

Success Factors for developing Air cargo in African Markets

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Abstract

Air cargo in African countries plays a relevant role in developing intra-African trade and enhancing economic prosperity. Unlike its great potential and expansion in foreign countries, Africa remains the weakest region worldwide. In 2016, according to ICAO's forecast, scheduled air traffic Compound Average Annual Growth Rate (CAGR) in Africa will reach 2.2 percent Freight Tonne Kilometre (FTK) by 2042 while world air cargo will grow over the next years by 4.2 percent per year. Despite of several researches related to airfreight industry little have analysed the factors influencing the growth of African air cargo market. This paper aims to fill a gap of literature by identifying the factors leading the development of African air traffic. Moreover, an insight is provided into the actual five cities concentrating the intra-African network namely, Cairo, Johannesburg, Nairobi, Addis Ababa, and Lagos. The results and interpretations have a significant importance for aviation stakeholders who aim to enhance airfreight's flow in African markets.

Keywords

Air cargo, African aviation, air cargo in Africa, transportation, air cargo Hub, research methods, research methodology

1. Introduction

There is a close statistical correlation between the growth of Gross Domestic Product (GDP) and growth in world air cargo (Boeing, 2017). In 2015, global Gross Domestic Product (GDP) slowed to around 3 percent and consequently dragged down all mode of freight transport, particularly air cargo transportation. Since the global economic recession of 2009, airfreight has struggled to ensure a positive's growth rate. However, according to recent forecasts from the International Air Transport Association (IATA) and the International Civil Aviation Organization (ICAO) positive outlook is expected through 2035 at a rate of 4.2 percent annually (Djibo, B., 2017). Hence, world air cargo will more than double over the next 20 years. Despite of the low cost prices offered by maritime sector, air transport remains the reliable and speed solution to transport a high value goods (Boeing, 2017), as it accounts less than 1 percent of world trade tonnage which represents around 35 percent of world trade value. In spite of the on-going challenges related to air cargo, fundamental growth factors remain in place in order to increase markets' connectivity across the continents (ICAO, 2015). Boeing has reported in 2017, that markets linked to Asia will lead the growth of all other regions, especially African ones. Even if Europe is Africa's principal air trade partner, because of its proximity, Asia air trade with Africa will reach 14.4 percent, as the region especially China has built strong commercial ties with intraregional Africa at a rate of 12.9 percent.

In 2017, Vladimir Zubkov as a secretary general of The International Air Cargo Association (TIACA) argued that "once the air cargo traffic in a country increases by one per cent, then trade grows by 6.3 percent". To enhance air cargo traffic in Africa, the continent is implementing free trade agreements in order to liberalize market access (Boeing, 2017). However, according to African Airlines Association, in 2017 the countries have not fully implemented the Yamoussoukro Decision (YD) which has aimed to open skies across the continent. Coupled with

the lack of liberalization, and given the growth of African markets, investors and stakeholders have to make sensitive decisions. This is very relevant since intra-African transportation infrastructure, which drives to an efficient intra-African trade, constitutes a major challenge in the continent. Regulatory framework and safety oversight impede as well the development of African air cargo market. Overall, taking all of these factors into account can contribute in expanding air cargo market across the continent. The remainder of the paper is organized as follows: Section 2 gives a short review of air cargo literature. Section 3 presents the research framework adopted. Section 4 provides a detailed overview on African air cargo market, the current air transport policy across the continent, the major African airports leading the growth, and the vital key enablers of airfreight expansion. Finally, section 5 highlights the main conclusions and suggestions for future researches.

2. Literature review

This section reviews a literature of few selected articles in the area of air cargo transportation, especially in African countries. Air transportation is not only an essential input for passenger, it represents also a vital ingredient for industries relying on airfreight services (Button, K., Taylor, S., 2000). After the emergence of globally integrated just-in-time production management, which was considered as a logistics system philosophy for better customer service (Zhang, A., Zhang, Y., 2002), air cargo is considered as a vital component, because of its speed and reliability. Institutionally, international aviation has been governed since the Chicago convention in 1944 by a bilateral air services agreement (ASAs) (Zhang, A., Zhang, Y., 2002). In 1978, US domestic air transportation has been deregulated when the US's "open skies" policy was applied (Button, K., 2009). From 1979 international air cargo and air passenger transportation were gradually liberalized (Button, K., Taylor, S., 2000). This deregulation (or in Europe, "liberalization") has generated significant economic benefits and has stimulated within Europe from the mid-1990s, the emergence of the large free trade area in air transportation service (Button, K., 2009). Moreover, airports and airfreight sector that provide air transport services, must be linked with inter-modal transfer facilities and warehousing service for a door-to-door delivery to enhance an efficient supply chain (Yuan, X. M., Low, J. M., Tang, L. C., 2010). In a competitive market, airlines have been adversely affected (Richman, A., Lyle, C., 2005). However, air transportation's growth is still developing in the new economy in spite of all of these limitations.

As a crucial enabler of the global economy (Kasarda, J. D., Green, J. D., 2005), air Cargo's volume has doubled in every 10 years since 1970 (Chang, Y. H., Yeh, C. H., Wang, S. Y., 2007) and has expanded faster than passenger during 1995 and 2004 (Wong et al., 2009). Given the difference between air passenger and cargo, stakeholders have suggested in 2001 to fully liberalize air cargo among the five continents (Zhang, A., Zhang, Y., 2002) through multilateral services liberalization program. Thus, (Kupfer et al., 2011) have argued that air cargo's sustainable growth was due to numerous developments, at the demand and supply side of the (liberalised) international airfreight market, including smaller volumes combined with a high average value, growing global trade, technological progress, downward pressure, and changing production processes. Despite air cargo's worldwide expansion and Africa's economy fast growth over the past 50 years, the continent remains the weakest region. Between 2008 and 2015, airfreight has reached from 1 800 freight Tonne- Kilometres Millions to nearly 2 900 freight Tonne- Kilometres Millions (Bofinger, H. C., 2017). In 2016, Africa's share of freight Tonne- Kilometres has accounted just 1.6 percent (ICAO, 2017). The literature evaluating the development of African air cargo transportation continues to grow as more researches focuses on the liberalization of air services on individual countries (Adler, N., Njoya, E. T., Volta, N., 2018; InterVISTAS, 2014). Given the few evidences on post-Yamoussoukro liberalization, African Union has stated that the slow pace in the implementation of the Yamoussoukro Decision has been a concern to the Policy stakeholders (African Union, 2017).

Moreover, as reported by (Adler, N., Njoya, E. T., Volta, N., 2018) the major key factors enabling air traffic growth are airport infrastructure, air traffic management's organization and a culture of safety. As the continent faces several challenges in the development of its transport infrastructure and transport services (African Union, 2017), the African Union envisages a long-term transport vision. In line with policies, defined in its Agenda 2063, this vision aims to improve regional connectivity, develop infrastructure and services by integrating the continent in a safe, secure and an environmentally sustainable manner. Likewise, during the participation of the African Civil Aviation Commission (AFCAC) and African members in the 39th General Assembly of International Civil Aviation Organization (ICAO), it was identified that also market access liberalization, security and facilitation, infrastructure development, capacity building for air cargo personnel and adherence to international instruments constitute the major problems in the country (Djibo, B., 2017). In this context, the International Civil Aviation Organization (ICAO) and the European Union (EU) have committed to support the African Union and African Regional Economic Communities in achieving efficient and sustainable aviation development in Africa (African Union, 2017). Overall, despite the importance of air transport as the main mode of international flows in Africa and the

importance of air cargo comparing to other modes of transport (ATAG, 2003) there is a lack of researches related to its expansion in African countries. .

3. Research framework

Once recognizing a problem that holds a deep interest, it will be relevant to evaluate its importance through numerous Criteria, namely: significant problem which aims to complete current knowledge or resolve incoherencies in previous researches, problem that can lead to further research, reachable problem that can be analysed empirically, ethically appropriate problem, and suitable problem for researcher by having the available resources to carry the study through achievement. (Ary, D., Jacobs, L. C., Irvine, C. K. S., Walker, D., 2018). This systematic approach must be developed under a scientific method, which constitutes a part of the research methodology, consisting on identifying and defining board problem, formulating hypotheses, collecting data, analysing the facts and reaching conclusions towards the concerned study (Sekaran, U., Bougie, R., 2016).

Through research methodology we can answer to a number of questions, for instance, why the research problem has been identified, why the hypothesis/criteria has been formulated, what data has been collected, which analyses have been undertaken and what interpretations have been adopted (Kothari, C. R., 2004)

3.1 Define the problem area

Since the research is a contribution to an existing knowledge, it is important to start by a determined aim to properly define a research area and select a research problem. This step of highest importance have to be developed by gathering information about the factors related to the identified problem, in order to plan a strategy and find answers to all questions. Defining a problem should be in a systematic matter through, identifying the problem in general way, narrowing problem's origin and nature, examining available literature, developing ideas and finally rephrasing the study into analytical or operational terms. (Kothari, C. R., 2004)

3.2 Develop criteria and collect Data

After a clear definition of the problem, it is necessary to state the working criteria that should be specific to the study in order to delimit the research's area. Working hypotheses should be examined and clearly defined to develop their influence in explaining problem's origins and solutions. However, some problems do not need testing variables. (Kothari, C. R., 2004). In our case, we will examine criteria that are not testable.

After criteria's formulation, it is appropriate to obtain the data for each. Two types of data collection are used in researches: primary data collected for the first time through experiment or survey, and secondary already collected and statistically processed by someone else (Kothari, C. R., 2004)

3.3 Analyze and interpret

After collecting data, this step is crucial to compare and analyse variables in order to answer the research's questions (Kothari, C. R., 2004). After analysing data, we will arrive to build a theory. Since the study arrives at conclusions, recommendations based on these deductions can be proposed.

4. Results and discussions

4.1 Define an overview about air cargo industry in Africa

African air transportation -according to aviation bodies considered as the most authoritative sources of aviation forecasts, Boeing, Airbus and the International Civil Aviation Organization (ICAO) - constitutes a vital corridor for many countries inside the continent (Abate, M., 2016). Boeing has forecasted that the region's air trade originating in or destined to Africa was estimated at 1.8 billion tonnes in 2015 (Boeing, 2017). Hence, aviation's growth in Africa plays a relevant role in facilitating trade and enabling African firms to link into global supply chains (InterVISTAS, 2014). Aviation sector helps to enhance air connectivity, and thrive the economic and physical integration of the continent (Njoya, E. T., 2016). As a catalyst for African economics' development, a number of favourable conditions have driven the expansion of African aviation's industry. With 20 percent of the world's total land mass and about 16 percent of the global population (Boeing, 2017-2036), combined with its stability, its wealth in terms of natural resources and its trade activity the continent represents a potentially huge market. Given these geographical and demographical characteristics, with 30.2 ml km² of landmass and 1.1 billion of population size (Abate, M., 2016) across 54 countries, Africa's aviation market has a tremendous growth potential (Fig 1). However, despite of its potential and its significant development over the last decades, the continent represents only

1.6 percent of Freight Tonne-Kilometres, which is the lowest cargo share compared to other continents (Fig 2; Djibo,B., 2017).

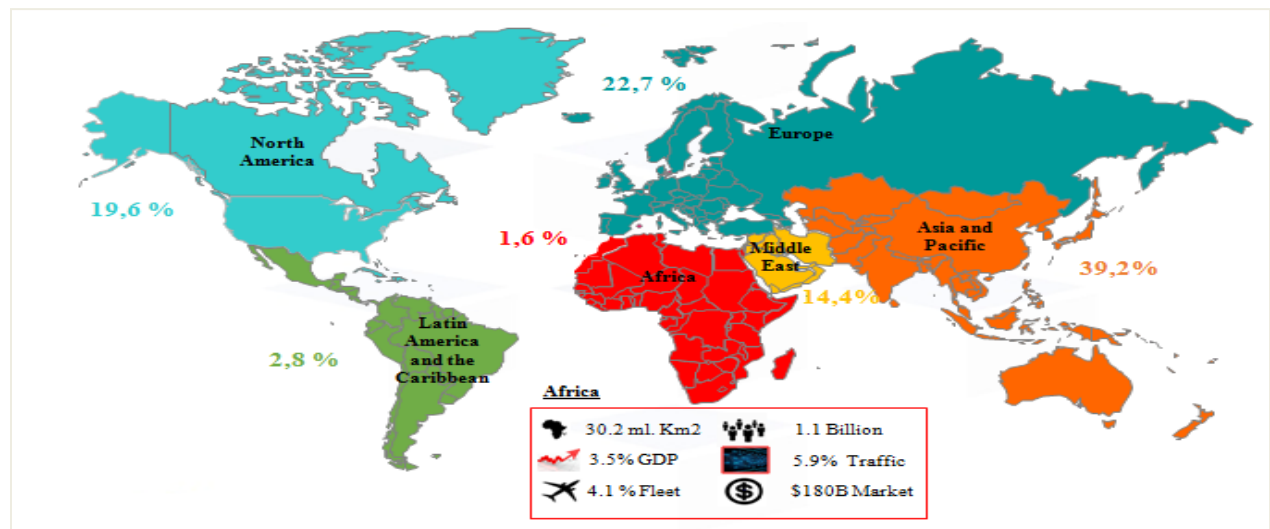


Figure 1. Africa's aviation and Share of Freight Tonne-Kilometres in 2016. Source: Illustration by the author based on information from (Djibo, B., 2017) and (Boeing, 2017-2036)

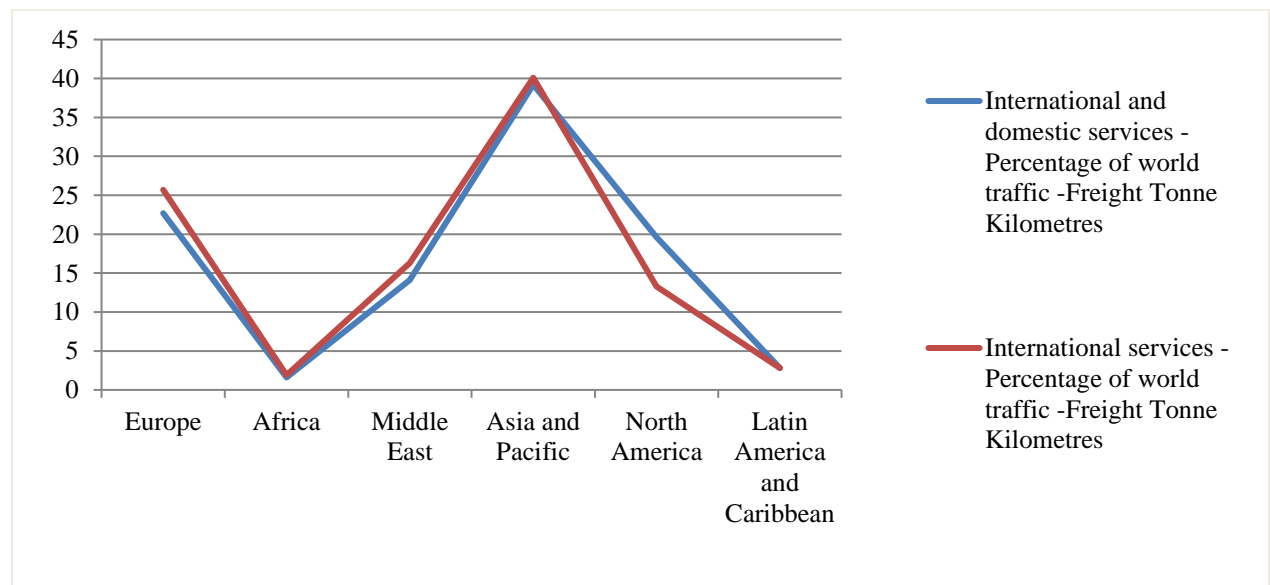


Figure 2. Regional distribution of scheduled traffic in 2016. Source: Illustration by the author based on information from (ICAO, 2016)

Looking forward African Airlines Association analysis (AFRAA, 2016) airfreight industry has increased in 2015 by 2.3 percent year on year, with a low percent of freight load factor at 47.7 percent. Moreover, African airlines' performance has dropped by 1.4 percent year on year as scheduled freight operations have represented 1.56 percent of total global freight. In spite of air cargo challenges during 2015 characterized by global trade's decrease and weak African economy, Boeing has argued that airfreight will constitute an important component of Africa's air service both within Africa and between regions, likewise intra-African air cargo will improve in regional trade and cross investments among the continent (AFRAA, 2016). With at least 2900 airports across Africa, 1.8 Million Tonnes of

freight have moved through African airports in 2016 and have grew up by 3.7 percent in terms of total freight carried worldwide (Djibo, B., 2017). As gateways to Africa for inter-continental freight, Africa's busiest airports include Cairo, Johannesburg, Nairobi, Addis Ababa and Lagos (Fig 3). However, the majority of African countries depend on foreign African airlines, given that 80 percent of non-African airlines carried intercontinental traffic within Africa and other continents (Njoya, E. T., 2016; Chingosho, 2013). This imbalance between African airlines is due, with a consensus, to insufficient integration and a lack of an open sky policy over the continent (Adler, N., Njoya, E. T., Volta, N., 2018). Hence, these non-physical barriers have impeded significantly the expansion of intra-African air traffic. As slow pace of liberalization remains the major limitation of intra-African connectivity, African members for civil aviation have recognized the need for liberalised regional market. Following the foreign liberalised aviation policies, particularly in the US and Europe, combined with the manifest failure of many state-owned airlines in Africa (Martini, G., Scotti, D., 2017); African ministers have adopted in 1999 several policies aiming to open intra-African market including the 5th freedom for African carriers, in order to improve safety and security standards, leading finally to Yamoussoukro Decision (YD) (Njoya, E. T., 2016).

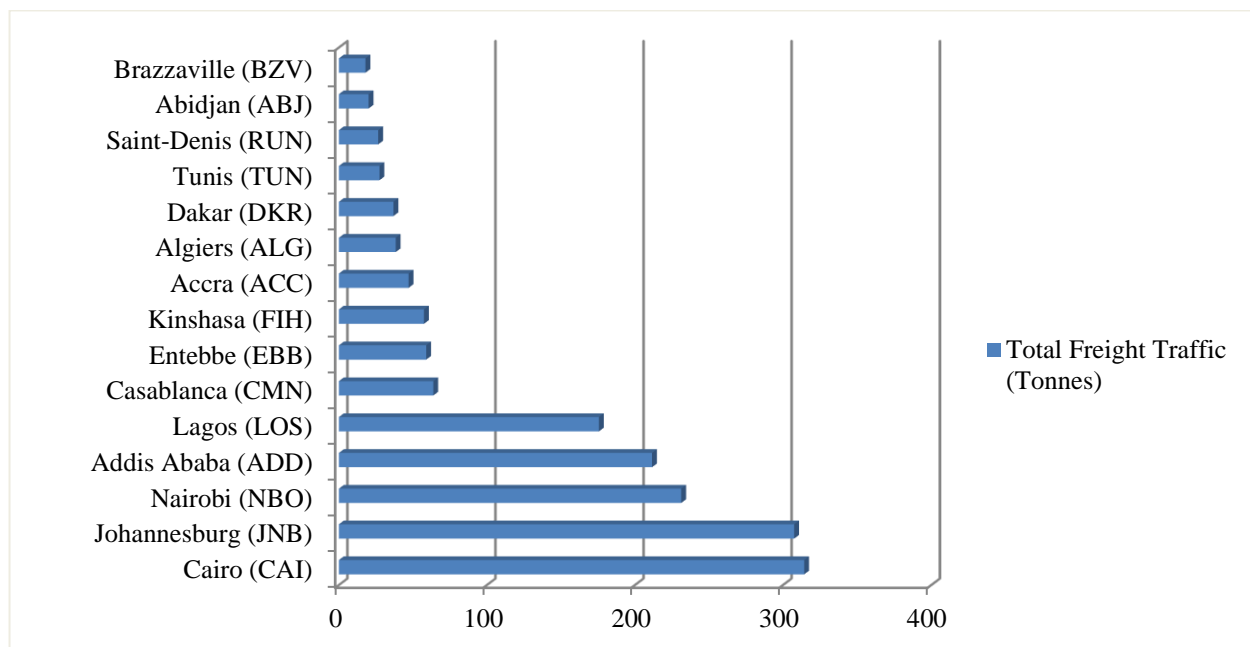


Figure 3. Ranking of African Airports Total Traffic in 2016. Source: Illustration by the author based on information from (Djibo, B., 2017)

- African aviation policy

Despite its large land areas and its demographic potential, air cargo share in Africa remains the weakest among the continents. Non-physical barriers between African countries affect this slow trend of freight growth. Institutionally, to enhance air transportation, particularly air freight, at the continental level efforts have been made to liberalise intra-African transport market. The transport policy through the continent has followed the path of the larger markets of North America and Europe in terms of transport deregulation such as the US airline deregulation and the EU single aviation market (Njoya, E. T., Christidis, P., 2017). After the US deregulation in 1970s, the country has started a liberal open skies policy and has concluded 100 Open Skies agreements around the world including several African countries such as Ghana, Rwanda, Senegal and Uganda (Brown, V., 2017). In 1993, EU has created also a single market to enhance airlines' services as market access freedom and fixation of capacity and tariffs within its borders (Abate, M., 2016). Subsequently, the first step toward Aviation liberalisation in Africa was the 1988 Yamoussoukro Declaration, which aims to consolidate airlines integration, and to cease gradually traffic rights. In 1999, the Yamoussoukro Declaration has evolved into Yamoussoukro Decision (YD), which was adopted and signed by heads of states responsible for civil aviation, in order to liberalise progressively the access to intra African market and open air within the continent (Martini, G., Scotti, D., 2017). As defined by (Njoya, E. T., 2016) "An open-sky treaty can be an agreement under which the carriers of two or more nations are allowed to operate any

route between the two countries without restrictions on capacity, frequency or price, and to have the right to operate 5th and 6th freedom services". Indeed the Yamoussoukro Decision (YD) aims to eliminate non-physical barriers, restrictions on access, capacity, frequency and fares, guarantee fair competition restrictions on access, provide rights from the first to fifth freedom and accomplish international safety standards. Currently the Decision conducts only intra-African transport. Most international air services in Africa are governed by bilateral air services agreements (BASA) that put restrictions on market access, tariffs, traffic rights, capacity, frequency and foreign airlines' ownership (Abate, M., 2016). In addition, Bilateral Air Service Agreement (BASA) negotiated between the EU and the various African governments deal intercontinental air services between both continents (Njoya, E. T., Christidis, P., 2017).

As shown in the table.1, comparing provisions of Yamoussoukro Decision (YD), with traditional bilateral air services agreements and the liberalisation framework of EU, YD is still more restrictive than other liberalised regimes. While EU allow until the 9th freedom, the decision provides just until the 5th freedom. Moreover, Yamoussoukro Decision has been signed by just 44 countries over 54. Within the 10 non signatories that are Djibouti, Equatorial Guinea, Eritrea, Gabon, Madagascar, Mauritania; two of them namely South Africa and Equatorial Guinea have implemented the YD, by means of their (sub) regional economic communities (Njoya, E. T., 2016; Schlumberger, 2010). As shown in comparison with other liberalised regimes, YD has been partially implemented in Africa. It has been fully implemented in West and Central Africa unlike in north and Southern the continent (Adler, N., Njoya, E. T., Volta, N., 2018). A number of factors have influenced the effective implementation of YD as argued by (Njoya, E. T., 2016) namely, fragmentation, poor-cooperation, dependency on the former colonial powers as a larger intra-African route network is still constrained by regional linguistic and colonial ties, and finally a lack of strong institutional structure. In conclusion, the limited and fragmented African liberalisations combined with the slow implementation of YD have impeded African airlines to compete in the pan-African level.

- African Airlines industry

Based on the International Civil Aviation Organization (ICAO), African Airlines are dominated by five carriers namely, Ethiopian Airlines, South African Airways (SAA), Egypt Air, Kenya Airways and Air Mauritius (Fig 4). Positive's growth rates were the trend in 2016 as the continent has grew up by 2.8 percent in total Freight Tonne Kilometres (FTK) and the Top 15 African airlines by 3 percent. The most profitable airline in the continent is Ethiopian Airlines focusing 44.4 percent of total FTK in Africa and operating scheduled services to 92 international destinations of which 51 within African continent and 19 domestic destinations (Adler, N., Njoya, E. T., Volta, N., 2018). (AFRAA, 2016) has in addition reported that the low rate of freight load factor has influenced negatively freight yields. While the capacity measured in available FTK increased by 5.8 percent the freight load factor remains at 47.4 percent. The poor load factors in African countries characterize the intra-African imbalance and a lack of networks coordination within the continent. Given that the continent does not have competent airlines to operate at international level, foreign airlines have dominated African market. Hence, the majority of foreign airlines carried traffic within Africa more than African ones (Adler, N., Njoya, E. T., Volta, N., 2018).

As stated by (Njoya, E. T., 2016), African airline's industry has known at least five developments. After intra-African market consolidation by some airlines and the collapse of other ones, new African carriers have more than doubled, thus the continent has seen the emergence of private carriers operating in domestic and regional markets. In addition, low cost sector has been developed as Low Cost Carriers (LCCs) provide much air traffic growth. Moreover, (Heinz, S., O'Connell, J. F., 2013) have analysed LCC model's applicability in Africa and concluded that full service network carriers and regional ones are still the most stable business in the continent. Consequently, to foster this growth it is relevant to enhance African airports infrastructure and improve regulatory regimes. (Adler, N., Njoya, E. T., Volta, N., 2018; Abate, M., 2016).

- African Infrastructure and insufficient equipment

Infrastructure is often listed as a catalyst for economic growth. Although, airport infrastructure is identified as an underlying factor for growth, it has been always considered as a major challenge to air traffic's development in the continent. Recently, the Programme for Infrastructure Development in Africa (PIDA) has launched a study that has focused partly on the African Regional Transport Infrastructure Network (ARTIN), of 53 airports handling 90 percent of Africa's air traffic in order to identify infrastructure gaps in the continent. It has been reported that air traffic will grow significantly by 2040, and 17 airports capacity will be exceeded by 2020 and, thus all airports need to be expanded or supplemented by additional ones by 2040. Furthermore, the study has found that there is a lack of

equipment in a number of regional airports to handle larger aircraft. PIDA has also, faced the risk related to finding a consensus with stakeholders to locate an urgently needed transport infrastructure namely, hub airports. Moreover, labour supply is one of the major problems to enhance African infrastructures, including air traffic control. For instance, the continent needs over 20 000 additional pilots to meet the growth predicted by Boeing. Added to this, most of African airports have a poorly quality or are underutilized (Martini, G., Scotti, D., 2017). Expensive infrastructure is also one of the major challenges in the continent (Bofinger H.C., 2017). Although, even if private sector has emerged Africa's aviation, there is a lack of sufficient funding.

Table 1. Comparison of the Yamoussoukro Decision (YD) Source: Illustration by the author based on information from (Njoya, E. T., 2016) and (Abate, M., 2016)

Provisions	Liberalized bilateral	EU (third deregulation package April 1997)	Africa (YD of 1999)
Airline designation	Multiple	No procedure for airlines of EU countries who can freely operate in any EU country	At least one by states under the below conditions : -The designated airline must be legally constituted in accordance with the laws of a member state -The headquarters and main operating activities of the designated airlines should be in the countries concerned
Traffic right	Full 5 th freedom (open market access that allows flying on any route between two states)	Authorisation of cabotage. These liberalisation measures only concern EU airlines	Full 5 th freedom in Africa as of 2002. The Decision does not oblige the signatory state to grant cabotage rights.
Capacity/ Frequency	Free choice of aircraft capacity and frequency	No limitations on frequencies and type of aircraft. This freedom is often technically limited by the absence of available slots in the big Europeans airports	Free choice of aircraft capacity and frequency
Ownership/ Licensing	More liberal provision on foreign ownership	Ownership of an EU airline by a non-EU national must be limited to 49.9% Multiple licenses granted to member states only if carrier is located in EU.	Substantially and effectively owned by nationals or government of the contracting states, or state parties to the YD
Fares/Tariffs	Double Disapproval	Tariff freedom limited to intra-European routes. No restriction on fare	Double Disapproval Tariff freedom limited to eligible airlines. States can reject excessive increases and low tariffs that adversely affect the economic viability of airlines

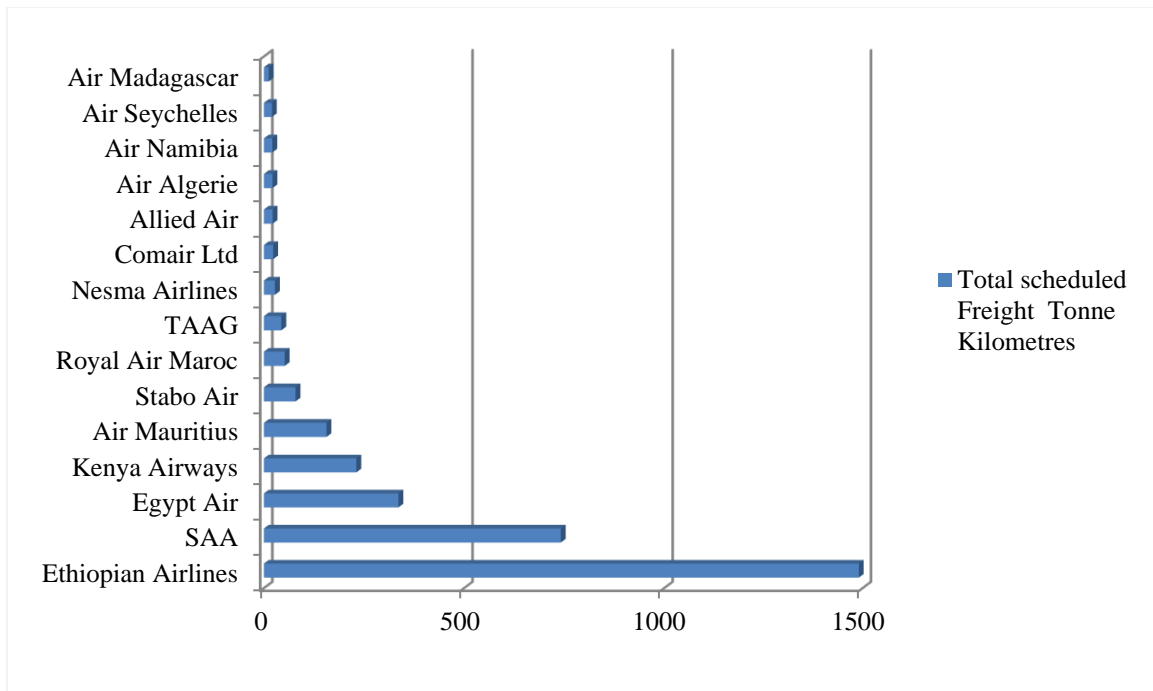


Figure 4. Ranking of African airlines total traffic in 2016. Source: Illustration by the author based on information from (Djibo, B., 2017)

4.2 Key factors driving Africa's air cargo growth

In 2017, the “Second ICAO meeting on Air Cargo Development in Africa” has been organized in Addis Ababa by the International Civil Aviation Organization (ICAO) in cooperation with the International Air Cargo Association (IATA), Ethiopian Civil Aviation Authority, and Ethiopian Airlines to discuss the African air cargo potential and the factors leading its growth. The slow implementation of Yamoussoukro decision resulting lower connectivity and less competitiveness was widely discussed by the stakeholders. Furthermore, Chris Welsh, secretary general of Global Shippers' Forum has argued that infrastructure investment is a vital component to foster cargo activity among the continent, and Vladimir Zubkov, secretary general of TIACA, has highlighted that it is relevant to review and improve regulatory agencies to compete internationally. Thus, improved connectivity, enhanced infrastructure investment and favorable regulatory reform are the major key enablers of African airfreight development.

- Enhancing Air Connectivity: implementation of Yamoussoukro Decision

Although, air transport contributes in improving and connecting markets, Yamoussoukro decision was committed in 1999 by 44 signatory countries. However, the implementation of the agreement has been slow and incomplete because of several issues namely, protectionist policies, Discriminatory practices that have promoted the emergence of non-African airlines in the continent, Severe restrictions imposed by foreign regulators as several airlines have been prevented to fly to EU due to lack of confidence in safety, and finally the efficient utilization of infrastructure that has been hindered by non-physical barriers.

In spite of these impediments, positive benefits have been realized under the liberalization of African air market within the continent and the rest of the world. Ethiopian Airlines become one of the largest in Africa as on intra routes, Ethiopians benefit from 10-21% lower fares and 35-38% higher frequencies (InterVISTAS, 2014). In this context it was confirmed by (Brown, V., 2017) that 35 percent of fares will drop if 12 African countries open their skies. Moreover, improved connectivity mitigates the problems faced by 16 African landlocked countries, attracts not existing industries and activities in a region, consolidates networks through the elimination of a number of low-density routes, and provides the opportunity for air carriers to grow their operations. Even if liberalization influences adversely the existing carriers, it offers a wider pool for others to be competitive by expanding into new markets. Hence, better flight connections, and higher frequencies help to increase the demand for existing products, especially high cargo value, often times perishable or time-sensitive. Furthermore, air connectivity stimulates economic growth and generates employment opportunities from increased trade, investment and productivity. Intra-

African airlines service has been underperformed, because of a lack of liberalization policies. Thus, large network carriers serving African markets rely on connectivity through a specific hub (e.g., Addis Ababa, Johannesburg, and Nairobi) and are members of global marketing alliances and strategic partnerships. These alliances play a vital role in providing connectivity over a third country hub. Low Cost Carriers (LCCs) have also grown rapidly in a liberal market and have been developed among Africa to stimulate global access and increase point-to-point traffic. As reported by (InterVISTAS, 2014); 1 percent increase in a nation's air connectivity increased the nation's productivity in each year by 0.0068 percent. In order to foster air liberalization a Single African Air Transport Market (SAATM) has been created through the Yamoussoukro Decision.

- Developing Infrastructure and labour investments

Open skies' success depends heavily on airports' investments, labour supply and equipment infrastructure. Presently, the quality and availability of infrastructure varies within African countries. As reported by (Gleave, S.D., 2014) for Infrastructure Consortium for Africa, a number of hubs have been established in North, East and South Africa such as Cairo, Addis Abba, Nairobi and Johannesburg, with reasonable infrastructure, however, while other airports provide an important connectivity (Lagos, Lomé), infrastructure quality remains poor preventing them to be developed into operational hubs. The study has further demonstrated that improved infrastructure has a positive impact on fuel costs for African carriers. Moreover, in Western Africa, the author has argued, relying on several sources, that terminal capacity represents the major impediment for aviation's development. In 2017 (Martini, G., Scotti, D., 2017) have confirmed that even if air traffic navigation which includes air traffic control is supervised by each country separately, 19 members of the Agency for Aerial Navigation Safety in Africa and Madagascar coordinate their operations. On the one hand, it was highlighted that South Africa's air traffic control reached the 15th position in the world in terms of infrastructure, while other countries as Morocco, Tunisia, and Ethiopia are in the Top 60. On the other hand, radar equipment is often non-existent and radio communication is often spotty among large countries in the continent. Moreover, adds to the issue of labour supply, there is a huge need of qualified aviation workers.

To finance airports 'investment and improve their efficiency, Public-private-partnerships (PPPs) has been widely fostered. Furthermore, airport development has been enhanced by the engagement of International agencies, both in terms of developing new facilities and significantly upgrading the existing capacity. Overall, China and the Center for Asia Pacific Aviation (CAPA) are becoming the major players in developing infrastructure and improving African airports (Martini, G., Scotti, D., 2017). Moreover, there are different models of financing air cargo hubs, for instance through business partnership, through land lease or investment by attracting operators, relying on airport authorities or handling infrastructure by handler (rolling material, fridges). Overall, Improved infrastructure, will facilitate domestic and international trade and enhance Africa's competitiveness. Financial institutions plays a significant role in its development.

- Regulatory reforms

In the light of the gradual liberalization aviation's market, African countries have recognized the need of new policies. In terms of safety oversight, Africa still struggling with the problem of hull losses, as according to International Air Transport Aviation (IATA), aircraft hull losses are twelve times higher in Africa than the U.S. and Europe and six times higher than Asia or Latin America (Brown, V., 2017). Moreover, (Martini, G., Scotti, D., 2017) argued that in 2005 almost 25 percent of the world's aircraft crashes occurred in Africa because of numerous factors, namely old aircrafts (Bofinger H.C., 2017). Hence, recent developments have been made in aviation safety, namely from ICAO's Universal Safety Oversight Audit Programme (USOAP), and US FAA's International Aviation Safety Assessment (IASA) programme that audit safety oversight in countries, and also the IATA Operational Safety Audit (IOSA) registry which audits individual airlines' safety mechanisms. Adds to these reforms the EU blacklist, which contains countries or individual airlines that are prohibited from entering EU (Bofinger H.C., 2017). Finally, the IATA Safety Audit for Ground Operations (ISAGO), which lists all ground handling, companies (AFRAA, 2016). In 2012, additional reform has been established namely, the Abuja Declaration on Aviation Safety in Africa signed by the African Union and implemented in cooperation with IATA. Moreover, rigorous institutional approaches must be established for Regulators, airport authorities, and airlines to enhance safety oversight. In 2016, as reported by AFRAA Africa wings, there were no safety related fatal airline accidents in Africa due to stakeholders' efforts. Cargo security principles require that goods should be screened or originated from a secure supply chain whose players are air carriers, regulated agents, known consignors and airport authorities. Moreover, additional security measures must be enhanced for high-risk cargo (Djibo, B., 2017)

In terms of customs, World Customs Organization (WCO) highlighted during the second ICAO meeting that better cooperation with ICAO is required to enhance security and facilitation in air cargo. Furthermore, to enable risk

evaluation and targeting across all Customs risks from manifest data, the IT application Cargo Targeting System (CTS) was developed and the working with Union Postal Union (UPU) is required. The UPU has come up with several cooperation as with International Civil Aviation Organization (ICAO), International Air Transport Association (IATA), and World Customs Organization (WCO). Adds to national security, this latter cooperation aims to improve the efficiency and effectiveness in the area of trade facilitation.

In addition, CHAMP Cargosystems, known under CHAMP Cargosystems, provides a range of integrated IT solutions and distribution services for the air cargo, such as Customs Arrival Notification / Declarations. The Electronic Single window has been also revealed as important component to ease the processes for traders and facilitate timely movement of goods.

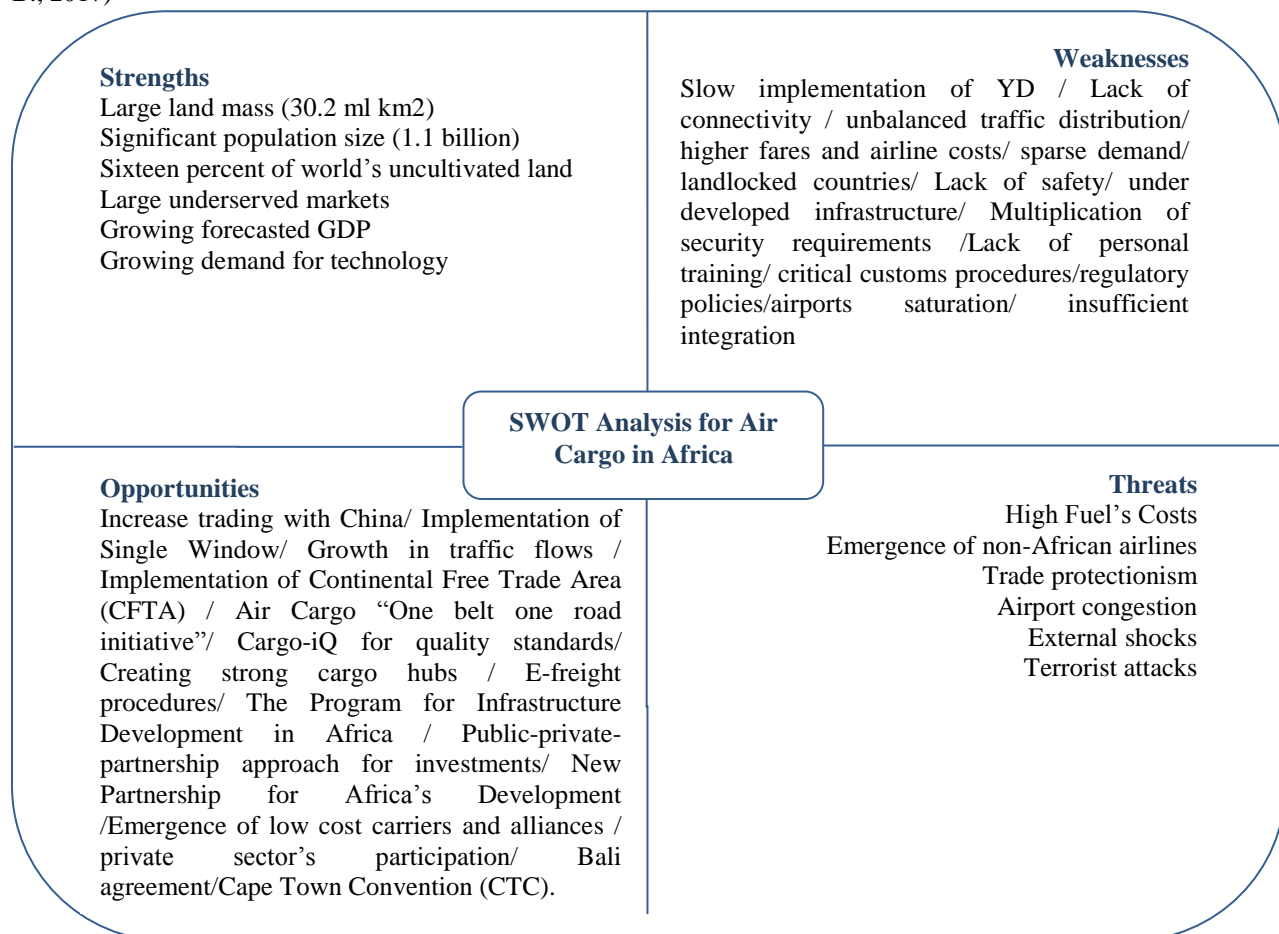
IATA regulatory initiatives to support air cargo in Africa are very relevant, by implementing Simplifying the Business program (StB) to accelerate change in the areas of Digitalization “e-Freight and e-AWB” Visibility “interactive cargo” and Safety “smart facility and Air cargo incident data base (ACID)”.

4.3 Analyses and interpretations

African airfreight has a tremendous potential that could bring significant benefits, however several challenges impede its development at the regional and international level. Adds to numerous researches, stakeholders during the second ICAO meeting on air cargo development in Africa, have analyzed airfreight market. Hence, the below SWOT analysis was deduced by the author (Fig.5).

SWOT analysis reveals four different strategies namely; **Strengths-Opportunities**, which consists on working on internal strengths to pursue opportunities, it is considered as the ideal situation where forces go in the same direction that opportunities : Offensive expansion’s strategy. **Weaknesses-Opportunities** aims to improve internal weaknesses in order to follow up opportunities. **Strengths-Threats** ought to use internal strengths against external threats, or convert threats into opportunities by investing the necessary resources: Defensive strategy. **Weaknesses-Threats** consists on minimizing weaknesses to become less vulnerable to external threats: Repositioning or diversification strategy.

Figure 5.SWOT Analysis of African Air Cargo. Source: Illustration by the author based on information from (Djibo, B., 2017)



The aviation in African market is a vigorously growing sector of the global regions, as the continent is home of 15.96 percent of the world's population across 54 countries with a large land mass, almost 60 percent of world's uncultivated land. As argued by Dr. Elijah Chingosho, AFRAA Secretary General, airline industry has grown after a huge recession during the 2008-2009 and owed to enhance air cargo demand. However, African airfreight's share stills the weakest in the world. The major barrier impeding its growth is the incomplete implementation of Yamoussoukro liberalization. The skies have not been fully opened to improve connectivity, sustain accessibility, and facilitate airlines' consolidation. On the one hand, full deregulation of African Market should be complemented for instance by high security and facilitation standards as the use of single window, sufficient infrastructure by relying on PIDA program. It can be also complemented by adopting several programs for safety oversight assessments and coming up with new policies as Bali agreement on trade facilitation aiming to boost e-commerce and clearance of goods, or Cape Town Convention consisting on facilitating financing and acquisition of assets. In addition, implementation of drones can be more effective than airplanes to reinvent trade. On the other hand, the factors affecting adversely air market as argued by Dr. Elijah Chingosho are terrorist attacks within African countries, high taxes and fees, and high fuel price. Furthermore, protectionism, lack of cooperation between African airlines, and low implementation of e-freight hindered significantly cargo growth.

5. Conclusion

African aviation has experienced several policies leading to liberalise intra-African air transport market. The partial implementation of Yamoussoukro Decision (YD) has impacted adversely Aviation industry among the continent. As a result, although air traffic flows have grown significantly, numerous challenges have hampered industry's development, such as regulatory restrictions, high fares, inadequate infrastructure, lack of safety and facilitation, and poor security. Adds to these constraints, African Airlines' behaviour has been affected: while intra-African routes have been widely consolidated, small aircraft routes have been abandoned and some African carriers have built new hubs such as Egypt Air, Royal Air Maroc, South African Airways (SAA), Ethiopian Airlines and Kenya Airways. The development of hubs has been successful in Eastern and Southern Africa, than in Central and Western the continent. Hence, regional traffic distribution has been characterized by a notable imbalance. Beyond those serving the market, namely Cairo and Johannesburg, strengthening, development of further competing hubs especially of cargo activity within the continent will play a vital role in enhancing air cargo industry and creating a stronger market at regional and international level.

References

- Button, K., Taylor, S., International air transportation and economic development, *Journal of air transport management*, vol. 6, no. 4, pp. 209-222, 2000
- Button, K., The impact of US-EU "Open Skies" agreement on airline market structures and airline networks, *Journal of Air Transport Management*, vol. 15, no. 2, pp. 59-71, 2009
- Yuan, X. M., Low, J. M., Tang, L. C., Roles of the airport and logistics services on the economic outcomes of an air cargo supply chain, *International journal of production economics*, vol.127, no.2, pp.215-225, 2010
- Richman, A., Lyle, C., The Economic Benefits of Liberalising Regional Air Transport—A Review of Global Experience Headline Report, *Commack Trust*, 2005
- Kasarda, J. D., Green, J. D., Air cargo as an economic development engine: A note on opportunities and constraints, *Journal of Air Transport Management*, vol.11, no.6, pp.459- 462, 2005
- Chang, Y. H., Yeh, C. H., Wang, S. Y., A survey and optimization-based evaluation of development strategies for the air cargo industry, *International Journal of Production Economics*, vol.106, no.2, pp.550-562,2007
- Wong, W. H., Zhang, A., Van Hui, Y., Leung, L. C., Optimal baggage-limit policy: airline passenger and cargo allocation, *Transportation Science*, vol.43, no.3, pp. 355-369, 2009
- Zhang, A., Zhang, Y., Issues on liberalization of air cargo services in international aviation, *Journal of Air Transport Management*, vol.8, no.5, pp. 275-287, 2002
- Zhang, A., Zhang, Y., A model of air cargo liberalization: passenger vs. all-cargo carriers, *Transportation Research Part E: Logistics and Transportation Review*, vol.38, no.3-4, pp. 175-191, 2002
- Kupfer, F., Meersman, H., Onghena, E., Van de Voorde, E., Airfreight and merchandise trade: Towards a disaggregated analysis, *Journal of Air Transport Studies*, vol. 2, pp.28-48, 2011
- Adler, N., Njoya, E. T., Volta, N., The multi-airline p-hub median problem applied to the African aviation market, *Transportation Research Part A: Policy and Practice*, vol.107, pp.187-202, 2018
- Ary, D., Jacobs, L. C., Irvine, C. K. S., Walker, D., Introduction to research in education, *Cengage Learning*, 2018
- Sekaran, U., Bougie, R., Research methods for business: A skill building approach, *John Wiley & Sons*, 2016

- Kothari, C. R., Research methodology: Methods and techniques, *New Age International*, 2004
- Abate, M., Economic effects of air transport market liberalization in Africa, *Transportation Research Part A: Policy and Practice*, vol.92, pp. 326-33, 2016
- Njoya, E. T., Africa's single aviation market: The progress so far, *Journal of Transport Geography*, vol.50, pp.4-11, 2016
- Martini, G., Scotti, D., Air transport in Africa, Chapters, pp.185-202, 2017
- Heinz, S., O'Connell, J. F., Air transport in Africa: toward sustainable business models for African airlines, *Journal of Transport Geography*, vol.31, pp.72-83, 2013
- Bofinger H.C., Air transport in Africa: A portrait of capacity and competition in various market segments, No. 2017/36, *WIDER Working Paper*, 2017
- Chingosho, E., 45th AFRAA Annual General Assembly Report of the Secretary General, Kenya, 25 November, 2013.
- Njoya, E. T., Christidis, P., Potential impacts of liberalisation of the EU-Africa aviation market, No. JRC106855, *Joint Research Centre (Seville site)*, 2017
- Brown, V., The Road to Yamoussoukro, *Journal of Comparative Urban Law and Policy*, vol.1, no.1, pp.17, 2017
- Schlumberger, C.E., Open Skies for Africa: Implementing the Yamoussoukro Decision, *World Bank publications*, 2010
- Djibo, B., Briefing on the 39th Session of the ICAO Assembly & Global Challenges for Air Cargo, Second ICAO Meeting on Air Cargo Development in Africa, Addis Ababa, ETHIOPIA, 27 – 29 June, 2017
- African Union , Progress report on implementation of transport plans of action, first ordinary session of the specialized technical committee on transport, intercontinental and interregional infrastructures, energy and tourism, Lomé, Togo, 13th –17 March, 2017
- InterVISTAS, Transforming Intra African Air Connectivity: The Economic Benefits of Implementing the Yamoussoukro Decision PREPARED FOR IATA in partnership with AFCAC and AFRAA, InterVISTAS Consulting Ltd., July, 2014
- Boeing, World Air Cargo Forecast 2016-2017, Available: www.boeing.com/commercial/market/cargo-forecast, 2017
- Boeing, Current Market Outlook 2017-2036, Available: www.boeing.com/cmo, 2017-2036
- AFRAA, Annual Report, Available: www.afraa.org, 2016
- ICAO, impact of air cargo services on economic development, Available: https://www.icao.int/Security/aircargo/Documents/AirCargo_EconomicDevelopment.pdf, May, 2015
- ICAO, Presentation of 2016 Air Transport statistical results, Available: https://www.icao.int/annual-report-2016/Documents/ARC_2016_Air%20Transport%20Statistics.pdf, 2016
- ATAG, The contribution of air transport to sustainable development in Africa, Oxford Economic Forecasting, Available: www.atag.org, 2003
- Gleave, S.D., Opening Up Aviation Services in Africa Implementing Air Transport Liberalization – Benefits & Opportunities, ICA, Available: https://www.icafrica.org/fileadmin/documents/Knowledge/Transport/OpeningUpAviationServices_in_Africa_-_ICA_Report-DEC-2014.pdf, December, 2014

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