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Article

Analysis of the competitiveness of West African air transport: Take-off key factors

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Abstract: African air transport is expected to take off after the Single African Air Transport Market (SAATM) launch in January 2018. Unfortunately, this seems not to be the case, particularly in West Africa, where adequate direct local flight is highly difficult to find. Hence, the fundamental question is: what levers should be activated for an effective revival of this sector? This paper aims to analyze West African air transport competitiveness factors by collecting data physically through surveys in various West African airports (Abidjan, Cotonou, Accra, Lome) also by interviewing professionals in the sector (Air traffic controllers, Air Navigation Service Providers, Air transports Managers, etc.) and among others, SAATM reports to appreciate its implementation. We were able to survey 435 actors (individuals and key informants) from January to July 2023 to evaluate quality of service, airline performance, safety, customer satisfaction etc. Airline operating costs were analyzed to understand the associated bottlenecks. The results show that SAATM is not yet well implemented in all contracting states, travelers are not satisfied with the air supply (airlines, infrastructure and fares) and taxation excessively increases ticket prices. The main factors for West African air transport take-off are liberalization, taxation and infrastructure investments.

Keywords: competitiveness; air transport liberalization; taxation; West Africa

1. Introduction

Air transport around the world has been significantly disrupted since the 11 September 2001, attacks in the United States. In the immediate aftermath, the sector witnessed a drastic 16 percent drop in flight requests within 3–4 months following these attacks (Ito and Lee, 2005, p. 78). According to the International Air Transport Association (IATA), global passenger traffic decreased by approximately 3 percent in September 2001 compared to the same period of the previous year (2000). This event marked a turning point, leading to heightened security measures, increased operational costs, and a revaluation of risk management within the aviation industry. In Africa, the subsequent years saw a series of airline bankruptcies that further weakened the aviation sector. The bankruptcy of major airlines such as Air Afrique in February 2002, Air Gabon in 2005, and Cameroon Airlines in 2006, along with approximately 80 other airlines facing severe difficulties, have significantly destabilized the air transport infrastructure in the region. Despite these setbacks, air transport services remain crucial for the economic growth and development of African countries. Air transport facilitates international trade, tourism, and investment, and plays a vital role in regional integration and socio-economic development (Cristea et al., 2022; Njoya and Isah, 2023). Air transport is the fastest mode of transporting passengers and high-value goods. However, in West Africa, air travel remains a luxury due to high costs and

limited accessibility. The region suffers from lack of regular subregional flight connections, which, coupled with recent global and regional disruptions, has led to increased airline ticket prices (Vigoureux, 2023). The COVID-19 pandemic, for instance, resulted in unprecedented global travel restrictions starting in March 2020, causing a dramatic decrease in passenger load factors and revenues. The IATA estimates that air traffic fell by 70 percent in 2020 compared to 2019, marking the "worst decline in the history of aviation" (IATA, 2020). Additionally, the African Airlines Association (AFRAA) reported losses of approximately USD 8.1 billion for the March–May 2020 quarter alone. Furthermore, the West African air transport sector is burdened by high taxes and fees imposed on airlines, which are ultimately passed on to passengers, making air travel less affordable. The complex regulatory environment, coupled with infrastructural deficiencies, adds to the operational challenges faced by airlines (Button et al., 2015, 2019). Despite these hurdles, several studies have highlighted the positive impacts of air transport liberalization on traffic growth, consumer welfare, and flight frequency. Many authors have shown that African air transport liberalization has positive effects on traffic growth, consumer welfare, and frequency. Liberalization initiatives have been shown to enhance market efficiency and stimulate competition, thereby helping consumers and the broader economy (Cristea et al., 2015, 2022; InterVistas and IATA, 2014, 2021; Ismaila et al., 2014; Njoya et al., 2018; Njoya and Isah, 2023). According to Bofinger (2017), the main challenges to liberalization include the affordability of air travel and increasing airport charges in West Africa.

This paper aims to analyze the determining factors of the competitiveness of passenger air transport in West Africa by addressing the following key questions: first, what are the factors that influence the competitiveness of intra-West Africa air transport? second, what are the cost challenges of airline tickets in West Africa? third, what are the key competitive parameters of West African air transport?

By exploring these questions, this study seeks to provide a comprehensive understanding of the current state of the West African air transport sector and offer insights into potential strategies for enhancing its competitiveness and sustainability.

2. Literature review

The idea of air transport liberalizing in Africa followed European skies liberalization (1987) and USA Air transport deregulation (1978) to build competitive local air carriers regarding the international air market (Bode, 2017, p. 1). The Yamoussoukro Declaration (1988) and the Yamoussoukro Decision (YD) (1999) established the Single African Air Transport Market (AFCAC, 2020, p.226). Africa, at the crossroads of air liberalization models, can usefully draw inspiration from the European experience in the construction of a single liberalized air transport market (Correia, 2014, p. 63). This aviation liberalization strategy must be based on an institutional framework focused on strengthening the technical cooperation between states, standards and procedures required for aviation safety needs (Bode, 2017, p. 2). The challenges of air transport liberalization through the MUTAA are therefore a priority of the African Union (AU), which makes the MUTAA a flagship project of its 2063 agenda. However, according to Baroux (2016, p. 9), it remains very difficult for

most African states to liberalize air transport; after all, the airspace belongs to them, and it retains a strong symbolic and political dimension. Many authors have investigated the impact of air transport liberalization on fares and passengers (Cristea et al., 2015; Ismaila et al., 2014; Manuela, 2017; Njoya et al., 2018; Piermartini and Rousová, 2008, 2013; Warnock-Smith and Morrell, 2008) and found that liberalization leads to passenger traffic growth in various proportions according to the study area, better-quality service and fares decline. However, Abate (2016) finds no effect of liberal policies on fares by using the two-stage least squares method in an Ethiopian case study. Moreover, InterVistas and IATA (2014, 2021) and Cristea et al. (2022) confirmed the effects of SAATM implementation on fares, passengers and quality service. Indeed, the implementation of the YD aims to establish fair competition in the intra-African air transport market to ensure affordable air services and consumer rights protection in the provision of intra-African air transport services (Njasawaka, 2020).

Salif (2018) evaluated the impact of fuel costs on air fares in West Africa based on data from airlines and airport authorities between 2015 and 2018 and compared aviation fuel price records (JET A1) and their evolution over three years at different airports in the region. Olivier (2018, p. 1) looks at the relationship between the development of air transport and tourism in sub-Saharan Africa. He showed that the increase in passenger air traffic is closely correlated with the increase in the number of tourists in many African countries. However, he emphasized that the high costs of plane tickets limit the accessibility of some destinations for tourists, particularly intra-African ones. Kesby (2023, p. 1) and Thiam (2023, p. 22) emphasize the low intraregional connectivity in Africa, with few direct flights between neighboring countries, which reinforces the inefficiency of the sector and the high cost of tickets. They jointly recommend reforms such as regulatory harmonization, the privatization of airports and national companies, and the improvement of the airworthiness of planes and staff training. This also highlights the need for massive investments in airport infrastructure and air navigation services. Finally, Mouele (2013, p. 25) analyzes the construction of airline prices and provides economic theories linked to the pricing of air services and the obstacles posed by airline operations costs. Although the literature provides some information on the explanatory factors of the high cost of air tickets in the region, it does not yet offer in-depth and systematic analyzes, making it possible to exhaustively identify the economic, structural and regulatory determinants of this problem.

3. Methods and data

This research uses a comprehensive multi-method approach, integrating both quantitative and qualitative methods to analyze air transport competitiveness in West Africa. Primary data were collected through field surveys at various West African airports and interviews with key informants and stakeholders in the air transport sector. Secondary data were obtained from established databases, including the International Civil Aviation Organization (ICAO), International Air Transport Association (IATA), World Bank, African Union (AU), African Airlines Association (AFRAA), and

Skytrax, covering historical data from 2012 to 2024, the table below not exhaustive but sums up the collection (**Table 1**).

Table 1. Data collection methods.

Primary Data collection	Secondary Data collection
Questionnaires	Publish Printed sources
Interviews	Books
Observation	Journals/Periodicals
Survey	Magazines/Newspapers
Process Analysis	Published electronic sources

Source: authors, 2023.

The survey was designed to capture quantitative data on costs, airline supply per day, transit times and distances, length of landing strips, airport capacities, intra-African airline networks, infrastructure, and the implementation level of the Yamoussoukro Decision (YD). A structured questionnaire was administered to 435 passengers at major airports, including Cardinal Bernadin Gantin Airport (Cotonou, Benin), Kotoka International Airport (Accra, Ghana), Félix Houphouët Boigny International Airport (Abidjan, Côte d'Ivoire), Gnassingbe Eyadema International Airport (Lome, Togo), Brazzaville, Dakar, Douala, Libreville, and Ouagadougou, from January to July 2023.

$$M = (N \times 400)/(N + 400) \quad (1)$$

The sample size was determined using the Marien and Beaud (2003) formulae. The research sample size (M) is designed for 95 percent of confidence level where N is the total airports passengers (pax) in one month (N = 329,538).

So, after computation, the minimum sample size is M = 400 pax, but the survey included 435 responses to ensure robustness (**Table 2**).

Table 2. Field survey sample design.

West African Airports	Total intra-african pax in the month	Total pax surveyed	% of the sample
Abidjan (Côte d'Ivoire)	60,000	60	13.8
Accra (Ghana)	43,000	53	12.2
Brazzaville (Congo)	25,000	23	5.3
Cotonou (Benin)	27,000	64	14.7
Dakar (Senegal)	45,000	70	16.1
Douala (Cameroon)	50,000	54	12.4
Libreville (Gabon)	29,000	36	8.3
Lome (Togo)	40,000	30	6.9
Ouagadougou (Burkina Faso)	20,538	45	10.3
Total	329,538	435	100

Source: authors, 2023.

Key metrics that were analyzed included service quality, airline performance, safety, customer satisfaction, and operating costs. Qualitative data from interviews were coded and analyzed thematically to identify recurring themes and insights related

to policy implementation, market challenges, and strategic recommendations were considered. Validation and triangulation were achieved by cross-referencing findings from surveys, interviews, and field observations, ensuring data validity and reliability. This triangulated approach provided a comprehensive understanding of the factors affecting air transport competitiveness in West Africa, leading to well-rounded conclusions and actionable recommendations for policymakers and industry stakeholders.

However, we ought to point out that we encountered some limitations and challenges in data collection like:

Accessibility Issues: Gaining access to certain airports for data collection was challenging due to security restrictions and bureaucratic hurdles. The wide geographical spread of the airports involved meant significant travel time and logistical coordination for surveyors. Participant Recruitment: Convincing passengers to participate in the survey was sometimes difficult, especially during busy travel periods also scheduling interviews with key informants and stakeholders was challenging due to their busy schedules and limited availability. Language Barriers: West Africa is a multilingual region with a variety of languages and dialects. Ensuring that questionnaires and interviews were comprehensible to all participants required translation and localization efforts. Data Consistency: Ensuring consistency and reliability in survey responses was a challenge, as some respondents provided incomplete or inconsistent information. For secondary Data, variations in data reporting standards and formats across different databases made it difficult to standardize secondary data for analysis. Limitations of the Study include Sampling Limitations, although the sample size was calculated to be robust, it may not fully represent the entire population of air transport users in West Africa due to the diversity of passenger profiles. Selection Bias, the selection of airports and respondents may introduce bias, as it may not fully capture the variability in passenger experiences across different airports and times. Temporal Limitations, the data collection period (January to July 2023) may not capture all the seasonal variations in air transport demand and performance in west Africa, potentially limiting the generalizability of the findings to other times of the year. Also, Contextual Limitations, because the study does not fully account for the impact of political instability and economic fluctuations in the region, which can significantly affect air transport competitiveness. Regulatory Environment, differences in regulatory environments and compliance levels across countries may influence the applicability of the findings. In conclusion there is no consolidated standardized recognized databases bank for these types of studies, or data in West Africa and people willing to help are also reluctant as any research or questioning make them feel they are giving out secret and are at risk in the event that something is discovered; in short, they fear losing their Jobs. Despite these challenges and limitations, the study aims to provide valuable insights into the factors influencing air transport competitiveness in West Africa. The findings can inform policymakers, industry stakeholders, and researchers in their efforts to enhance the region's air transport sector.

4. Results and discussion

4.1. Difficulties in implementing SAATM despite its advantages and opportunities

Aviation provides the only rapid worldwide transportation network, which makes it essential for global business and tourism, thus facilitating economic growth, particularly in developing countries (African Union, 2011, p. 5). The presence of large inhospitable areas (e.g., the Sahara Desert and equatorial forest), the shortcomings of other means of transport, and the need to move quickly from one point to another have enabled air transport to develop rapidly in Africa, even if there are still many obstacles to its development (African Development Bank, 2015, p. 15). Despite the importance of this sector in Africa, it remains highly uncompetitive. The growth in intra-African traffic was lower than that in other regions of the world (AfDB report, 2012, p. 32). Faced with this situation, African countries have opted to follow the example of other parts of the world and liberalize air transport. The decision on the implementation of the Yamoussoukro Declaration (YD) on the liberalization of air transport market access in Africa (YD, 1999), endorsed by the Assembly of African Heads of State held in Lomé (Togo) in July 2000, laid the groundwork for an African strategy for the sustainable development of air transport by harmonizing the air transport liberalization framework (ICAO, 2015, p. 1). In 1994, in Mauritius, the African ministers responsible for civil aviation adopted a series of measures to speed up the implementation of the declaration, particularly the relaxation of the criteria for granting fifth-degree freedom rights. These actions have contributed to a relatively modest improvement in air connections in Africa while facilitating the expansion of this sector of activity on the continent (Wang et al., 2016). With the launch of the Single African Air Transport Market (SAATM) on 28 January 2018, the African aviation industry reached a historic milestone. In practical terms, SAATM means the elimination of bilateral agreements between individual countries, as envisaged in the Yamoussoukro Decision (African Development Fund, 2019, p. 2). Despite these efforts, most African airlines remain modest in size, and a ranking of these airlines shows that the leading African airline ranks 35th (Ethiopian Airlines) in the world and the second, 53rd (Royal Air Maroc) (Skytrax World Airlines Awards, 2023).

Despite the potential benefits of implementing the SAATM, many countries are reluctant to apply the measures prescribed by this flagship project of the African Union's Agenda 2063.

Some of the specific concerns hindering the adoption of SAATM are as follows: unfair competition, restrictions on free movement, charges and taxes, non-protection of local airlines, lack of reciprocity, unfair financial gain and lack of technology (Deloitte, 2018, p. 16).

In 2019, AFRAA and AFCAC studied the challenges facing SAATM. These included:

1) reluctance to sign solemn commitment and memorandum of implementation;
2) A delay in implementing and reporting on concrete measures by signatory states;
3) complex local procedures that delay the signing of the memorandum of implementation;

4) benefits of SAATM not fully understood and not embraced;
5) protectionism for fear of national carriers either being vulnerable or not ready for SAATM;
6) protectionism in the form of restrictions to granting traffic rights on specific routes and protecting slots;
7) granting limited frequencies and restricted capacity;
8) unfair and restrictive existing agreements;
9) stifling of low-cost carriers;
10) high cost of operations due to unconventional taxes;
11) member States being very reluctant to review restrictive bilateral air services agreements.

Protectionism is a serious obstacle to the full liberalization of air transport in Africa. Africa's discussion of underserved status can be attributed to the protection of air service markets held by certain airlines (mainly state-owned air carriers) via certain restrictions (IATA, 2020, p. 12).

Other difficulties were mentioned during a presentation by the AFCAC in May 2022. In fact, according to AFCAC, the difficulties encountered by the SAATM included:

1) high taxes, charges and fees on aviation in Africa, accounting for a great portion of fare prices;
2) Airline operating costs are very high, mainly due to their high exogenous costs (fuel cost, ground services, aircraft financing, etc.).
3) Limited access to financing for African airline development (purchase or lease of aircraft)
4) restrictive visa policies: 75 percent of the African population needs a visa to travel, of which more than 40 percent requires a traditional visa (no e-visa or visa on arrival available);
5) unequal pace in the implementation of liberalization measures, even between the countries that have committed to SAATM and signed the memorandum of implementation.
6) limited infrastructure development, especially of secondary gateways that complement the country's main airport in the capital.

According to Issa S. Baluch, quoted by (Shankaran, 2023), SAATM member states are unable to move forward because bureaucrats are still in charge and are firmly in control. By way of illustration, he takes the example of a Kenyan freight operator who obtained an Air Operator Certificate in South Africa even though both States are members of SAATM. Logic would have dictated that this operator could operate without the need for an Air Operator Certificate because of the application of the 5th freedom rights of SAATM, to which these two States belong. However, in practice, this is not yet a reality (Dobruszkes, 2009; Dobruszkes and Mwanza Wa Mwanza, 2007).

The AFRAA communique on the meeting organized by the AFCAC in Nairobi on 9 February 2024, states that "after five years of the official launch of SAATM, there is still very little commitment by some of the 37 signatory States for the full liberalization of the aviation market on the continent. Barriers that prevent the successful implementation of SAATM on the continent include lack of prioritization

of aviation by governments, policy of protectionism, high fees and taxes and failure to facilitate opening visas between countries" (Logistics Update Africa, 2024). Protectionism is a serious problem for the full implementation of SAATM. This is also the view taken by Abate (2022) when he states: "*The coexistence of a regulated domestic market and liberal international policies is one of the main dilemmas facing many African countries. This duality hinders the logical transition from national deregulation to the opening up of regional and continental airspace*". This point of view is also shared by Lumbroso (2019), who thinks that a level playing field is an objective that everyone is in favor of, but which no one can define, let alone achieve. However, when governments perceive that the playing field is uneven, however, they define it, and they often react with protectionism. All this corroborates Issa S. Baluch's thoughts: the real problem with SAATM is that the bureaucrats are in charge.

Protectionism remains the main challenge facing SAATM, and from this stem, all the other difficulties associated with the total opening of African air transport. The policies of the Member States are not always in favor of total liberalization of the African sky. States often tend to protect their national airlines. This opinion is also shared by the Secretary General of AFRAA, who concurred in an interview in a panel session during the Connecting Europe Days on the Single African Air Transport Market (AFRAA, 2024).

The total liberalization of air transport remains elusive, despite all the advantages that could be derived from it.

4.2. Taxation pull-down of African air transport

The cost structure of air transport ticket fares in West Africa is multifaceted and influenced by a combination of factors ranging from operational expenses to regulatory frameworks. Access to current and authentic data is also a challenge, as one can either find a variety of data based on different floating dependent and independent variable parameters or find no data at all with reluctance from different bodies to give one due access.

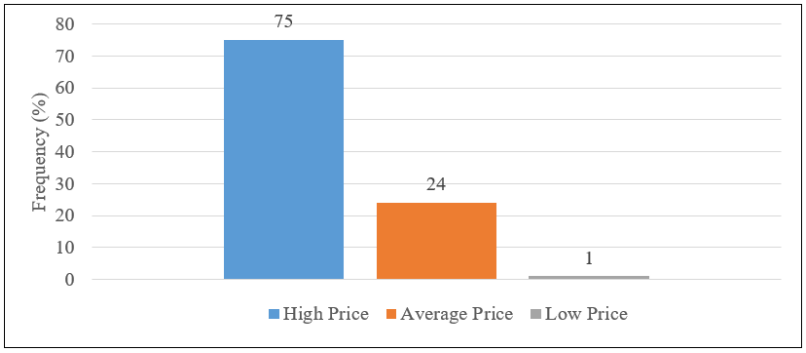

Figure 1. Airfares survey.

Source: Field survey, May 2023

It should be noted that every aspect of civil aviation is strictly bound by standards and recommended practices (SARP) by the International Civil Aviation Organization (ICAO), although national regulations apply. By doing so, we should not normally observe a great disparity between regions or subregions in terms of access to air

transportation; however, our study shows that West Africa has one of the highest airfares, as shown in the **Figure 1**.

$$\text{frequency} = \frac{\text{number of passengers response in a category}}{\text{total number of participant}} \times 100\% \quad (2)$$

The analysis of the appreciation of airfares by travelers surveyed shows that a very large majority, 75 percent, consider that air ticket prices are high in West Africa. This reflects widespread discontent on the subject; moreover, 24 percent consider prices to be average; this more moderate perception potentially comes from travelers benefiting from reduced or subsidized prices. Only 1% of respondents believe that prices are low. This marginal result shows that an overwhelming majority of interviewees point out the high cost of plane tickets in the region. This imbalance of responses reveals a major and persistent problem of the high cost of tickets in West Africa. This is consistent with the findings of Raphael (2024): "It's crazy that flights within Africa, even to neighboring countries, cost more than flights to Europe, Asia, America or anywhere in the world. Imagine paying a fortune to watch the "AFCON2023 finals." Deeper into this issue, we realized that the ICAO's policies on Charges for Airports and Air Navigation Services contained in the ICAO document (Doc 9082) are not well put in place at major airports. However, (Doc 8632) defines ICAO's policies on taxation in the field of international air transport and makes a conceptual distinction between a charge and a tax.

A charge is a levy that is designed and applied specifically to recover the costs of providing facilities and services for civil aviation.

A tax is a levy that is designed to raise national or local government revenues, which are generally not applied to civil aviation in their entirety or on a cost-specific basis.

What are the cost components of airfares?

Air transport operating expenses are traditionally divided into two main categories (Oum and Yu, 2012). These costs include the direct operating costs and indirect operating costs of operations.

1) Direct operating costs:
    a) Aircraft acquisition or leasing costs
    b) Maintenance and overhaul costs:
        - Maintenance Cost per Flight = Scheduled Maintenance Cost + Unscheduled Repair Cost Maintenance Cost per Passenger = Maintenance Cost per Flight/Number of Passengers Example: If the scheduled maintenance cost for a flight is $2000 and the unscheduled repair cost is $500, with 180 passengers, the maintenance cost per passenger would be: Maintenance Cost per Passenger = ($2000 + $500)/180 = $13.89
    c) Crew salaries and training
        - Labor Cost Formula: Labor Cost per Flight = Total Crew Salaries + Employee Benefits Labor Cost per Passenger = Labor Cost per Flight/Number of Passengers. Example: If the total crew salaries and benefits for a flight are $4000 and there are 150 passengers, the labor

cost per passenger would be: Labor Cost per Passenger = $4000/150 = $26.67

d) Insurance costs
e) Airport charges (landing fees, navigation charges, etc.)
f) Fuel costs: A significant portion of an airline's operating costs are fuel. The formula for calculating fuel cost is as follows: Fuel Cost = (Fuel Price per Gallon × Fuel Consumption in Gallons)/Number of Passengers Example: If the fuel price is $3 per gallon, the aircraft consumes 1000 gallons of fuel, and there are 150 passengers, the fuel cost per passenger would be: Fuel Cost per Passenger = ($3 × 1000)/150 = $20

2) Indirect operating costs:
g) Catering and in-flight services
h) Ground handling charges
i) Marketing and distribution costs
j) Administrative and overhead expenses

Although the cost of transportation itself remains the main component of airfares, numerous taxes are added to this amount when purchasing a ticket. The taxes that apply are very diverse and have names that sometimes make them incomprehensible even when the company provides details that they mostly do not do. The **Figure 2** shows an example Air Cote d'Ivoire booking.

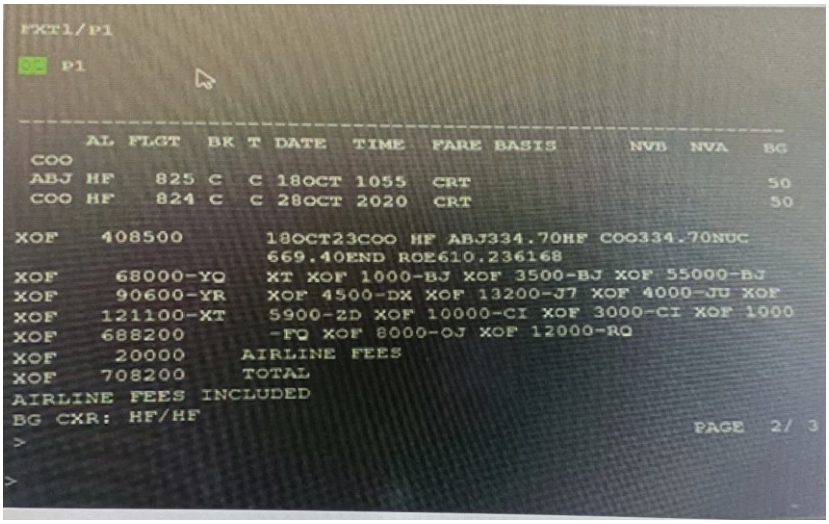

Figure 2. Air Cote d'Ivoire booking costs.
Source: Field survey, June 2023.

Analyzing the breakdown of this plane ticket price allows us to highlight the following elements: the net fare represents approximately 62 percent of the total price; the YQ tax, linked to variations in the price of fuel amounts to 10 percent of the YR fuel surcharge tax reaches 14 percent of the price; and the XT safety and security tax represents more than 18% of the total amount. On this single ticket, we also have more than 12 different fiscal taxes.

We see that taxes represent more than one-third—38 percent—of the total airfares. The net price received by the company is only 62 percent, and the remainder is returned in the form of taxes. This analysis allows us to better understand at least the

composition of a plane ticket price and the significant weight of taxes that are added to the net fare. This result echoes those of Ngala (2021). "As a traveler, consumer, or passenger, when journeying across Africa, especially within Sub-Saharan Africa and particularly within Central and West Africa, a significant portion, ranging from over 50 to 40 percent of the total airfare paid to the airline facilitating your travel, is allocated toward taxes, fees, and charges".

Essentially, airlines serve as intermediaries for collecting these taxes, fees, and charges on behalf of governments. Regrettably, a substantial portion of these funds are not reinvested in aeronautical development but rather diverted for other purposes. There are more than 200 different types of taxes, fees, and charges across the five regions of Africa (West, East, Central, South and North). Additionally, following the findings of (AFRAA/Rafaelle, 2020), the **Figure 3** below shows the average airport charges per African subregion.

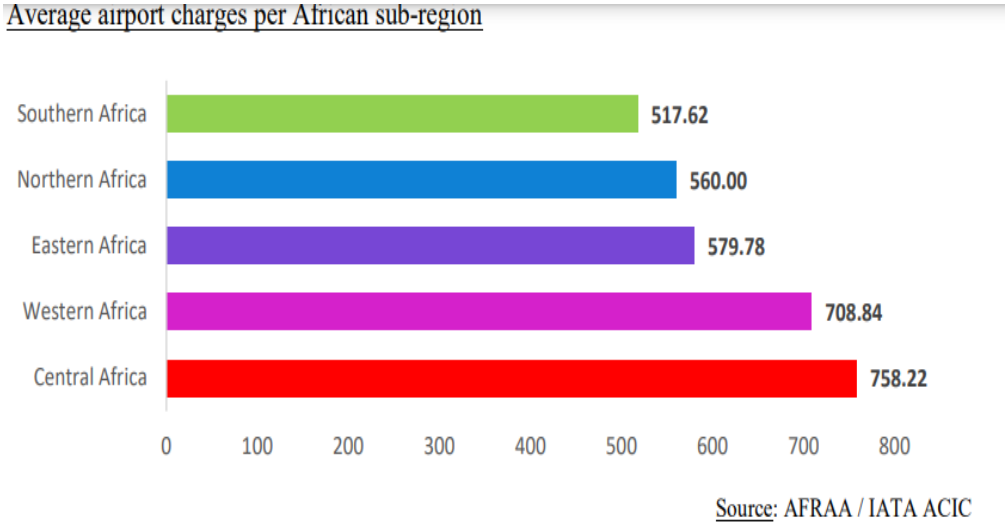

Figure 3. Airport charges per African sub-region.

It can be easily derived from the **Figure 3** that Central and Western African airports are the most expensive**.** The average amount of charges in those regions (USD 758.22 and USD 708.84, respectively) exceeds the continental average, which is USD 624.58. Southern Africa is the least expensive region in terms of airport charges, with an average of USD 517.62.

Why do airfares fluctuate so much in West Africa?

Ticket prices are modified several times a day, according to the principle of "yield management", an adjustment of prices according to the volume offered on the market, number of seats available, prices of competing companies, and demand based on the history of past years, the number of queries on search engines, etc. (Donovan, 2005). In addition, other important parameters, such as the price of crude oil (Bunker adjustment factor BAF), the political stability of the destination country, etc. (Notteboom and Vernimmen, 2009). Africa's low refining capacity means that aviation fuel is largely imported and "often 30 percent more expensive than elsewhere, including in... oil-producing countries," (The Citizen, 2024). These extremely complex computer programs factor thousands of parameters, and it would be

pretentious to claim to know how they work precisely, but we can draw out some fundamental rules:

(1) If supply increases (examples: a competitor charters a new plane or opens a new route, a tour operator cancels a major booking), ticket prices drop.

(2) If a plane fills up faster than in the expected scenario, ticket prices increase.

(3) If a plane fills up less quickly than in the expected scenario, ticket prices drop.

"Since the crisis between Russia and Ukraine, the price of crude oil has continued to increase because of all the embargoes in place which have reduced the level of supplies," notes the secretary general of the Association of African airlines (AFRAA, 2022). In this sense, we monitored fluctuations in Air Côte d'Ivoire airfares over a period of 11 days for the destinations mentioned above. The **Figure 4** represents the fluctuations on the Abidjan-Cotonou line for the period in the morning and evening.

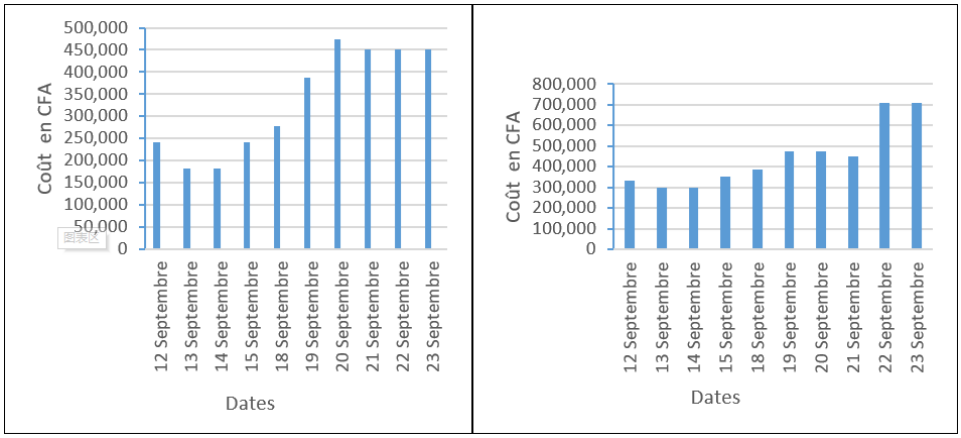

Figure 4. Prices fluctuations on Abidjan-Cotonou airline.

Source: field survey, June 2023.

These large and rapid price fluctuations appear to reveal strong variation in supply and demand depending on the day. They also question companies' pricing policies. However, it is important to remember that there are cyclical periods of price increase, such as end-of-year holidays, the beginning of the academic year, and certain major events in certain countries or in the region.

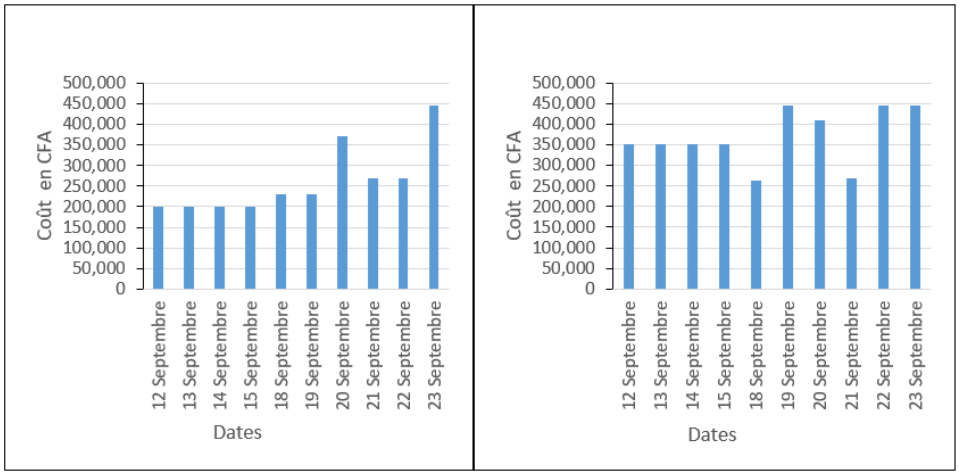

Figure 5. Price fluctuations on Cotonou-Libreville line.

Source: field survey, June 2023.

The **Figure 5** shows the fluctuations on the Cotonou-Libreville line in the morning and evening.

The fluctuations are significantly less pronounced than those at the Cotonou-Abidjan destination, with a maximum amplitude of 1.8 compared to 4. We observe a much greater price stability over the period, and prices appear less subject to day-to-day variations in supply and demand. The lack of direct flights from one major city to another is also something that affects airfares and passengers. Just imagine from Cotonou to Accra, you only have 2 choices, and both require you to make a long transit. There are no direct flights. Flying between the West African capitals of Freetown and Banjul took approximately one hour. However, as the BBC's Umaru Fofana determined, because of the region's poor air connections, it can be quicker and easier to fly via Morocco or Belgium, although that could take a day or even three. Airfares accessibility appears to be a crucial issue, as this subject crystallizes travelers' dissatisfaction and weighs on demand. A proactive pricing policy seems essential for regional companies.

4.3. Infrastructure investments limit West African air transport take-off

Air transport infrastructure (ATI) includes airports with their commercial and technical equipment, air traffic control (ATC) centers, and the entities that manage and coordinate their services and operations. Without ATI, air transport cannot function, and without a well-functioning air transport system and the international linkages it provides, national markets will be smaller, and some markets may not even exist, particularly for landlocked, isolated, and low-population-density countries (Hamilton and Hussain, 2010).

And that goes with the following "It is especially urgent for Africa to address its aviation infrastructure gaps, given current and high levels of awareness of how air connectivity has become such a unique and indispensable catalyst for socio-economic growth on this continent" (Olumuyiwa, 2019).

For many decades, air transport in Africa has struggled due to insufficient investment, lack of strategic vision, and poor management. This has led to deteriorating infrastructure, outdated equipment, and unsafe systems both on the ground and in the air. Because traditionally, ATI was exclusively under government ownership and management, and capital investment funding was, in general, a responsibility assumed by governments.

About ten years ago, a pivotal change occurred when international organizations, including regional development banks and global institutions like the World Bank and the International Finance Corporation, began demanding full transparency and accountability from the recipients (the States) of their aid. That has opened the door of transitioning from a solely led public development of Airport Infrastructure to a Private Public Partnership investments and management of ATI. Following theses changes in the last decade we have observed in terms of runway infrastructure for example as shown in the **Figure 6** that there has been a tremendous improvement.

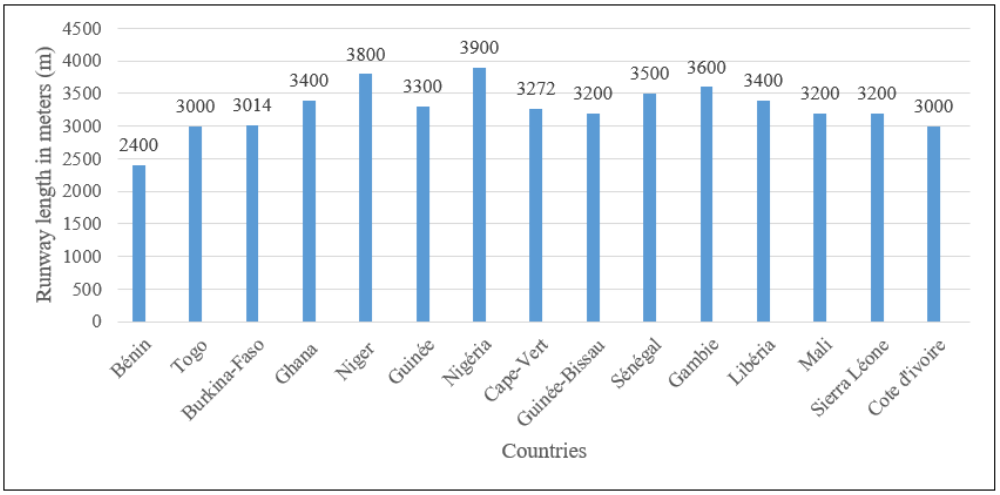

Figure 6. Runway length of principal West African Airports.
Source: Data of AIP ASECNA et ACI 2022.

Although, the sector is now beneficiary of some attention from public and private sectors partnerships, we are still very far from an average Quality of service (QOS) satisfaction from passengers across West African airports. The results in the **Figure 7** below translate the perception that passengers have on West African airports. We must emphasize that these results do not include air traffic equipment.

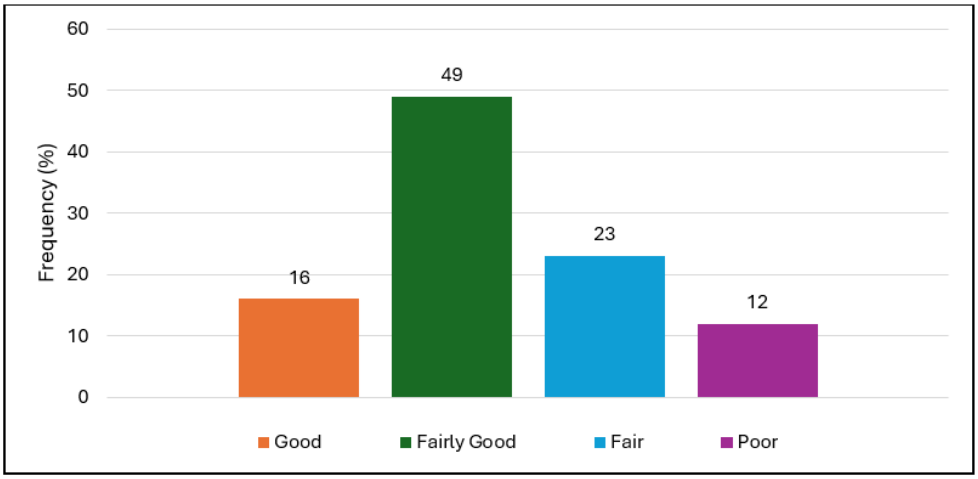

Figure 7. Perception of West African airports.
Source: field survey, May 2023.

What emerges from the above results is that the "Good" satisfaction rate (16%) reveals shortcomings in terms of quality of infrastructure and services in the appreciation of users in many airports while the high "Fairly good" rate (49%) shows that efforts are perceived but that the quality is improvable in many airports. Also, the notable rate of "Fair" (23%) highlights malfunctions or insufficient basic services in certain airports. Finally, the rate of 12% granted to "Poor" highlights very unsatisfactory situations in a minority of airports, requiring priority actions. Overall, the dissatisfaction highlights a need for improvement in infrastructure, quality of service and passenger comfort at West African airports.

The ability of airport infrastructure providers to deliver increased capacity and improved services at reasonable cost to users will be a substantial determinant of whether the air transport industry will be able to respond to anticipated demand growth (Holt et al., 2006). The basic choice is between investing now and avoiding a deterioration of quality in the event of a surge in the demand for air transport or delaying investments and avoiding (in the short term at least) large, fixed investments that come with varying levels of financing costs which increase with the levels of private sector participation (PSP) (Hamilton and Hussain, 2010).

It's also important to add that airlines also find it difficult to access credit to make the investments they need to operate, such as buying or leasing aircraft or spare parts (AfDB, 2015).

5. Conclusion

African air traffic doubles every 15 years, a growth in the passenger population estimated at 5.4% per year, and the growth in the number of aircraft 3.5% per year until 2040, according to the Global Air Navigation Plan (GANP). Thus, Africa in general and particularly West Africa must negotiate the best possible way to get the maximum benefit from the SAATM. The liberalization of African air transport is currently experiencing difficulties in its implementation, which is timid and has been going on for more than two decades already. African states, despite their desire to facilitate air transport activities, have not yet managed to implement the SAATM in all its dimensions. Air transport promoting socioeconomic development, regional integration and jobs, must therefore be revitalized in Africa.

To achieve this goal, we need a close coordination between policy makers, civil aviation authorities, airlines and all other stakeholders, to improve the competitiveness of air transport in West Africa. This can help boost economic growth, create jobs and strengthen regional integration, thereby offering a brighter future for this vital industry. Practically, West African air transport industry needs continental-scale review of the texts governing intra-African air transport with reference to ICAO doc 9626, contribution to the implementation of the Single Sky for Africa (SSFA) which advocates the technical operation of air navigation by a single provider of air navigation services (Agency for Air Navigation Safety in Africa and Madagascar - ASECNA in this register) through the transfer of the management of the airspaces of African States to this single provider, support for African airlines that want to make low-cost flights, amplification of the practice of code sharing between African companies in order to avoid huge losses for companies by allowing them to gain reciprocally. Indeed, Africa's population growth is a key indicator of strong demand for intra-African air transport in the future. At the same time, the procedures for waiving visas for African passengers by some African countries, for example, are indicators that predict strong demand for intra-African transport in the future. Therefore, West African States must review national civil aviation texts by promoting supranational standards, continue the process of waiving visas between Africans, invest in the training of quality human resources (through the building of cutting-edge training centers in the aeronautical sector) and modernize airport infrastructures/platforms. Another important aspect in the life of African airlines is the

share of airport charges which greatly influences air transport costs in Africa. States must reduce their airport charges to relieve airlines.

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