	Alliance Member	April 2006
Sky Team	Kenya Airways	Kenya	Alliance Member	September 2007

The regulatory aviation framework in Africa is highly obstructed and as a consequence this has barricaded and curtailed its growth over the decades. Until 1991, nearly all African carriers were state owned. These carriers were mostly run as government entities with strong embedded protectionist policies coupled with a lack of commercial focus (Chingosho, 2009; Schlumberger, 2010; Heinz, 2011; Heinz and O'Connell, 2018). As a result, intra-African air traffic remained costly and inefficient. To address these shortcomings, African countries adopted the Yamoussoukro Decision (YD) whose aim was to liberalise market access within Africa by 2002. GebreMariam (2016) stated that Africa needs to copy the European model for open skies. Even though progress towards Open Skies within Africa is visible - the YD signed by 44 countries has yet to be implemented (Schlumberger, 2010). The current picture is that in the 24th ordinary session of the assembly of the African Union, 11 members declared their solemn commitment to the implementation of the Yamoussoukro Decision in 2017 (African

Union Commission, 2015). Also, the African Union supports the YD with their agenda 2063 (African Union, 2015).

3. Research Methodology

From an academic perspective, the literature on the African air transport market is sparse, even though Africa seems to have promising future prospects (ATAG, 2014). Furthermore, data is either not available or is fragmented, making it extremely challenging to analyse. Therefore this research is based on primary as well as secondary data, which cross-validated and filled gaps in the primary data (Saunders et al., 2009). This process helped create a template that underpins how African carriers can be successful. A summary of the methodology used to identify the parameters that are required for an African carrier to be successful such as Ethiopian Airlines is shown in Fig. 2.

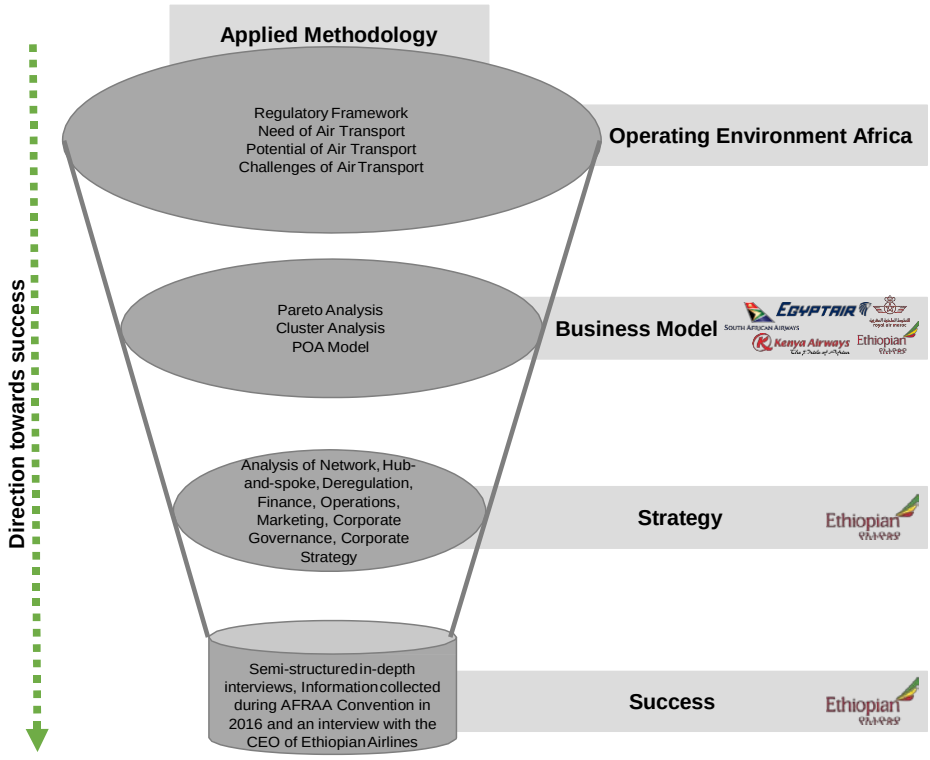

Fig. 2. Summary of structure and methodology
Source: Authors

To identify the major African players, the 80/20 Pareto rule was applied, demonstrating that 80% of the outputs are caused by 20% of the inputs (Craft and Leake, 2002). All 95 African carriers, operating from/to and within Africa were selected and ordered by Available Seat

Kilometres (ASKs) for 2015 though an OAG database. To understand differences between the most important African carriers, a cluster analysis was applied, which identifies clusters based on similarity of data (Sumathi and Sivanandam, 2006, p44). Two cluster techniques have been used – hierarchical in the form of the agglomerative approach (bottom-to-top) and a graphical clustering using the bubble scatterplot. The analysis was two-fold. The first step involved decisions on the most appropriate variables to position the airlines in the marketplace. The African air route network is characterised by sparse demand, with long sector distances, low frequencies and high fares *(*Ssamula, 2012; Heinz and O'Connell, 2013, Heinz and O'Connell, 2018). Therefore, average stage length (average distance flown per aircraft departure), frequencies, and ASKs were selected as influential variables in this analysis; data for 2015 was used. Secondly, the squared Euclidean distance (Equation 1) was applied to standardise the distance between the different variables (metric) and minimise the difference between each cluster, This measure solves the problem of the different scales of measurement for the variables (Larose and Larose, 2014).

Equation 1: Squared Euclidean distance

$$\text{□}(\text{□},\text{□}) = (\text{□}_1 - \text{□}_1)^2 + (\text{□}_2 - \text{□}_2)^2 + \cdots + (\text{□}_i - \text{□}_i)^2 + (\text{□}_n - \text{□}_n)^2$$

Source: Larose and Larose, 2014

The statistical software application SPSS was used to present the final outcome in a dendrogram. This was chosen over the nested cluster diagram, because it allows for a superior visualisation and understanding of the hierarchy (Larose and Larose, 2014). Also, a graphical clustering was used to recognise the most important carriers. Heinz and O'Connell (2013; 2018) identified that Full Service Network Carriers (FSNC) and Regional Carriers (RC) are the most sustainable business models in Africa. A Product and Organisational Architecture (POA) model was applied showing the importance of each characteristic to the airlines' overall performance for the five biggest African FSNCs that were identified through the Pareto and Cluster analysis.

The POA model that was formulated by Mason and Morrison (2008) was applied to the African market, however modifications were exercised as the model specifically focused on comparing Low Cost Carriers (LCCs). Therefore a number of adjustments were made to align the framework with African specific criteria. Firstly, secondary airports are almost non-existent in Africa. Therefore, the airport attractiveness index has been removed. Secondly, the distribution/sales index had to be erased based on the lack of information. Thirdly, certain indices had to be changed to cope with the constrained data. These attributes defined the

limitations of the methodology, while there was a distinct geographical dispersion of airport location, which negatively impacted the hubbing capability of carriers such as South African Airlines and Air Mauritius, compare to airlines located in East, West and North Africa. A summary of the used indices, benchmarking metrics and definitions are listed in Table 2. An in-depth analysis of the data can be found in Appendix A.

Table 2
Applied indices and benchmarking metrics of POA model.
Source: Modified Mason and Morrison, 2008

Indices	Benchmarking Metrics	Defintion
Profitability Index	Operating margin	Identifies the overall success
Cost Index	Unit cost per ASK ($ cents)	Key cost values
Revenue Index	Yield ($ cents)	Key revenue values
	Revenue per ASK ($ cents)	
Connectivity Index	Network density (departures per airport per day)	Measure network density
	Routes offered	
	Connectivity	
	All destinations available	
Convenience Index	Average frequency per route (per week)	Measure of convienence
	Punctuality	
Comfort Index	Load factor	Measure of comfort on-board
	Economy seat width	
	Economy seat pitch	
Aircraft Index	Aircraft utilisation (hours per day)	Measure of fleet productivity
	Most populous aircraft type (in % of total fleet)	
	Aircraft sectors per day	
Labour Index	Pax per employee	Measure of employee's productivity
	Employees per aircraft	
	ASK per employee ('000)	
Market Structure Index	Average HHI on capacity (seat)	Measure of competitiveness
	Median HHI on capacity (seat)	
	Average no of competitors per route	
	Capacity share of seats	

The POA methodology is split into three steps before a Kiviat diagram and index correlation can be derived. Firstly, the *benchmark item calculation* sets each airline in relation to the "best in class", which has the highest or lowest score depending on the benchmarking metrics (equation 2 and equation 3).

Equation 2: Benchmark ratio "Best in Class"

$$\text{Benchmark ratio} = \frac{\text{airline's value}}{\text{best in class value}}$$

Source: Mason and Morrison, 2008

Equation 3: Benchmark ratio "Worst in class"

$$\text{Benchmark ratio} = \frac{(\text{Worst in class} - \text{Airline score})}{(\text{Worst in class} - \text{Best in class})}$$

Source: Mason and Morrison, 2008

These benchmarking indices follow a weighted index score calculation, which combine the results of each index into an overall result. Therefore, weights for each benchmarking metric need to be calculated based on the correlation of each benchmarking metric with profitability. Each calculated weight is multiplied with its benchmarking metric and summed to a total index weighted score (Equation 4).

Equation 4: Weighted score

$$\text{Weighted score} = \frac{\sum_{i=1}^{n} w_i * x_i}{\sum_{i=1}^{n} w_i}$$

Source: Mason and Morrison, 2008

The last step is to set all airlines in relationship with the best performer in the area of analysis (i.e. cost, profitability) (Equation 5).

Equation 5: Final index

$$\text{Final Index} = \frac{\text{Weighted score}}{\text{Best in class}} * 10$$

Source: Mason and Morrison, 2008

The final index score for each category benchmarks all five best performing airlines through a Kiviat diagram. However, a research gap still exists namely, why Ethiopian Airlines is so successful in contrast to the other African airlines. To answer this question a qualitative approach was used to enrich the limited insight from reliable numerical data in Africa. The qualitative approach utilised semi-structured in-depth interviews with senior executives drawn from three groups. Firstly, industry experts[1] with explicit knowledge on the wider African market who emanate from airlines, consultancy and via other stakeholders. The second group was created from attendees at the 5th Stakeholder Convention of AFRAA 2016, in Kigali, Rwanda attended by 300 senior industry managers. Presentations at the meeting, along with

[1] **Airlines:** Henok Teferra, CEO, ASKY Airlines; Sanjeev Gadhia, CEO Astral Aviation; Johan Pauwels, Vice President; Hahn Air; Richard Boden, CCO, FastJet; Edith Githachuri, ancillary revenue manager, Fastjet; Nnamdi Bolu, Senior manager, Arik Air.

Consulting: Rigas Doganis, CEO, Doganis and Associates; Stephan Heinz, Seabury; Steve Duley, Sabre
Other stakeholders: Koussai Mrabet, CCO, African Airlines Association; Mark Schwab, CEO, Star Alliance; Riyan Qirbi, World Fuel Services Africa.

semi-structured in-depth interviews with 16 representatives of the most important organisations[2] in attendance provided a generic picture of the strategic success of African carriers. The third source of insight was an in-depth interview with the CEO of Ethiopian Airlines, conducted through a lengthy telephone dialog. The insight provided there was interspersed with accessible secondary data on Ethiopian Airlines' network and overall strategies, which were then triangulated in the Ethiopian Airlines analysis and evaluation, reported in (sections 5 and 6) below. All interviews were transcribed for analysis and the information gained from this technique was particularly influential in creating a template that underpins ways that African carriers can be successful in the future.

4. Positioning of African Airlines

In 2015, 95 African airlines served the intra-African air transport market (OAG, 2016). Previous analysis by Chingosho (2009:164) suggested there are too many carriers given the size of the market and the Pareto analysis confirmed that observation as only ten African airlines were responsible for 80% of ASKs for all African carriers for 2015 (OAG, 2016) as shown in Fig. 3. In fact the top five (Ethiopian Airlines, South African Airways, Egyptair, Royal Air Maroc and Kenya Airways), are the only African airlines that each transport over five million passengers annually and accounted for 62% of the market (ASKs) in 2015, consistent with Njoya (2016) analysis Most African airlines remain unprofitable even in the current environment of low fuel prices. At the same time 80% of the traffic is concentrated at 50 of the continents 403 airports with Johannesburg, Cairo and Addis Ababa airports being the busiest three. These act as gateways to Africa for inter-continental traffic while also serving the continental market.

[2] AFCAA; AFRAA; Air Zimbabwe; Airbus; Astral Aviation; Boeing; Ethiopian Airlines; Hahn Air; IATA; ICAO; Kenya Airways; Lufthansa Consulting; RwandAir; Sabre; SITA; South African Airways.

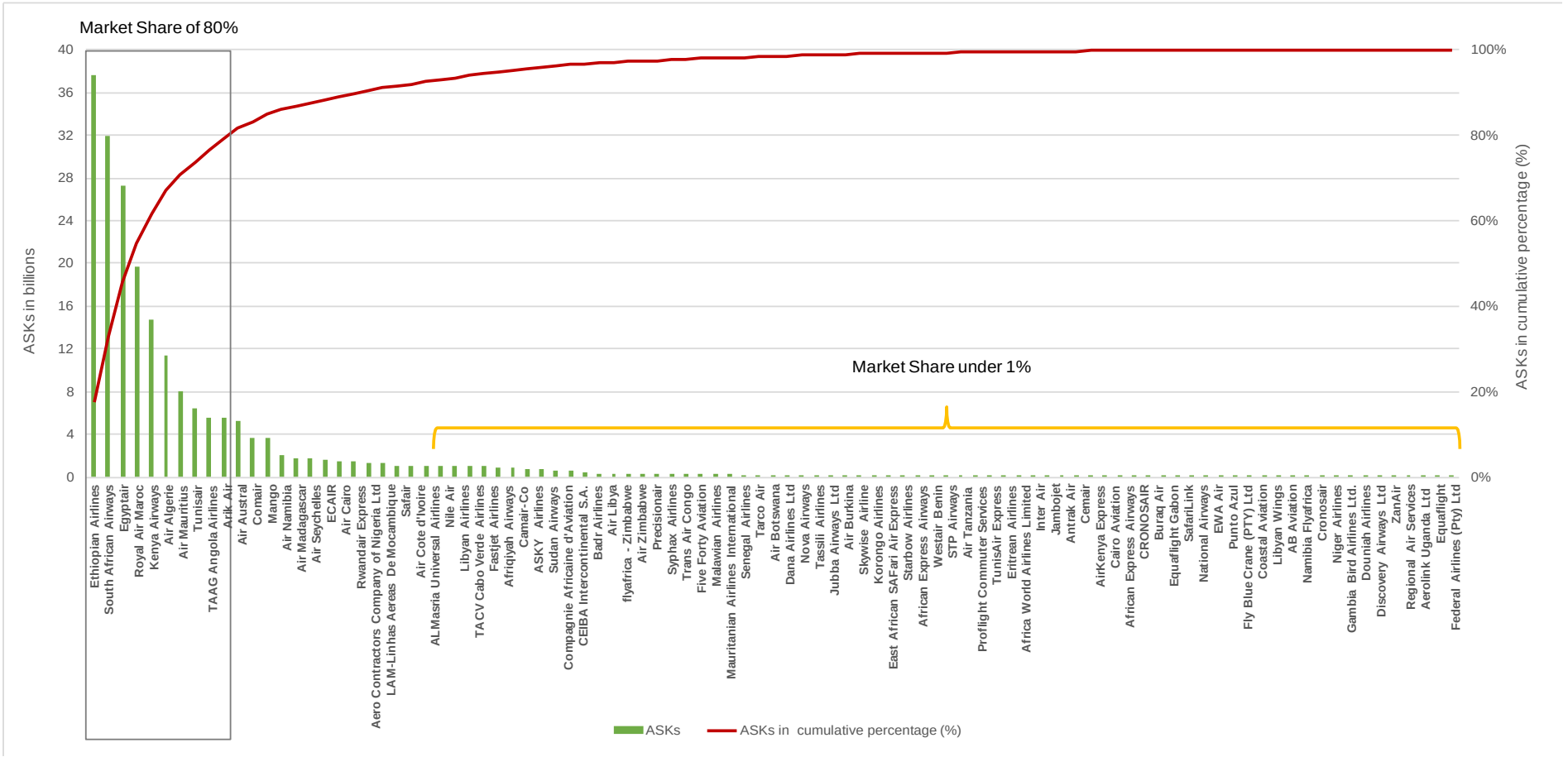

Fig. 3. Pareto analysis of African carriers (2015).
Source: OAG, 2016

A cluster analysis was performed encapsulating capacity (ASKs), connectivity and average stage length of the top five FSC African Carriers and the results are illustrated as a bubble scatterplot in Fig. 4. South African Airways has a prominent position in this analysis due to its higher frequency (136,015) versus Ethiopian (79,487) in 2015. The geographical positioning of these five airlines contributes to an uneven distribution of intra-African air services which are concentrated in Northern, Eastern and Southern Africa while Central and Western Africa are less well served. The key characteristics of each of the Full Service Network Carriers are listed in Table 3 and all appear to adhere to similar business practices.

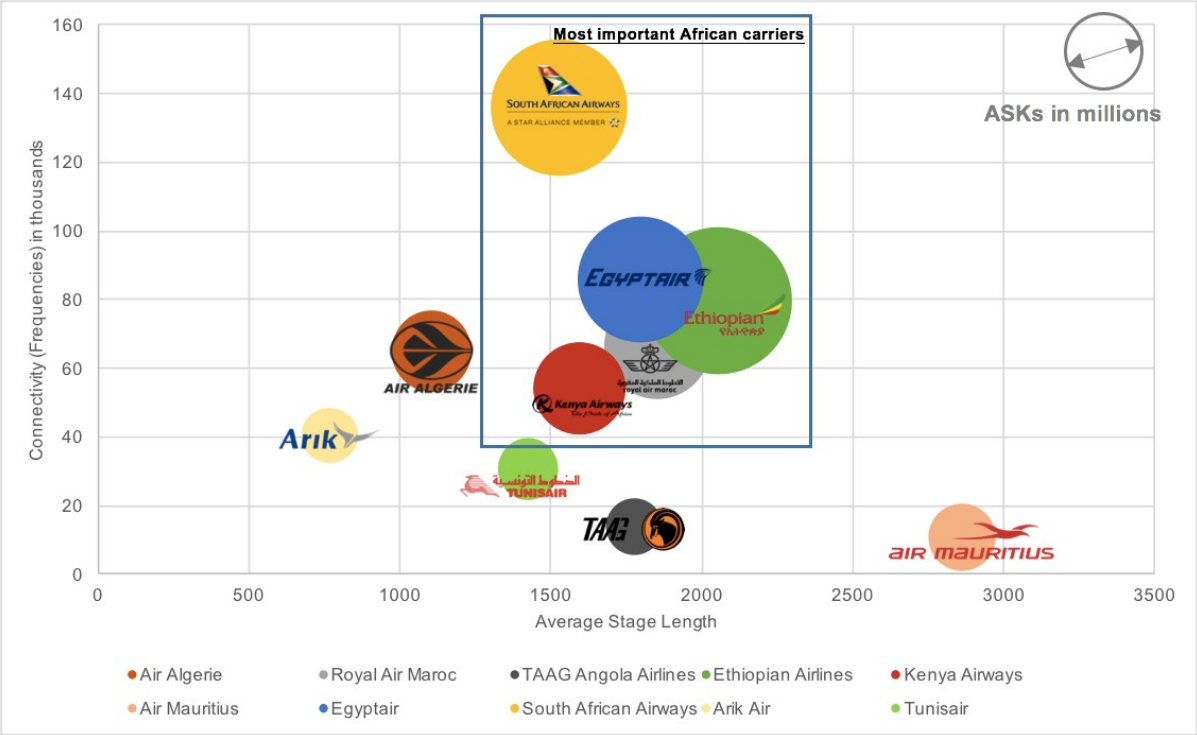

Fig. 4. Positioning of most important African carriers (2015).
Source: OAG, 2016

Table 3
Key characteristics of 5 Full Service Network Carriers in Africa (2016).
Source: Modified Cento, 2008, airline web pages; AFRAA Convention, 2016

Elements of FSNC	Ethiopian	South African Airways	Kenya Airways	royal air maroc	EgyptAir
Core business	✔ Passenger, Cargo, Maintenance, Catering, Aviation Academy, Ground Handling	✔ Passenger, Cargo, Technical, Air Chef	✔ Passenger, Cargo, Maintenance	✔ Passenger	✔ Passenger, Cargo, Maintenance & Engineering, Ground Service, In-flight Services, Medical Services, Training Center, Supplementary Industries
Hub-and-spoke network	✔ Hub: Addis Ababa	✔ Hub: Johannesburg	✔ Hub: Nairobi	✔ Hub: Casablanca	✔ Hub: Cairo
Global player	✔	✔	✔	✔	✔
Alliance development	✔ Star Alliance	✔ Star Alliance	✔ SkyTeam	Negotiations going on	✔ Star Alliance
Vertical product differentiation	✔	✔	✔	✔	✔
Customer relationship management	✔ FFP: Sheba Miles	✔ FFP: SAA Voyager	✔ FFP: Flying Blue	✔ FFP: Safar Flyer	✔ FFP: Egyptair Plus
Yield management and pricing	✔	✔	✔	✔	✔
Multi-channel sales	✔	✔	✔	✔	✔
Distribution system	✔	✔	✔	✔	✔

✔ = fulfilled

The overall business model and competitive environment of each of these airlines can be effectively assessed through a POA approach (Mason and Morrison, 2008). The POA descriptor data delineating the indices can be found in Appendix A. A key weakness that filters through the African airline landscape is its inability to extract profitability as only Ethiopian and Royal Air Maroc produce positive operating margins, as illustrated in Fig. 5. The POA approach clearly shows a similar performance by all carriers in terms of comfort and aircraft indices, whereas the other indices identify bigger differences, with some extreme variations especially on the cost and labour index. Egyptair clearly appears overstaffed while Kenya Airways unit costs are unsustainable. South African Airways outperforms in the Convenience index (average frequency per route per week with a 91% punctuality record). Nevertheless, in aggregate Ethiopian Airlines outperforms the other carriers and attention now turns to it.

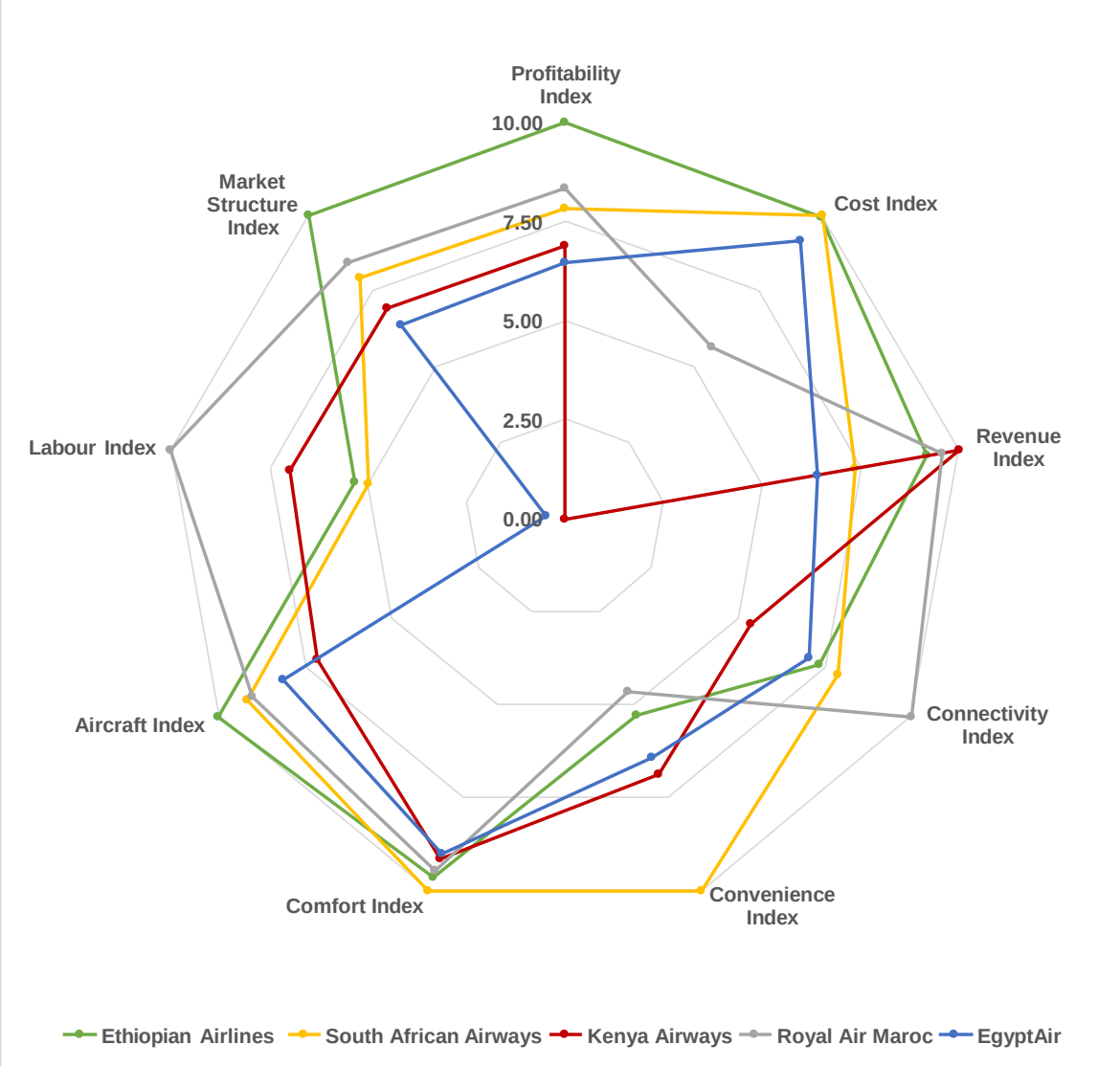

Fig. 5. Overview of POA result
Note: An index of 10 represents best in class, while an index of 0 represents worst in class
Source: Annual Reports; Flightglobal, 2016; OAG, 2016

5. Analysis of Ethiopian Airlines

Ethiopia is Africa's second largest country in terms of population, after Nigeria, with over 86 million inhabitants and it is the most-populous landlocked country in the world. It occupies a total area of 1,100,000 square kilometres – which makes it approximately twice the size of Spain. Its national flag carrier, Ethiopian Airlines is 100% government owned and celebrated its 70th anniversary in 2016. Ethiopian is a diversified airline group with seven business units, namely ET International Services; ET Regional services; Ethiopian Cargo Services (the largest in the continent); Ethiopian MRO Services; Ground Services; Catering Services; and the Aviation Academy. Passenger services contributed 77% of its revenues for 2016, while cargo and the other subsidiaries amounted to 15% and 8% respectively (Flightglobal, 2017).

Ethiopian's annual report stresses the importance of the divisions as it aspires to be a self-sufficient aviation powerhouse and a symbol of what African carriers can achieve – all of the divisions are growing their revenues year-over-year, except for the Academy. However, it has invested heavily in human capital training by building a $100 million facility that now trains 4,000 personnel per annum which provides a talent pipeline for decades to come (Ethiopian, 2016b). Ethiopian was established with the vision of a Pan-African airline, serving the region in addition to its domestic market and by being the first airline connecting East and West Africa (Bekele, 2016b). It currently connects the continent to the rest of the world under the slogan *"The New Spirit of Africa"* (Ethiopian, 2016b). In 2004, it operated to 71 destinations and carried just 1.5 million passengers, while by 2016 it served 117 destinations and expanded its passenger base to 8.8 million which was growing with CAGR of 16% per annum. It operates 79 aircraft, which is the largest fleet in Africa, with 42 more on order. There was a rapid 5-fold growth in demand (RPKs) which was mirrored with a corresponding increase in capacity (ASKs) while its load factors mostly hovered over 70%. Ethiopian has accumulated approximately US$800 million in profits over the last eight years while the rest of the African airline sector has incurred losses of approximately US$1.5 billion (CAPA, 2016a). Fig. 6 depicts Ethiopian Airlines as fast growing in terms of passenger demand, seat capacity, revenues and network destination for the last decade.

Its progress will be tracked to determine which strategies proved effective in transforming the carrier into such a successful entity. The overwhelming rhetoric emanating from the interviews at the 2016 AFRAA Convention was that Ethiopian Airlines success was derived from its network, hub development and its African-based airline partnerships. This insight was used to formulate a template of the attributes required for an African based airline to outperform in the continent. Each of these attributes will be discussed in the following section.

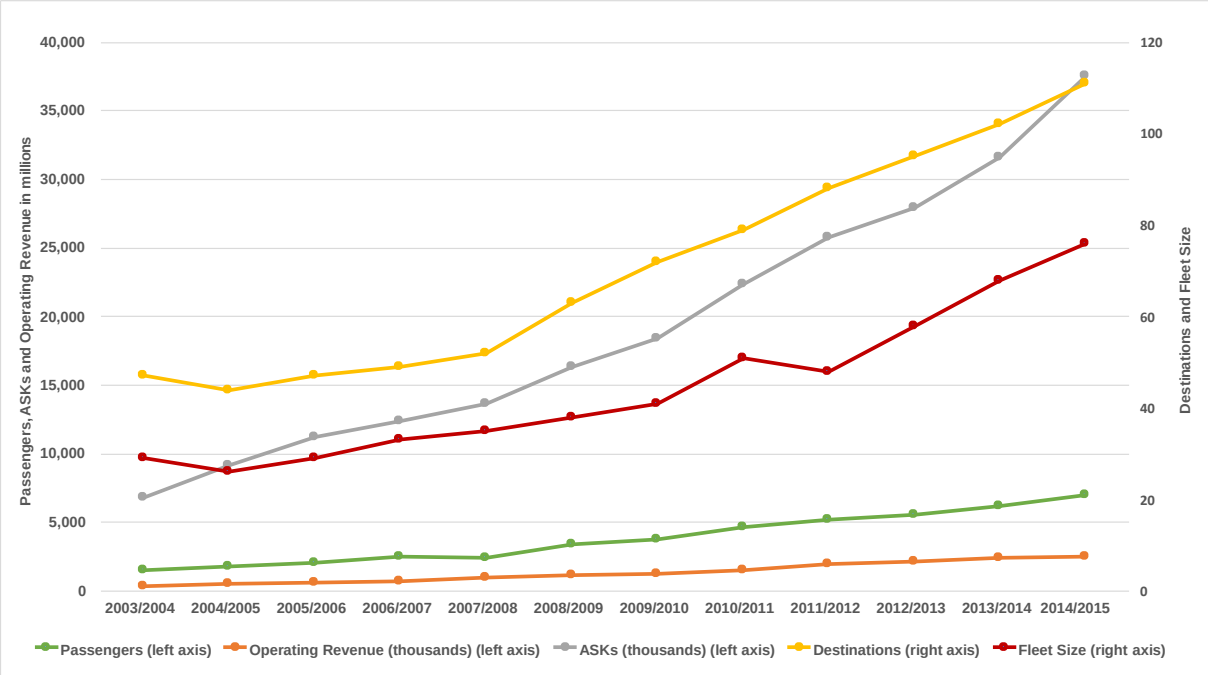

Fig. 6. Growth of Ethiophian (various indicators)
Source: Ethiopian, 2016a; OAG, 2016

5.1. The network development of Ethiopian Airlines' – its significant presence in the African continent

A key competitive advantage and core competence of Ethiopian Airlines' is its intra-African footprint which is off limits to overseas carriers due to the restrictive regulatory forces in situ, while other African carriers do not have the financial and operational capabilities to replicate such a network. Ethiopian has the strongest intra-African network and its long term strategy is to connect to each African state from its hub airport. This platform will allow the flag carrier and its Star Alliance members to feed traffic through its hub at Addis for redistribution within this intra-African network. Fig. 7 shows that its seat capacity in the African continent extended from 3.4 million in 2004 to 14.4 million by 2016 which represents 76.3% of its total capacity by 2016. It served 58 destinations directly within Africa from its hub at Addis Ababa in 2016, while its domestic network connected 17 airports and traffic increased from 449,068 passengers in 2010 to 1.1 million by 2015 (Innovata, 2016). Its global connections were to Asia (8.3% of total capacity), Europe (8.3%), the Middle East (5.2%), North America (1.4%) and South America (0.2%).

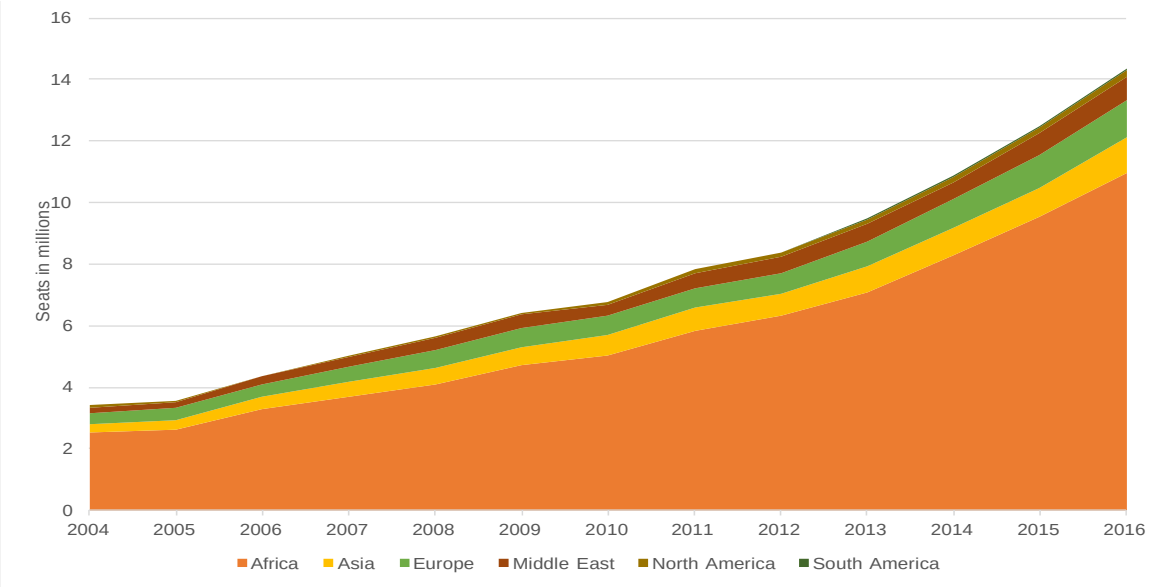

Fig. 7. Seat development in millions by continent for Ethiopian Airlines
Source: Innovata, 2016

5.2. Connectivity at Ethiopian Airlines

In 2015, Ethiopian Airlines transported around 7 million passengers, while analysis from MIDT data deducted that 1.3 million flew direct while 5.7 million were connecting passengers from Ethiopia Airlines to other carriers; from other carriers to Ethiopian Airlines; or from/to Ethiopian Airlines. Deeper analysis depicted that 2.8 million passengers connected between flights involving Ethiopian Airlines in 2015, up by 55% when compared to 2012 levels (Innovata, 2016). Fig. 8 shows that 64% (1.8 million) of the connecting passenger from/to Ethiopian Airlines were connecting at Addis Ababa International airport. The other four major airports where traffic was connecting were Dublin (where fifth freedom traffic rights permitted it to operate onwards to the United States) and Rome (from which the majority connects to Stockholm) and thirdly, Kilimanjaro in Tanzania.

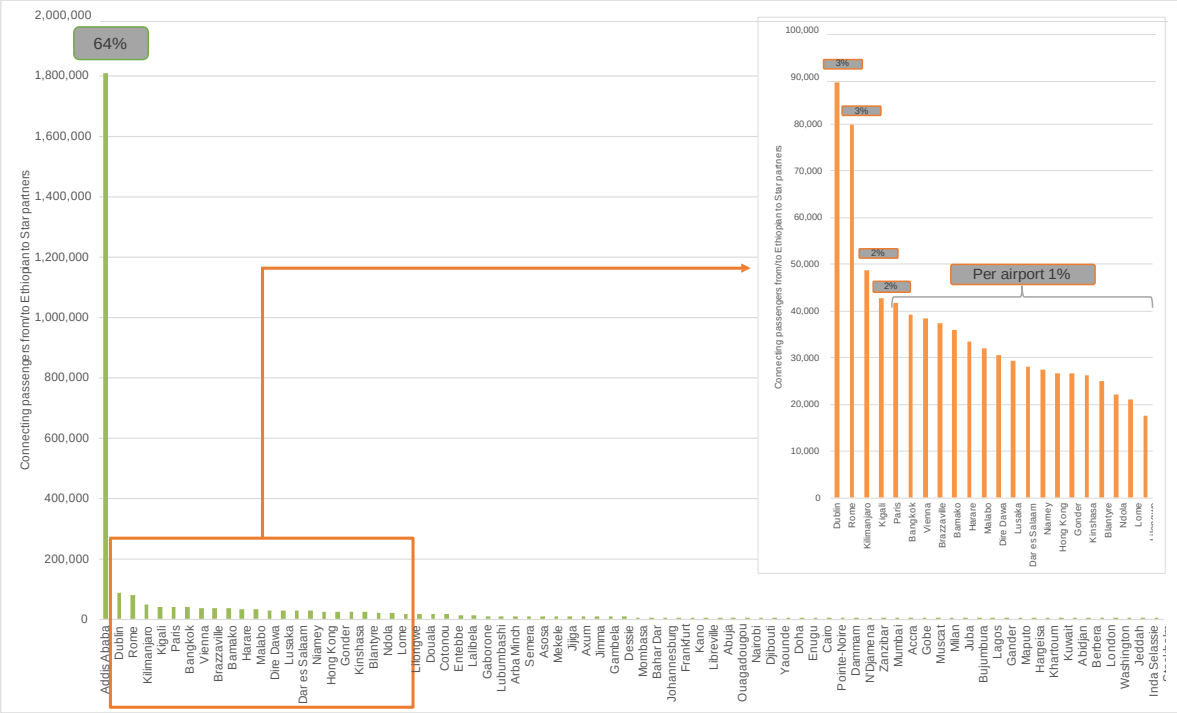

Fig. 8. Connecting passengers from/to Ethiopian Airlines per airport (2015)
Source: Innovata, 2016

5.3. Hub development of Ethiopian Airlines at Addis Ababa

Addis Ababa Bole International Airport (ADD) serves fewer than 20 airlines with 486 flights a week, operating to 79 destinations in 2016. In 2015, the airport handled 7.9 million passengers, consisting of 7.1 million international and 846,000 domestic passengers (Bekele, 2016a; Ethiopian, 2016b; Flightglobal, 2016). The Full Service Network Carriers (FSNC) clearly dominate at Addis Ababa with a market share of 99.5%, with flydubai being the only LCC s shown in Fig. 9. Ethiopian Airlines has a strong position in Addis Ababa holding over 89% of the total seat capacity in early 2016 and this is largely because of the restrictive policy imposed on foreign airlines by the Ethiopian government which enables Ethiopian Airlines to oppose fifth freedom rights to larger carriers who have the financial and network scale to inflict damage and erode market share (Njoya 2016). This policy position reflects the fragmented and heterogeneous liberalisation of African airspace as discussed by Schlumberger, (2010) and Pirie, (2014). On domestic routes, National Airways operated with a market share (ASKs) of 3.1%, but subsequently withdrew services leaving only Ethiopian Airlines to serve the 21 commercial domestic airports within Ethiopia

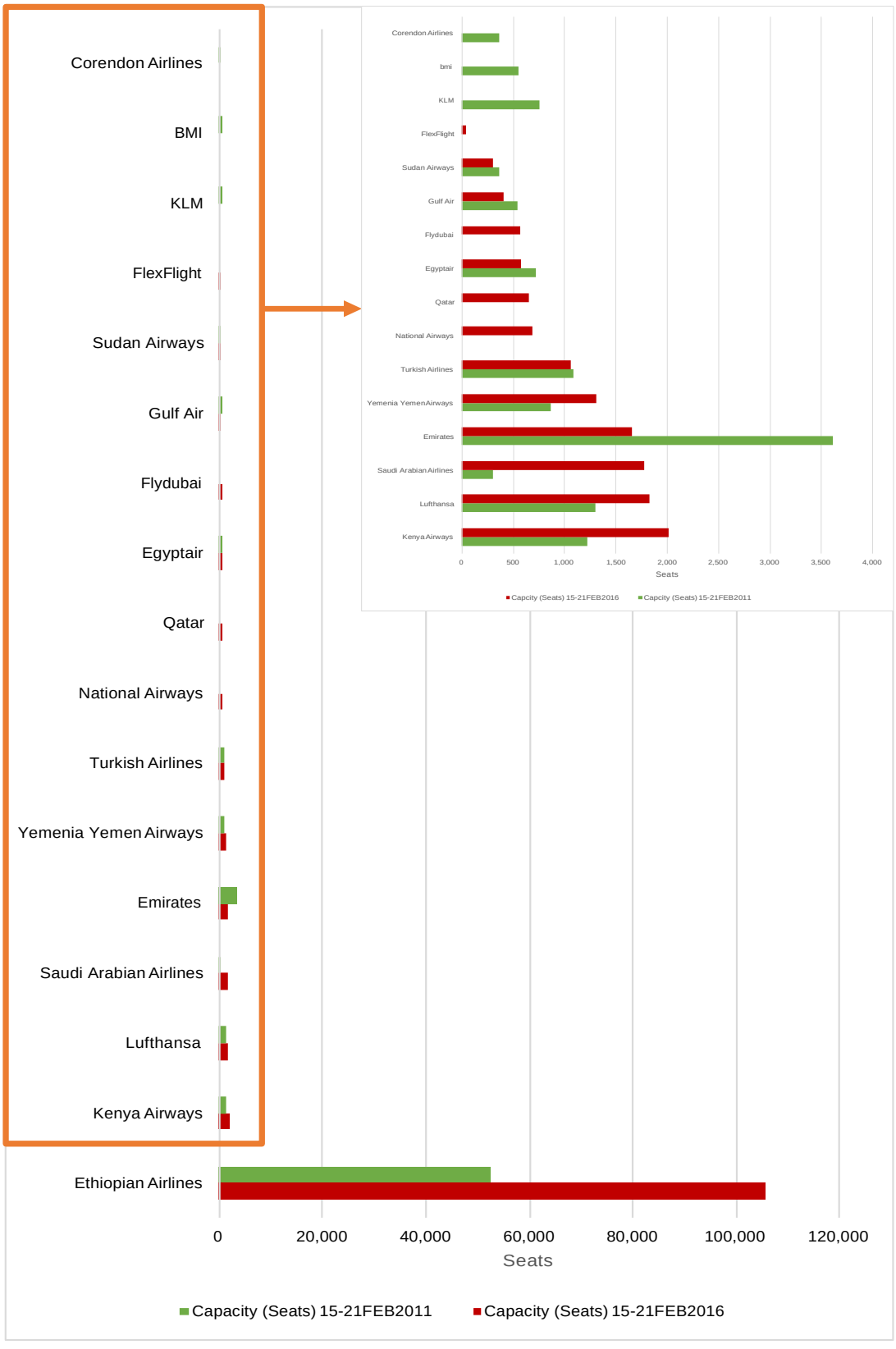

Fig. 9. Total seats for carriers flying from/to Addis to world (2011 vs 2016)
Source: OAG, 2016

This policy context means that Ethiopian Airlines has a fortress presence at Addis Abba, with strong hub and spoke mechanism with significant connecting traffic. Its schedule coordination

for 17th June 2016, is illustrated in Fig. 10, shows that inbound traffic from the Middle East, Asia, North America and Europe brings passengers to Addis from 05:30 to 08:00, who then continue onto Africa (outbound) from 07:00 to 10:00. The next smaller inbound wave arrives at 10:00 to 14:30, followed by a smaller outbound wave from 14:30 to 17:00, connecting within Africa. The last inbound wave starts at 18:00 and goes on until 22:00 from all parts of Africa, and closes with an outbound wave to the Middle East, Asia, North America and Europe from 22:00 to 00:30. Therefore the driver of their intra-African network is the inter-continental inbound and outbound traffic. The Ethiopian market itself is not sufficient for Ethiopian Airlines as its expansion is fundamentally underpinned by its hub and spoke mechanism which is engineered to disperse traffic throughout Africa. GebreMariam (2016) stresses the favourable effect of Addis Abba's central position in an Eastern African corridor, as well as its place in the middle of the world, as exploited by airlines at Dubai and Istanbul. This hub is the most synchronised in Africa for encapsulating the transfer of intercontinental to intra-African traffic and thus avoids the problem of imbalance of capacity and demand, limited commercial co-operation and un-coordinated intra-African networks seen by AFRAA (2014) as a problem for any African airlines.

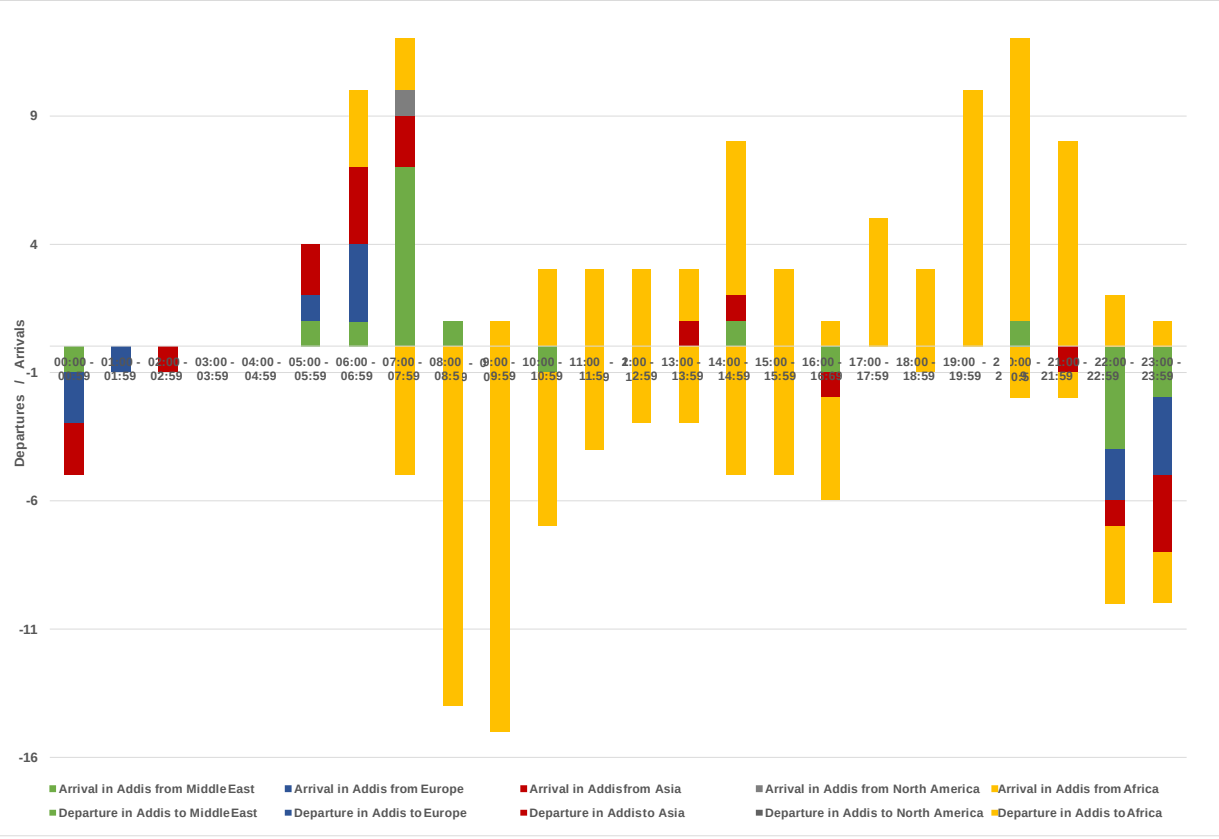

Fig. 10. Schedule co-ordination for Ethiopian (17 June 2016)
Source: OAG, 2016

5.4. Network augmentation by Star alliance participation and code share agreements

In 2011, Ethiopian Airlines joined Star Alliance as the third African airline after SAA and Egyptair. Overall, the biggest advantage for airlines being part of global airline alliance is to facilitate the network collaboration among its associate members as discussed by (Oum and Park, 1997; Brueckner, 2001; Iatrou and Alamdari, 2005; O'Connell, 2006, Gaggero and Bartolini, 2012; O'Connell and Bueno, 2016). Ethiopian Airlines has 23 code share agreements, of which 17 are with Star Alliance partners (CAPA, 2016a). Fig. 11 shows the strengthening ensemble of such marketing collaborations between carriers after it joined the Star alliance, while by 2016 it served 251 routes with 529 million ASKs per week, clearly depicting the synergies being formulated by Ethiopian as a result of the alliance.

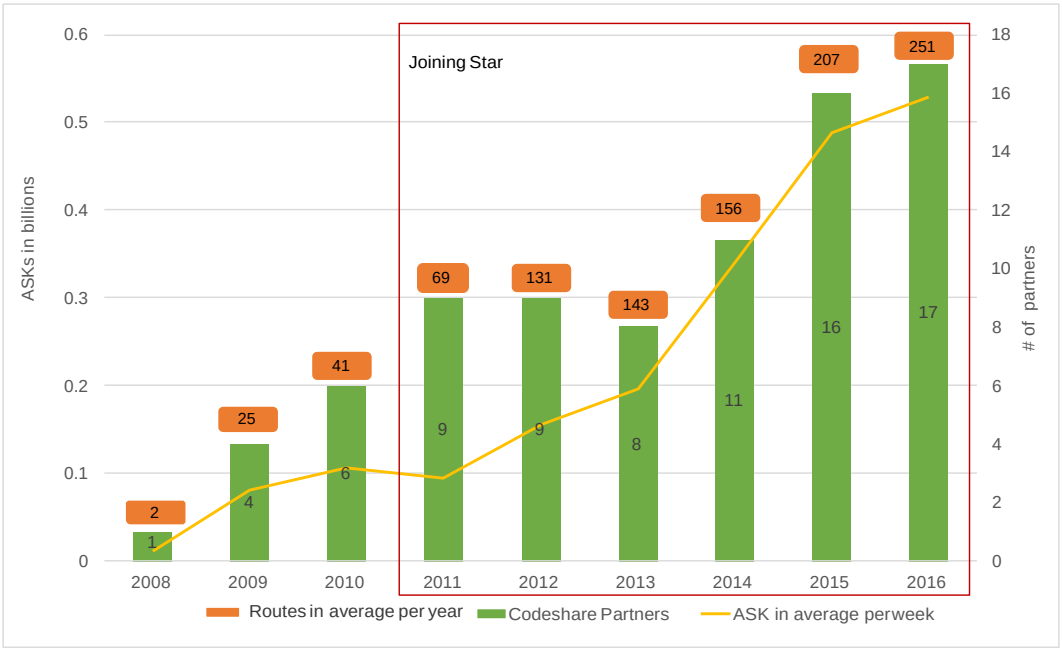

Fig. 11. Development of codeshare partners with Ethiopian Airlines as marketing carrier
Source: Innovata, 2016

5.5 *Ethiopian Airlines strategic partnerships with African based carriers*

The global aviation industry is based on a set of archaic rules that in most countries limit ownership and control of airlines and as a result, cross-border mergers and acquisitions are usually strictly prohibited. In order to build connectivity and so gain market access and circumvent such regulatory restrictions, carriers can acquire minority stakes in other airlines which can later serve as a prerequisite to a commercial partnership (AFRAA Convention, 2016; Doganis, 2016; GebreMariam, 2016; O'Connell and Bueno, 2016). Ethiopian is working along this path, Heinz and O'Connell (2013; 2018) note that Full-Service Network Carriers (FSNC)

and Regional Carriers (RC) are the most prominent and stable business models in the African market which provides a foundation for a long term strategy.

Ethiopian has embarked on an African based multi-hub strategy to gain revenues from the continent's fast growing market, by developing maximum coverage across the region (GebreMariam, 2016). Ethiopian first equity venture was geographically motivated as it took a 40% stake in Asky Airlines, a regional carrier based at Lomé Airport in Togo that began operations in 2010. Its creation filled the gap left by the demise of West African based carriers such as Air Afrique, Nigeria Airways and Ghana Airways (Heinz and O'Connell, 2013). Despite having a fleet of only 8 aircraft, Asky's partnership with Ethiopian airlines, enhances the Ethiopian's feed at the Togolese base airport in Lomé. Such an approach can compensate for low load factors over sparse routes as well as adding additional revenue. The success of this arrangement has been enhanced by schedule integration between the two airlines which culminated in Ethiopian commencing scheduled thrice weekly flights to New York-Newark from Addis Ababa via Lomé, in July 2016. Asky Airlines which serves more than 200 weekly flights throughout West and Central Africa and provides around 60% of the passengers to this New York service (AFRAA Convention, 2016). The authors interviewed the CEO of Asky airlines who stated that Ethiopian provides technical, commercial and infrastructural support as well as management expertise for Asky Airlines, while it also supports aircraft leasing, by serving as a guarantor and by subleasing aircraft. Subsequently Asky has produced a profit for the first time of $4 million (Teferra, 2016). Ethiopian also holds a 49% stake in Malawian Airlines, providing the regional carrier with two aircraft and technical assistance to start their operations. Ethiopian Airlines is continuing this quest for a Pan-African hub strategy as it negotiates with RwandAir (CAPA, 2016b; Ch-aviation, 2016) and Congo Airways (African Aerospace, 2016; CAPA, 2016c) for potential partnerships. Bekele (2016a) stated that Zambia, Uganda and Mozambique are also potential candidates. If successful this approach could provide Ethiopian with six or seven major hubs across the continent. However the process is dependent upon smaller nations to adopt forward looking air transport policies that embrace liberalisation and foreign ownership. Air Service Agreements within Africa are still 'work in progress' but the success depends on greater collaboration at a pan-African level which has been slow to achieve under the current regulatory framework that is largely governed on a bilateral basis. Ethiopian has disrupted the status quo by engineering equity partnerships whose success is evident at US and EU carriers – the benefits are apparent for smaller nations as Togo for example has a reinforced domiciled airline with financial stability and has direct flights to

New York, which would not have been possible without the investment from Ethiopian (Teferra, 2016). The analysis of Ethiopian Airlines' development outlined above, at is home hub, as well as its carefully structured approach to the creation of new hubs, can be integrated with the expert opinions expressed in interviews gathered at the 2016 AFRAA conference. That has led to a summary of the mutual benefits of strategic partnerships of Ethiopian Airlines illustrated in Fig. 12. It shows that key elements in airline operation such as capital and technical support for example are provided to the strategic partner by Ethiopian, while the strategic partner provides a regional niche market for Ethiopian and synergies flow both ways as feed traffic percolates to both parties enriching the revenue streams and boosting load factors.

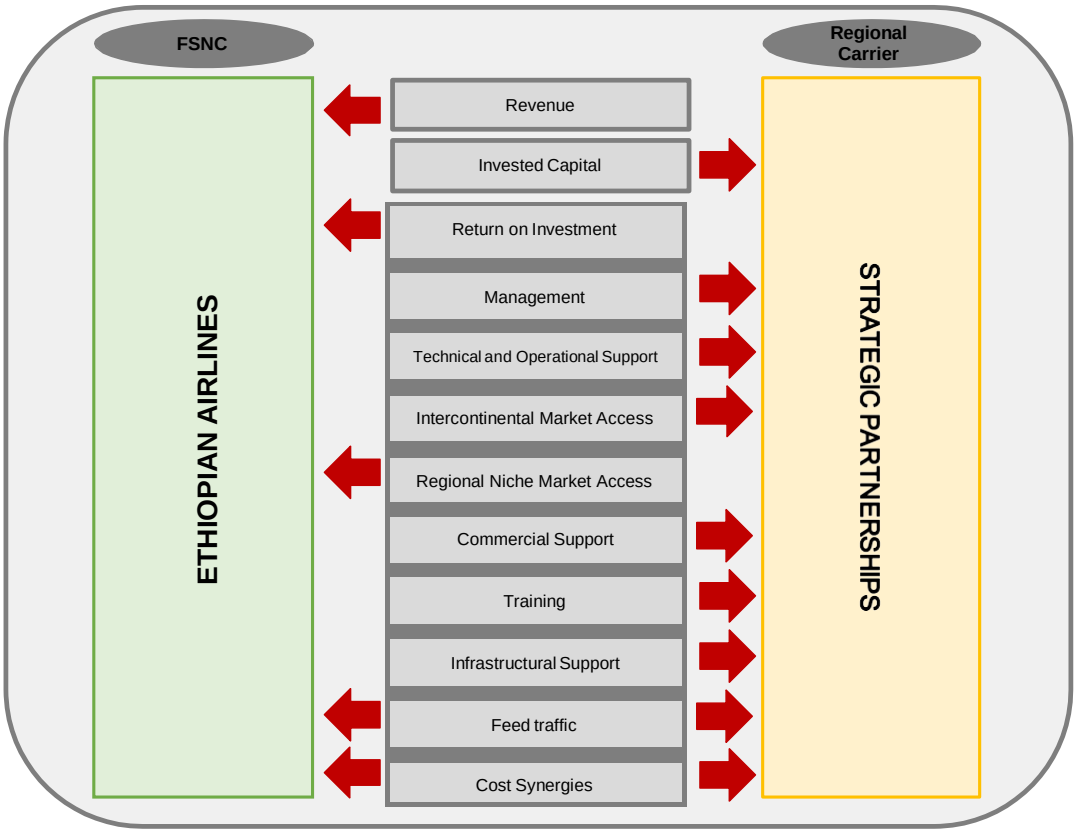

Fig. 12. Summary of mutual benefits for strategic partnership with Ethiopian Airlines
Source: AFRAA conference, 2016

6. Strategic elements for the successful operation of an African carrier.

The research formulated a number of principles that flow from the analysis carried out above that will be for an African carrier to be successful and prosperous. The approach begins with a Full Service Network Carrier which relies on value adding differentiation through Regional Carrier partnerships where synergies cross fertilise each other, facilitating an increase in traffic

volumes and revenues, while gaining traction in new markets assuming new perspectives on the part of protectionist Governments. The theory builds on the importance of that FSNC or RCs noted by Heinz and O'Connell (2013; 2018), but suggests both models should become integrated across an array of airline operations in order to become financially sustainable. That integration can be organised around the five key strategic pillars identified in Fig. 13 which are central to effective the bipartisan integration and standardisation. Firstly, management expertise was paramount as both business models are aligned and a unified long term vision is produced which is supplemented by a training etiquette to the highest of international standards. Secondly, Corporate Governance where there is little government interference into the commercial operations of the airline. The government's key objective is to achieve long-term economic growth and need to embrace deregulation, reduce aviation taxes and support the aviation infrastructure pertaining to airports, ATC and security. Thirdly, cost-leadership in certain categories like labour is easily achievable in the African continent due to low wage remunerations, which has prompted Ethiopian Airlines to develop their own in-house maintenance facility, which is in turn made available to the partners. Fourthly, the overall product is designed to be 'best in class' and benchmarked against competitors to retain its competitive advantage while consistency across the product range between the carriers is essential. Finally the network should be enlarged by expanding beyond a domiciled home airport through the mechanism of the Pan African multi-hub structure, just as US carriers use to meet demand within mainland America. These hubs will incorporate synchronised schedules to feed and connect traffic with minimum connecting times thus acting as an effective traffic multiplier.

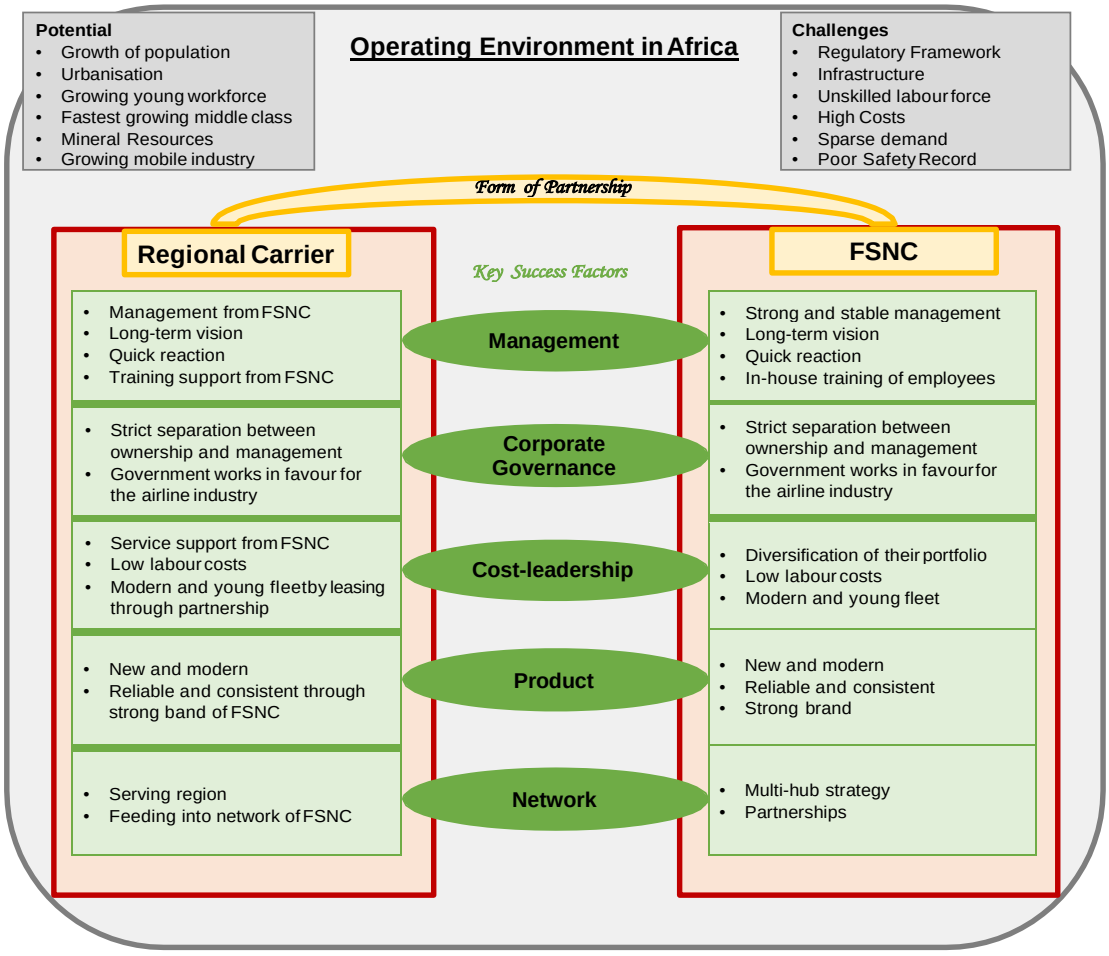

Fig.13. A business plan Template for operating a successful airline in Africa
Source: Authors

7. Conclusion

The African air transport market largely remains entrenched in a plethora of problematic issues that curtail its expansion and prosperity. It suffers from embedded protectionist policies and bureaucracy along with inadequate infrastructure which coupled with high fuel prices, fees and taxes that add up to create high fares that stifle its potential growth. Consequently there is sparse demand compounded by long sector distances with low frequencies which negatively impacts on the overall quality of service. Big challenges lay ahead as 80% of the traffic to/from Africa is transported by non-African airlines and the vast majority of the domiciled airlines within the continent are loss making.

However, Ethiopian Airlines appears to be significantly disrupting this trend as it is exponentially expanding its African and international network footprint, served with new generation aircraft. Its passenger base is escalating accordingly and the carrier's commercial

endeavours are profitable, despite the carrier's location lacking both a tourist pedigree and a heritage of colonial links.

The paper sought to extract the strategies enacted by Ethiopian Airlines, which was seen through the eyes of major industry players, and so create a blueprint that could point a way to success for African carriers. This has three elements. First, a strong intra-African network is required in order to redistribute incoming intercontinental traffic. Second, establishing a major hub where the synchronisation of incoming flights provides maximum feed for departing aircraft. Thirdly, deep strategic financial and operational associations between the FSNC and established regional carriers to provide regional feed enriching the collaboration with higher load factors and revenue streams. The regional carriers are synergised by commercial and technical support from the full service airline expressed in management expertise, corporate governance, cost-leadership, best-in-class products and enlarged networks. Although this blueprint seems a very big step from the current problems of many African airlines, and from the difficult regulatory context associated with the partial adoption of the Yamoussoukro Declaration, Ethiopian Airlines' success indicates that it is achievable, and shows that Africa can produce a carrier worthy of being benchmarked against other leading international airlines across the globe.

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Appendix

Appendix Table 1
Data Source POA approach.
Source: Annual Reports; Flightglobal, 2016; OAG, 2016

Indices	Benchmarking Metrics	Ethiopian Airlines	SAA	Kenya Airways	Royal Air Maroc	EgyptAir
Profitability Index	Operating margin	Annual Report 2014	Annual Report 2014	Annual Report 2014	Annual Report 2014	Annual Report 2014
Cost Index	Unit cost per ASK ($cents)	Annual Report 2014	Annual Report 2014	Annual Report 2014	Annual Report 2014	Annual Report 2014
Revenue Index	Yield ($ cents)	Annual Report 2014	Annual Report 2014	Annual Report 2014	Annual Report 2014	Annual Report 2014
	Revenue per ASK ($cents)	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014
Connectivity Index	Network density (departures per airport per day)	OAG	OAG	OAG	OAG	OAG
	Routes offered	OAG	OAG	OAG	OAG	OAG
	Connectivity	OAG	OAG	OAG	OAG	OAG
	All destinations available	OAG	OAG	OAG	OAG	OAG
Convenience Index	Average frequency per route (per week)	Annual Report 2014	Annual Report 2014	Annual Report 2014	Annual Report 2014	Annual Report 2014
	Punctuality	Annual Report 2014	Annual Report 2014	Annual Report 2014	Annual Report 2014	Annual Report 2014
Comfort Index	Load factor	Annual Report 2014	Annual Report 2014	Annual Report 2014	Flightglobal	Flightglobal
	Economy seat width	Seat Guru	Seat Guru	Seat Guru	Seat Guru	Seat Guru
	Economy seat pitch	Seat Guru	Seat Guru	Seat Guru	Seat Guru	Seat Guru
Aircraft Index	Aircraft utilisation (hours per day)	Annual Report 2014	Annual Report 2015	Heinz, 2011	CAPA	Annual Report 2014
	Most populous aircraft type (in % of total fleet)	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014
Labour Index	Aircraft sectors per day	OAG	OAG	OAG	OAG	OAG
	Pax per employee	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014
	Employees per aircraft	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014
	ASK per employee ('000)	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014	Flightglobal, Annual Report 2014
Market Structure Index	Average HHI on capacity (seat)	OAG	OAG	OAG	OAG	OAG
	Median HHI on capacity (seat)	OAG	OAG	OAG	OAG	OAG
	Average no of competitors per route	OAG	OAG	OAG	OAG	OAG
	Capacity share of seats	OAG	OAG	OAG	OAG	OAG

Appendix Table 2
Benchmark data and Index Score for POA approach.
Source: Annual Reports; Flightglobal, 2016; OAG, 2016

		Annual Report 2013/2014 - Year 2014				
		Ethiopian Airlines	SAA	Kenya Airways	RAM	EgyptAir
		2014	2014	2014	2014	2014
Profitability Index Score		**10.00**	**7.83**	**6.90**	**8.37**	**6.49**
Operating Ratio (%)		126%	99%	87%	106%	82%
	Operating Revenue	2,457,305,000	2,005,022,825	1,237,100,000	1,503,670,018	1,479,720,475
	Operating Costs	1,948,160,585	2,029,799,094	1,420,500,000	1,424,405,493	1,808,965,144
Cost Index Score		**9.97**	**10.00**	**0.00**	**5.68**	**9.19**
Unit cost per ASK ($ cents)		0.0603	0.0602	0.0920	0.0739	0.0627
	Operating Costs	1,948,160,585	2,029,799,094	1,420,500,000	1,424,405,493	1,808,965,144
	ASK	32,331,292,847	33,739,065,578	15,440,906,953	19,268,975,671	28,837,138,678
Revenue Index Score		**9.19**	**7.36**	**10.00**	**9.57**	**6.40**
Yield ($ cents)						
	Operating Revenue	2,457,305,000	2,005,022,825	1,237,100,000	1,503,670,018	1,479,720,475
	RPK	22,267,000,000	21,814,000,000	9,793,000,000	12,793,000,000	18,348,000,000
RASK		0.0760	0.0594	0.0801	0.0780	0.0513
	Operating Revenue	2,457,305,000	2,005,022,825	1,237,100,000	1,503,670,018	1,479,720,475
	ASK	32,331,292,847	33,739,065,578	15,440,906,953	19,268,975,671	28,837,138,678
Connectivity Index Score		**7.36**	**7.90**	**5.36**	**10.00**	**7.06**
Network density (departures per airport per day)		1.90	5.55	2.59	1.91	2.94
Routes offered		290	186	138	405	230
All destinations at airport served		2.89	2.71	2.51	4.23	2.79
Convenience Index Score		**5.28**	**10.00**	**6.86**	**4.65**	**6.41**
Average frequency per route (per week)		4.50	14.40	7.26	3.17	7.39
Punctuality		79.35%	91.17%	89.00%	78.00%	77.03%
Comfort Index Score		**9.66**	**10.00**	**9.17**	**9.46**	**9.02**
Load factor		70.80%	75.00%	65.60%	67.80%	63.00%
Economy seat width		17	17	17	18	17
Economy seat pitch		32	32	31	31	32
Aircraft Index Score		**10.00**	**9.19**	**7.16**	**9.05**	**8.16**
Aircraft utilisation (hours per day)		13.00	10.37	8.80	11.00	10.10
Most populous aircraft type (in % of total fleet)		26.47%	29.17%	33.33%	67.92%	30.77%
	Most populous aircraf	18	14	15	36	20
	Total Fleet	68	48	45	53	65
Aircraft sectors per day		2.79	7.88	3.18	3.36	3.67
	Total Fleet	68	48	45	53	65
Labour Index Score		**5.36**	**5.01**	**7.00**	**10.00**	**0.48**
Pax per employee		612	715	1212	3108	284
	Passengers	6,200,000	6,697,000	4,179,000	6,781,000	8,795,000
	Employee	10,126	9,371	3,449	2,182	30,943
Employees per aircraft		149	195	77	41	476
	Employee	10,126	9,371	3,449	2,182	30943
	Aircraft	68	48	45	53	65
ASK per employee ('000)		3,193	3,600	4,477	8,831	932
	ASK	32,331,292,847	33,739,065,578	15,440,906,953	19,268,975,671	28,837,138,678
	Employee	10,126	9,371	3,449	2,182	30943
Market structure index		**10.00**	**7.95**	**6.93**	**8.44**	**6.38**
Average HHI on capacity (seat)		0.86	0.78	0.76	0.79	0.75
Median HHI on capacity (seat)		1.00	1.00	0.96	1.00	0.89
Average no of competitors per route		0.73	0.94	1.05	0.88	1.10
Capacity share of seats		0.83	0.76	0.73	0.75	0.72