
THE DEVELOPMENT OF JOMO KENYATTA INTERNATIONAL AIRPORT AS A REGIONAL AVIATION HUB

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ABSTRACT

Air transportation plays an important role in the social and economic development of the global system and the countries that seek to participate in it. As Africa seeks to take its place in the global economy, it is increasingly looking to aviation as the primary means of connecting its people and goods with the world. It has been suggested that Africa as a continent needs to move toward a system of hubs to optimize its scarce resources. Jomo Kenyatta International Airport in Nairobi, Kenya, is one of the airports in the eastern region of Africa that is seeking to fill this role. This paper discusses the prospects for success and the challenges that it will need to overcome, including projections through 2020 for the growth in passenger and cargo traffic.

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INTRODUCTION

Air transportation plays an important role in the social and economic development of the global system and the countries that seek to participate in it. According to the Air Transport Action Group, the world's airlines carried over 1.8 billion passengers and 29 million tons of freight in 2004. The air transport industry as a whole provided over 28 million jobs directly and supported another 192 million in the travel and tourism industry. Air transport is one of the fastest growing sectors of the world economy, expanding 2.4 times above the Gross Domestic Product (Air Transport Action Group, 2000, 2005). Although the aviation industry has suffered from the combined effects of economic recession, Severe Acute Respiratory Syndrome, war, and terrorist attacks (September 11, 2001, and later), traffic in all regions has returned to pre-September 11, 2001, levels and the global economy shows signs of continued growth (Air Transport Association, 2002).

One region that did not see a decline in air traffic following September 11, 2001, was Africa which posted a 1.4 percent gain in 2001 and is expected to witness continued traffic growth for the foreseeable future (ICAO, 2002). A number of factors account for this growth. First, Africa is the second largest continent in the world with a large population base that is separated by geographically challenging terrain. Because of the "poor state of land transport and the enormous cost of addressing these deficiencies" (Abrahams, 2002, p. 3), aviation is seen as a particularly ideal means of connecting Africa with itself and the rest of the world (Rhoades, 2003). Second, it is estimated that less than one in every twenty Africans currently has access to air travel. Thus, the potential for growth is substantial if the countries in the region can overcome the many barriers that exist today (Airports Company South Africa, 2004). These barriers include poverty, lack of aviation infrastructure, maintenance and financial support, safety and security concerns, and competition from non-African airlines (Abrahams, 2002; Graham, 1995; Rhoades, 2003; World Bank Group, 2002).

It has been suggested that Africa as a region must move toward a system of hubs "rather than the proliferation of competing yet unviable airport infrastructure across the continent...which detract from the much needed investment in other areas of development within African states" (Abrahams, 2002, p. 7). Further, traffic forecast would seem to indicate that three major hubs in Sub-Saharan Africa would be ideal for serving both international and regional needs. Based on general air traffic patterns, these hubs would be located in Southern, Eastern, and Western Africa. Johannesburg in South Africa appears to be the most likely candidate for Southern Africa. The situation in Western and Eastern Africa is less clear (Abrahams, 2002). One

contender for Eastern Africa is Kenya. The major north-south and east-west air routes pass over the country at present and Kenya already possesses several international airports used for technical and refueling stops. This geographical advantage could help facilitate the development of one of Kenya's airports as a regional hub and major player in transport development in the continent (USAID/REDSO/ESA, 2001).

The objective of this paper is to discuss the development of Jomo Kenyatta International Airport (JKIA) as a regional aviation hub within the airline context of a hub-and-spoke system itself. Existing patterns and forecasted trends in passenger and cargo traffic are examined as a means of assessing the possibilities of a viable hub. In addition, the regional competition faced by JKIA and the potential investment required are explored to understand some of the challenges facing JKIA efforts to establish itself as the premier Eastern African hub.

HUB-AND-SPOKE CONCEPT

Button (2002) has noted that "there is in fact no unique or even widely used, definition of what exactly constitutes a hub airport" (p. 179). It may be used to refer to a geographical area whose airport (or airports) enplane a significant number of passengers or cargo (Button, 2002; Wells, 1994). It may also be used to refer to the broader concept of a hub-and-spoke system. In such a system, the hub is the central point in a radial airline network. This network allows 'an airline to increase frequency in thin markets by connecting the thin markets (the spokes) to a central airport (the hub), trading off the inconvenience of a stop and connection for greater frequency and the ability to match the right sized aircraft to each route (Taneja, 2003). Hubs are not unique to air transportation having application to any form of transportation that serves markets of varying sizes. It is also not unique to the U.S. aviation system even though thirty years of deregulation have created a system in the U.S whereby most large carriers have created a series of hubs and feeder carriers (Button, 2002). Part of the observed difference between the U.S. system and the rest of the world is the different historical development of the industry. In much of the rest of the world, countries established through consolidation a single large international flag-carrier that utilized that country's national capital as the hub for an international route network (Graham, 1995).

Button (2002) addresses a number of the cited problems with the hub-and-spoke system including: a) the loss of direct service suffered by small communities; b) airport congestion; c) potentially higher fares resulting from airline concentration and control of hub markets; d) restriction of new entrants; and e) environmental damage, but concludes that the system is not inherently flawed and can result in wider choices and lower overall costs.

For the purpose of this discussion, the issue of congestion is a critical element in discussing potential hub airports since it relates directly to the question of infrastructure. Traffic at a true hub-and-spoke airport typically arrives and departs in a series of banks, that is, a number of different flights arrive at around the same time, connect to another flight and depart around the same time, hopefully with minimum delay. However, this strategy may lead to congestion in several areas: a) on the ground as passengers for various flights attempt to arrive (or depart) at around the same time; b) within the airport as peak volumes of passengers move from one area to another; and c) in the air as a number of aircraft try to use a limited amount of airspace.

While debate is likely to continue over the costs and benefits of hub networks, there is general agreement that too many hubs for a carrier or a region is not economically viable (Shaw, 2004; Taneja, 2003). As already noted in the introduction, traffic patterns and forecasts seem to indicate that Africa would best be served with a system of three continental hubs in Southern, Western, and Eastern Africa (Abrahams, 2002). If this is true, the question now becomes which airport is best positioned to assume this role and what types of investment, infrastructure, and regulatory support will be required. Hub airports compete on a number of factors including “the number of destinations and frequency of the services offered, transfer times, comfort levels at airports, ticket prices charged by carriers, airport taxes, etc.” (Reitveld & Brons, 2001, p. 248). In international aviation, a hub airport serves as the home base for its national carrier as well as the arrival and departure point for international carriers as set out in the bilateral air service agreements between nations. The strength of the home carrier as well as the nature of the bilateral air service agreements with other nations will effect the destinations and frequency at the airport. Transfer times are another important issue for hub (or potential) hub airports. If congestion creates delays that result in missed connections, then passengers are likely to choose other travel routing, particularly if limited flight schedules result in extended stays for rebooking. Inadequate seating in airports, lack of facilities for dining, shopping, etc., become important to passengers waiting for connections. Ticket prices can also affect customer trip selection. The President of the African Civil Aviation Commission recently acknowledged that in order to find an affordable fare from one African capital to another many passengers were forced to fly to Europe and back on a European carrier (Africa must open the skies, 2005). From an airline (and indirectly a passenger or shipper) perspective, airport taxes, gate fees, and fuel prices are additional considerations. In short, many factors will influence the behavior of passengers, shippers, and airlines in selecting trip routing. The successful hub must attempt to address the concerns of all major stakeholders.

DEVELOPMENT OF AIR TRANSPORT IN KENYA

Air transport has, in the recent past, gained popularity among the residents of Kenya and is no longer considered as a reserve for rich foreigners and senior government officials. There are new trends in the country, as elsewhere in Africa, which will create opportunities for aviation to thrive. These opportunities include a huge population, the vast physical size of the country, inadequate surface transportation, emerging commercial links with the outside world, and the low level of development of the country leading to great potential once the development process begins (USAID/REDSO/ESA, 2001). As in other developing countries, air transportation was imposed wholly from outside the country. Similarly, the spatial pattern of important routes emerged early and has remained basically the same, with the majority of the air routes geared to Europe and Asia. The existing pattern of air transportation network in Kenya, like that of the rest Africa can be traced from the colonial origins of the international network (Hogenauer, 1975).

Scheduled domestic air transport services

Domestic air transport services began in Kenya soon after World War I with the first air passenger services offered by Wilson Airways, a private airline established in 1929. This transport company had its headquarters in Mombasa. In August 1932, Wilson Airways introduced regular passenger services between Nairobi and Dar es Salaam through Zanzibar, Tanga and Mombasa on a weekly basis. The inauguration of this service offered the first inter-territorial (regional) communication linking East African towns with the main Imperial Airways Trans-Africa (Cairo-Cape Town) route. Later in the year, Wilson Airways launched another weekly service, this time to Entebbe through Nakuru, Kisumu and Jinja. This marked the development of the first international air routes in East Africa. With the outbreak of World War II in 1939, the airline was liquidated. The East African Airways Corporation (EAAC), a regional airline operated by the three East African countries of Kenya, Uganda and Tanzania, replaced it in January 1946. EAAC operated until 1977 when the East African Community collapsed. The demise of EAAC led to the development of national carriers such as the Kenya Airways, Air Tanzania and Uganda Airlines.

Currently, domestic air transportation in Kenya serves the tourism industry by transporting tourists to and from Mombasa, Nairobi and other tourist sites such as the Maasai Mara, Mt. Kenya, Malindi, Western Kenya and Lake Turkana region. Air passenger services are operated to and from Nairobi, Mombasa, Kisumu, Eldoret, Malindi, Lokichogio and Maasai Mara among other destinations. Certain areas in the northern and eastern parts of Kenya have low levels of accessibility by road and are totally lacking in

railway transportation (Irandu, 1995). Aviation is also important in the transportation of perishable horticultural products, fish and other meat products to overseas market.

Scheduled international air transport services

International air passenger services in Kenya were established during the 1930s. The services were provided by the Imperial Airways the forerunner of the British Overseas Airways Corporation (BOAC). In January 1932, Imperial Airways started the London-Cape Town service which initially passed through Mwanza but was later changed to pass through Nairobi. Imperial Airways merged with BOAC in April 1940. With the attainment of independence, Kenya renegotiated all the Bilateral Air Service Agreements previously entered into on her behalf by the then colonial government of the United Kingdom. This involved the review of traffic rights for all scheduled foreign airlines operating into and out of Kenya. On February 4, 1977, Kenya established its own airline, Kenya Airways (KQ) to provide both domestic and international scheduled services. Together with its partner KLM, KQ provides the highest service frequencies to Europe from Nairobi via Amsterdam's Schipol hub. The two airlines provide convenient and regular connections to continental Europe, North America and the rest of Africa.

By 1987, Kenya had more inter-Africa connections than other nations in Africa when the Yamoussoukro Declaration on a New African Air Transport Policy—established in 1988—committed African nations to total integration of their airlines through the liberal exchange of air service rights, unbiased computer reservation systems, and joint infrastructure projects. Unfortunately, there has not yet been any significant implementation of this policy. International air traffic in Africa continues to be concentrated on a few large airports with intercontinental connections and limited feeder lines from other African capitals. Between 1986 and 1996, Johannesburg, Nairobi and Dakar developed into the most important international hubs in sub-Saharan Africa (Pedersen 2000). In terms of inter-African connections, Johannesburg has become the most important hub. However, its location further south puts it at a disadvantageous position compared to Nairobi, which has served as a gateway to parts of Africa south of the Sahara. Nairobi also has a greater frequency of flights to cities such as Dar es Salaam, Entebbe, Lusaka or Harare. Nairobi's location vis-à-vis the principal north-south alignment between Europe and Southern Africa requires little deviation in terms of route kilometers flown and yet offers a convenient stopover for passengers, freight and fuel.

Air transport infrastructure

The growth of air traffic in Kenya after independence has led to rapid development of airport infrastructure. Numerous airports and airstrips have been developed. Today, the country has about 568 aerodromes spread all over the country, including national parks and game reserves. About 160 of them are public aerodromes manned by Kenya Airports Authority (KAA), a parastatal that was established by an Act of Parliament in 1991. There are different categories of airports, with each having different requirements for communications, navigation, surveillance and air traffic management facilities and equipment. These are international airports such as JKIA and Moi International Airport (MIA); Category A aerodromes such as Wilson and Malindi. Categories B and C are aerodromes and airstrips. Examples of Category B airports include Keekorok, Wajir and Voi while Category C include local airstrips found in national parks and game reserves throughout the country. International Airports operate 24 hours a day with aircraft landing and taking off any time. Category A airports operate 12 hours a day, usually between 6:30 a.m. and 8:30 p.m. Categories B and C operate during daylight hours only from 6:00 a.m. to 6:00 p.m. The three international airports in the country also have the basic infrastructure needed for airports according to International Civil Aviation Organization (ICAO) Air Safety Standards. These include Instrument Landing System for night landing a Very High Frequency (VHF) control tower to enable the air traffic controller to see the whole airport and radar surveillance of a bigger area. Category A (domestic airports) use VHF and air field lighting for communicating. Smaller airports use locaters such as VHF omni-range or Non-Directional Beacons or Distance Measuring Equipment. Out of 568 airports in the area only seven are manned. These are JKIA, MIA, Eldoret International Airport, Wilson, Malindi, Kisumu and Lokichogio. The rest of the aerodromes are unmanned and lack navigation equipment and proper maintenance.

Today, Kenya has a relatively well-developed air transport industry with three international airports in Nairobi, Mombasa, and Eldoret and four main domestic airports at Wilson, Malindi, Kisumu, and Lokichogio. Of the domestic airports, Wilson generally records the largest number of aircraft movements because it serves as the base for domestic charter planes to and from the National Parks and Game Reserves dotting the country. It also handles aircraft taking relief aid to neighbouring countries such as Sudan, Somalia and the Democratic Republic of Congo. Airfreight traffic has increased rapidly in the country over the years, particularly the export of high quality horticultural produce. At the domestic-only airports, domestic cargo is dominant. For example, at Kisumu airport, domestic cargo accounts for 97 percent of the total cargo handled (USAID/REDSO/ESA, 2001). Currently, most of domestic cargo in Kenya is carried by roads or railways as air transport is expensive and not well developed. International airfreight

is dominant at the international airports such as JKIA and MIA. According to a recent survey, the Europe-African southbound air freight grew by 14.4 percent in 2004 while the northbound market grew at 3.4 percent (Clancy & Hoppin, 2005).

As already discussed, most aerodromes in the country are poorly maintained and lack essential navigation aids. Some of the crucial air transport infrastructure such as control towers and buildings housing radar stations are in a sorry state and require urgent rehabilitation (Ministry of Transport and Communications, 2003). Poor infrastructure and services such as roads, electricity, information technology and water and sanitation services are still poor in most airports. Sufficient and effective linkages between airports and other transport modes such as railways and roads are lacking. Roads linking airports at present are in a bad state of repair and public bus services are poorly developed and infrequent. A case in point is JKIA, which has only one bus service (Route 34) and the buses using the airport route are often overcrowded.

Facilities and capacity at JKIA

JKIA is Kenya's premier airport and is increasingly growing in status as an international aviation hub in East Africa, handling substantially more passengers than either Entebbe or Kotoka (Table 1). At present, JKIA handles about 60 percent of the total visitors to Kenya by air. The airport was initially equipped to international standards with a handling capacity of 2.5 million passengers per annum and about 200,000 tons of cargo per year. The airport has already exceeded its planned maximum capacity for handling passengers. The airport now handles on average about 4 million passengers per year (Table 1). KAA manages JKIA like other airports in Kenya. Tables 1 and 2 compare passenger volume and aircraft movements for JKIA, Entebbe and Kotoka airports. Table 3 compares air cargo traffic for JKIA, Entebbe and Kotoka airports while Table 4 presents cargo throughput for selected international airports throughout Africa. According to Table 4, Nairobi is ranked second to Johannesburg in terms of the volume of cargo handled. JKIA handles about 130,000 tons of cargo per year. This constitutes about 65 percent of its planned cargo capacity (USAID/REDSO/ESA, 2001).

Table 1. A comparison of passenger throughput* at Jomo Kenyatta International Airport (Nairobi, Kenya), Entebbe International Airport (Entebbe, Uganda) and Kotoka International Airport (Accra, Ghana), 1996-2004 (in thousands).

Year	JKIA	Entebbe	Kotoka
1996	2,677	325	402
1997	2,551	356	429
1998	2,350	367	484
1999	2,668	377	554
2000	2,945	373	592
2001	-	-	622
2002	3,053	-	636
2003	3,451	494	756
2004	4,000	544	806

* Includes total domestic and international passengers

Source: Airports Council International. (2005). *2004 Worldwide airport traffic report*. Geneva, Switzerland.

Table 2. A comparison of numbers of aircraft movements* at Jomo Kenyatta International Airport (Nairobi, Kenya), Entebbe International Airport (Entebbe, Uganda) and Kotoka International Airport (Accra, Ghana), 1996-2004.

Year	JKIA	Entebbe	Kotoka
1996	41,549	15,624	6,664
1997	42,191	15,057	6,209
1998	41,528	17,038	7,210
1999	45,576	17,806	9,107
2000	46,808	16,190	10,414
2001	-	-	9,064
2002	49,897	-	8,161
2003	58,588	26,116	11,701
2004	59,927	26,265	11,852

* Includes total domestic and international movements

Source: Airports Council International. (2005). *2004 Worldwide airport traffic report*. Geneva, Switzerland.

Table 3. A comparison of air cargo traffic* at Jomo Kenyatta International Airport (Nairobi, Kenya), Entebbe International Airport (Entebbe, Uganda) and Kotoka International Airport (Accra, Ghana), 1996-2004 (in metric tons).

Year	JKIA	Entebbe	Kotoka
1996	74,963	27,010	37,045
1997	75,690	26,926	37,623
1998	116,205	30,967	45,767
1999	125,552	25,633	46,757
2000	139,619	26,015	46,826
2001	-	-	44,779
2002	168,803	-	40,877
2003	166,517	36,617	47,667
2004	183,470	48,585	46,918

* Includes total domestic and international cargo

Source: Airports Council International. (2005). *2004 Worldwide airport traffic report*. Geneva, Switzerland.

Table 4. International cargo traffic for top 20 airports in Africa, 2003 (in metric tons).

Ranks in Africa	World Rank	Airport	Traffic (tones)
1.	62	Johannesburg	262,151
2.	85	Nairobi (JKIA)	173,926
3.	-	Cairo	166,056
4.	116	Luanda	117,143
5.	163	Lagos	55,496
6.	151	Kinshasa	51,183
7.	180	Accra	47,667
8.	187	Casablanca	44,834
9.	202	Entebbe	36,617
10.	224	St. Denis-Gillot	29,705
11.	226	Brazzaville	29,294
12.	251	Algiers	21,942
13.	255	Addis Ababa	20,875
14.	269	Lusaka	18,224
15.	271	Tunis	18,189
16.	284	Doula	15,958
17.	287	Libreville	15,768
18.	288	Abidjan	15,727
19.	294	Antananarivo	14,835
20.	301	Mwanza	13,702

Source: Air Cargo World. (2004), Top Airports, International Edition, p. 22

TRAFFIC GROWTH AND FORECAST

Growth of passenger traffic

One thing that needs to be noted is the holiday or tourist nature of the majority of visitors to Kenya by all means of transport (King, 1984). For example, in 1987, such visitors accounted for about 63 percent of the arrivals. In 2002, the visitors on holiday accounted for 75 percent of the total departing visitors. Over 90 percent of Kenya’s holiday visitors arrive by air with most of them arriving in Nairobi (JKIA) on scheduled flights (World Tourism Organization, 2002b).

According to a recent forecast by the World Tourism Organization (WTO), Africa should be able to triple the size of its tourism industry by 2020 if proper efforts are made to ensure safety and security of visitors (2000a). The number of tourist arrivals in the continent is forecast to reach 77.3 million in 2020, up from 27.8 million in 2000 (WTO, 2000a). Most of the tourists will be heading to South Africa. Tourist arrivals in South Africa will grow by 10.4 percent per annum and will increase to 36 million by 2020 up from 6 million in 2000. East Africa will be the other major growth region, with the number of arrivals increasing at 6.0 percent annually. This means that the estimated tourist arrivals will increase to 17 million in 2020. Table 5 shows the trend in tourism arrivals for 1996-2000. It should be noted that international tourist arrivals fell worldwide in 2001 by 1.3 percent, the first

decline in international tourism arrivals since World War II (WTO, 2002a). Data suggests that Kenya's tourism industry will continue to play a vital role in JKIA efforts to establish itself as an international aviation hub in Eastern Africa. Further, a decline in tourist traffic would result in far fewer flight operations and could reduce air traffic to levels lower than those of Entebbe, Dar es Salaam and Addis Ababa (King, 1984; WTO, 2002b).

Table 5. African tourist arrivals, 1996-2000.

Country	Tourist Arrivals (in thousands)				
	1996	1997	1998	1999	2000
South Africa	5,186	5,170	5,898	6,026	6,000
Tunisia	3,986	4,392	4,831	5,000	---
Egypt	3,896	3,961	3,454	4,489	5,506
Morocco	2,856	3,203	3,414	4,088	4,293
Zimbabwe	1,597	1,336	2,090	2,250	1,967
Kenya	1,003	1,001	894	969	1,037
Algeria	605	635	678	749	866
Botswana	656	765	940	1,051	---
Nigeria	1,230	1,292	1,357	1,425	1,492
Namibia	525	571	---	580	---

Source: World Tourism Organization. (2002): Compendium of Tourism Statistics. Madrid, Spain.

Growth of cargo traffic

Africa accounts for approximately 3.5 percent of the world's air cargo traffic in terms of tonnage and 4.4 percent in terms of tonne-kilometers. The total international flows of cargo moving into, within and out of Africa totaled approximately 961,000 tons in 2001, with Europe accounting for 65 percent of all African foreign air trade. Europe's dominance of market share can be explained by the region's proximity to Africa and long standing historical ties going back to the colonial days. While Europe once held parity in northbound and southbound tonnage, the market between the two regions is now slightly imbalanced as African air exports exceed air imports in total tonnage by a ratio of about 3 to 2.

African air exports—especially perishables—have made significant inroads in European market since the mid 1990s. The exports to Europe primarily consist of perishables such as fruits, vegetables, cut flowers and fish. Some textiles and express documents are also exported by air. African air imports from Europe primarily consist of specially manufactured goods, components and peripherals, express documents, machinery, transport equipment and spare parts. In Kenya, air exports have experienced a remarkable growth in the last ten or so years. Exports of fresh horticultural products through JKIA have increased from 57,383 tons in 1992 to about 139,619 tons in 2000 (KAA, 2001, USAID/REDSO/ESA, 2001). An examination of Table 3 shows that there has been an increase in airfreight handled at JKIA during the study period.

Traffic forecast

Based on data obtained primarily from the Kenya Civil Aviation Authority offices, KAA and airlines operating into and out of Nairobi and interviews held with key informants in the Ministry of Transport, projections were made for departing visitors, aircraft movements, and passenger/cargo traffic through 2020. Index Numbers were used to show whether the volume of cargo throughout has been increasing at the airport or not. Time Series Analysis is used to reveal the future trend of aircraft numbers, passenger and cargo throughout in the next five to twenty years. A linear trend curve was used to forecast aircraft movements and volume of passenger and cargo traffic at JKIA. The nature of the trend curve used is determined by using the mathematical formula shown below:

$$Y = a + bT$$

Where: Y is volume of traffic (e.g., cargo)

T is number of years

a and b are constants representing the intercept and the slope respectively.

The trend curve assumes a constant annual increase in traffic level and decreasing rate of growth.

The trend curves reveal that growth in aircraft movements, passenger and cargo traffic have not been characterized by random fluctuations from year to year. It is apparent that as demand for air travel and air trade increased, so do the number of aircraft movements increase. Using the trend curves, projections for aircraft movements, passenger and cargo traffic were made for the period 2005-2020. Based on the trend curves, JKIA is likely to experience a major increase in the volume of passenger and cargo traffic leading to an increase in demand for more aircraft movements. Aircraft movements are expected to increase from 55,000 in 2005 to 78,000 in 2020 while passenger traffic will increase from 3.4 million in 2005 to slightly over 4.9 million in 2020. Cargo traffic is expected to see even greater increases as it nearly doubles from 160,000 tons to almost 280,000 tons in 2020. Consequently, the airport authorities have to expand and modernize JKIA if it is expected to handle efficiently such large volumes of traffic in the future. Any congestion at the airport would lead air operators to shift to other more efficient airports in the region.

CONCLUSION

Air transport in Kenya, like elsewhere in the developing countries, was introduced from outside. By the time the country attained independence in 1963, it was well linked with its former colonial master, through British Airways and several other foreign airlines operated into and out of Nairobi. EAAC, owed by the three East African states, provided regional services as well as international flights into and out of Nairobi. The rapid growth of air traffic in Kenya after independence has led to development of several major airports and numerous airstrips dotting the whole country. Many of the airstrips are found in National Parks and Game Reserves distributed throughout the country.

Today, Kenya possesses three international airports, the most important in terms of passenger and cargo traffic handled being JKIA. In 2003, JKIA was ranked 85th in size among world airports and 2nd in Africa after Johannesburg in terms of cargo traffic (Table 3). JKIA has grown into a major regional hub airport in Eastern Africa due to its geographical position and the large number of international airlines operating into and out of the airport.

As already discussed, most of the foreign visitors passing through JKIA are tourists. At present, the country continues to be one of the top destinations in Africa. Since the tourism industry is predicted to grow rapidly in East Africa in the next twenty years, the region is likely to witness a significant increase in tourist arrivals by 2020. JKIA has already exceeded its planned passenger handling capacity. The planned cargo capacity will also be soon exceeded. This will force airline operators to relocate to other airports in the region that are already expanding to cope with increasing passenger and cargo traffic. JKIA faces several additional problems that need to be addressed if the airport is to compete with other regional air hubs in Africa such as Entebbe, Addis Ababa and Johannesburg, namely aviation safety and security. If these issues and airport infrastructure are addressed, there is no doubt JKIA can become an aviation hub in eastern and central Africa.

REFERENCES

- Abrahams, T. (2002). "Key challenges facing air transport in Africa." Paper presented at the 8th Aviation and Allied Business Leadership Conference, Johannesburg, South Africa, 1-2 July.
- "Africa must open the skies." (2005, April 25). AP wire service.
- Air Cargo World (2004) Top Airports, International Edition, Journal of Commerce, Inc., Washington, D.C., October, p.22.
- Airports Company South Africa. (2004, May 26). "African airports urged to take advantage of huge growth potential." Press release.
- Airports Council International. (2005). *2004 worldwide airport traffic report*. Geneva, Switzerland.
- Air Transport Action Group. (2005).. "Facts and figures." Retrieved from www.atag.org/contents/showfacts
- Air Transport Action Group. (2000). "The economic benefits of air transport." Geneva Switzerland.
- Air Transport Association. (2002). *The perfect economic storm*. Washington, D.C.
- Button, K. (2002). "Debunking some common myths about airport hubs." *Journal of Air Transport Management*, 8, pp. 177-188.
- Clancy, B. & Hoppin, D. (2005). "Slight slowing of growth: MergeGlobal's 2005 world air freight forecast." *Air Cargo World, May*, pp. 21-39.
- Graham, B. (1995). *Geography and air transport*. John Wiley and Sons, New York.
- Hogenuer, K. (1975). *Patterns of air transport in the East African community*. Unpublished Doctoral Thesis. Columbia State University.
- Irandu, E. M. (1995). *Air transport in Kenya: An analysis of domestic and international airline networks*. Unpublished Doctoral Thesis. University of Nairobi.
- ICAO. (2002, October 2). "One year after 11 September events: ICAO forecast world air passenger traffic will exceed 2000 in 2003. Press release.
- KAA. (2001). *Airport statistics, marketing and business development*. Kenya Airports Authority, Nairobi, Kenya.
- King, J. W. (1984). Nairobi as an airline passenger hub. University of Utah, Salt Lake City.
- Ministry of Transport and Communications. (2003). Integrated National Transport Policy Workshop, Nairobi, Kenya, January 8, 2003.

- Pederson, P. O. (2000). "The changing structure of transport under Trade Liberalization and Globalization and its impact on African development." CDR Working Paper. Center for Development Research, Copenhagen, Denmark.
- Rhoades, D. L. (2003). *Evolution of international aviation: Phoenix rising*, Ashgate Publishing, Aldershot, UK.
- Rietveld, P. & Brons, M. (2001). "Quality of hub-and-spoke networks; the effects of timetable coordination on waiting time and rescheduling time." *Journal of Air Transport Management*, Vol. 7, pp. 241-249.
- Shaw, S. (2004). *Airline marketing and management*, 5th ed. Ashgate Publishing, Aldershot, UK.
- Taneja, N. K. (2003). *Airline survival kit*. Ashgate Publishing, Aldershot, UK.
- USAID/REDSO/ESA. (2001). The role of air transport in East African regional trade, Technoserve Inc., Nairobi, Kenya.
- Wells, A. (1994). *Air transportation: A management perspective*. Wadsworth Publishing, Belmont, CA.
- World Bank Group. (2002). "Making Monterrey Work for Africa: New Study Highlights Dwindling Aid Flows, Mounting Challenges." Press Release no. 2002/273/S.
- WTO. (2002a) *Compendium of tourism statistics*. World Tourism Organization, Madrid.
- WTO. (2002b). "Latest Data, 2001." Retrieved from www.world-tourism.org/market-research/facts&figures