

**GEOGRAPHICAL ANALYSIS OF LIBYAN AIRPORTS AND THEIR
POTENTIAL AS A HUB OF AIR TRANSPORTATION**

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GEOGRAPHICAL ANALYSIS OF LIBYAN AIRPORTS AND THEIR
POTENTIAL AS A HUB OF AIR TRANSPORTATION

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To My Beloved Parents

To my father, Allah's Mercy upon his pure soul, who had directly advised me few hours before he passed away to continue my study until I finish it.

To my great and strong mother, who prays for us every time; who also traveled thousands of miles, despite her age of over 77 years, just to see me and encourage me to continue my study.

I humbly dedicate this research to them

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ABSTRACT

Air transport has increased during the last three decades at the local level, regional and international. Passengers have preferred air transport to other modes of transportation. The research focused on geographical analysis of main Libyan airports, Tripoli, Benina, and Sebha International Airport. The research studied the ability and potential of the airports to be hubs of air transportation, comparable with Jomo Kenyatta International Airport, in Kenya at the regional level and Dubai International Airport at the international level. The methodology, involved a geographical location analysis of Libyan Airports, as a basis for comparison with Jomo Kenyatta Airport, and Dubai Airport, to find out which areas optimized geographically to be hubs of air transportation. Twenty (20) International air transport hubs, geographically distributed around world continents will be a unit of measurement of geographical location. The research, also examined the climate of these areas, and analyzed climate data for a period of five years from the year 2008 to the year 2012. Moreover, a measurement distance and time spent between five airports under the study and twenty (20) hub airports to figure out proximity to international hubs, also gives information about Libyan airports infrastructure, current situation and abilities. The study resulted that, geographical location of Libyan airports was ideal in terms of *centrality and moderatiacy* in field of air transport compared to Dubai and, Jomo Kenyatta airports. The prevailing climate in Libya ideally suited and lacks climatic phenomena that negatively affect airlines. In addition, Tripoli International Airport closest in terms of distance and flight time to arrive the twenty (20) hub airports, used in the comparative analysis.

ABSTRAK

Pengangkutan udara meningkat dalam tempoh tiga dekad yang lalu di peringkat tempatan, serantau dan antarabangsa. Pengangkutan udara semakin digemari lebih daripada mod pengangkutan yang lain. Penyelidikan ini memberi tumpuan kepada analisis geografi lapangan terbang utama Libya, Tripoli, Benina , dan Lapangan Terbang Antarabangsa Sebha. Kajian ini mengkaji kemampuan dan potensi lapangan terbang tersebut untuk dijadikan hab pengangkutan udara, setanding dengan Lapangan Terbang Antarabangsa Jomo Kenyatta, di Kenya pada peringkat serantau dan Lapangan Terbang Antarabangsa Dubai di peringkat antarabangsa. Metodologi kajian ini melibatkan analisis lokasi geografi Lapangan Terbang Libya, sebagai asas untuk perbandingan dengan Lapangan Terbang Jomo Kenyatta , dan Lapangan Terbang Dubai, bagi mengetahui jarak yang optimum dari segi geografi untuk dijadikan hab pengangkutan udara. Sebanyak dua puluh (20) hab pengangkutan udara antarabangsa di sekitar benua dunia telah dipilih sebagai satu unit ukuran geografi. Kajian ini turut mengkaji iklim kawasan dan menganalisis iklim dalam rekod sepanjang tempoh lima tahun iaitu dari tahun 2008 hingga 2012. Selain itu, kajian jarak dan masa yang diperlukan antara lima lapangan terbang ini dan dua puluh (20) lapangan terbang hab berdekatan diambilkira dengan jarak hampir kepada hab antarabangsa. Kajian ini juga memberikan maklumat tentang lapangan terbang Libya, infrastruktur, keadaan semasa dan kelebihanannya. Hasil kajian mendapati bahawa lokasi geografi lapangan terbang Libya adalah ideal dari segi keutamaan dan kemudahsampaian dalam laluan udara berbanding Dubai dan lapangan terbang Jomo Kenyatta. Manakala iklim sedia ada di Libya adalah sesuai dan tidak mempunyai fenomena negatif yang boleh menjejaskan syarikat penerbangan. Di samping itu, Lapangan Terbang Antarabangsa Tripoli adalah yang terdekat dari segi jarak dan masa penerbangan untuk tiba di dua puluh (20) lapangan terbang hab berdasarkan analisis perbandingan dalam kajian ini.

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LIST OF ABBREVIATIONS

TIP	-	Tripoli International Airport
BEN	-	Benina International Airport
SEB	-	Sebha International Airport
DXB	-	Dubai International Airport
NBO	-	Jomo Kenyatta International Airport
T	-	Temperature (°C)
TM	-	Maximum Temperature (°C)
Tm	-	Minimum Temperature (°C)
H	-	Mean Humidity (percentage)
VV	-	Mean Visibility (Km)
VM	-	Maximum Wind Speed (Km/h)
PP	-	Precipitation of Rain and (Mm)
V	-	Wind Speed and Mean (Km/h)
SN	-	Days with Snow
TS	-	Days with Thunder Storm
FG	-	Days with Fog
TN	-	Days with Tornado or Funnel Cloud
GR	-	Days with Hail

LIST OF SYMBOLS

Km	-	Kilometer
Mi	-	Mile
H	-	Hour
C	-	Celsius

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Air transportation has significantly increased in three recent decades, at local and international levels. The passengers now prefer air transportation to other means of transportation for several reasons. High level of safety, access speed to the point intended by the passengers in a short time, and easy access to any point in the world.

Air transportation is divided into two main types: transport of passengers and cargo. With respect to the first, transfer of passengers is from point or one city to another, and respect to the second type; transfer of goods requires access to their intended destination in a short period.

As a result of the sharp increase in passengers as well as goods transportation by air, air transportation becomes the interest of governments who are now keen to support air transport industry. In some countries, air transportation has become the main source of national income. The attendant huge budgets involved in the improvement and the development of the industry's associated services such as

tourism now attract the largest number of passengers for tourism. This has also affected infrastructural services development, such as airports, roads, communications, hotels and financial services as well as administrative facilities. In addition, the development of airports ground services, airstrips, and parking service to the international level. There is also a sharp increase in quality of services as required by the World Organization for air transportation to attract international airlines.

Most important reason for the success of air transportation is the geographical location of the airport. This has also served in attracting many airlines in and out of the airport.

Some researchers believe that the centrality and intermediacy of the city is one key factor to the success of air transport, generally so-called Strategic Commercial location “The two identified factors, centrality and intermediacy, are special characteristics or qualities that enhance the traffic levels of transportation hubs. Strategic commercial location can be defined in terms of these two characteristics”(Douglas K and Fleming, 1994).

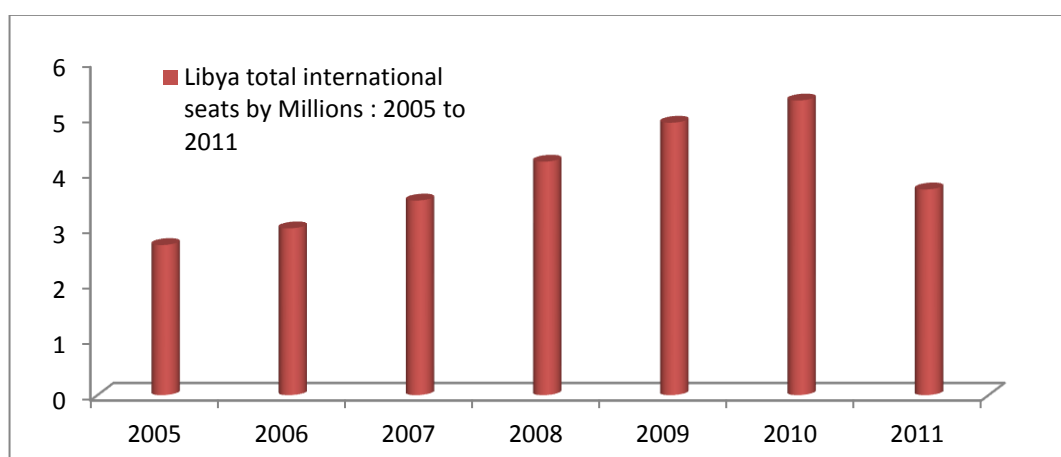


Figure 1.1 Libya total international seats: 2005 to 2011 (CAPA CENTRE FOR AVIATION, 2013).

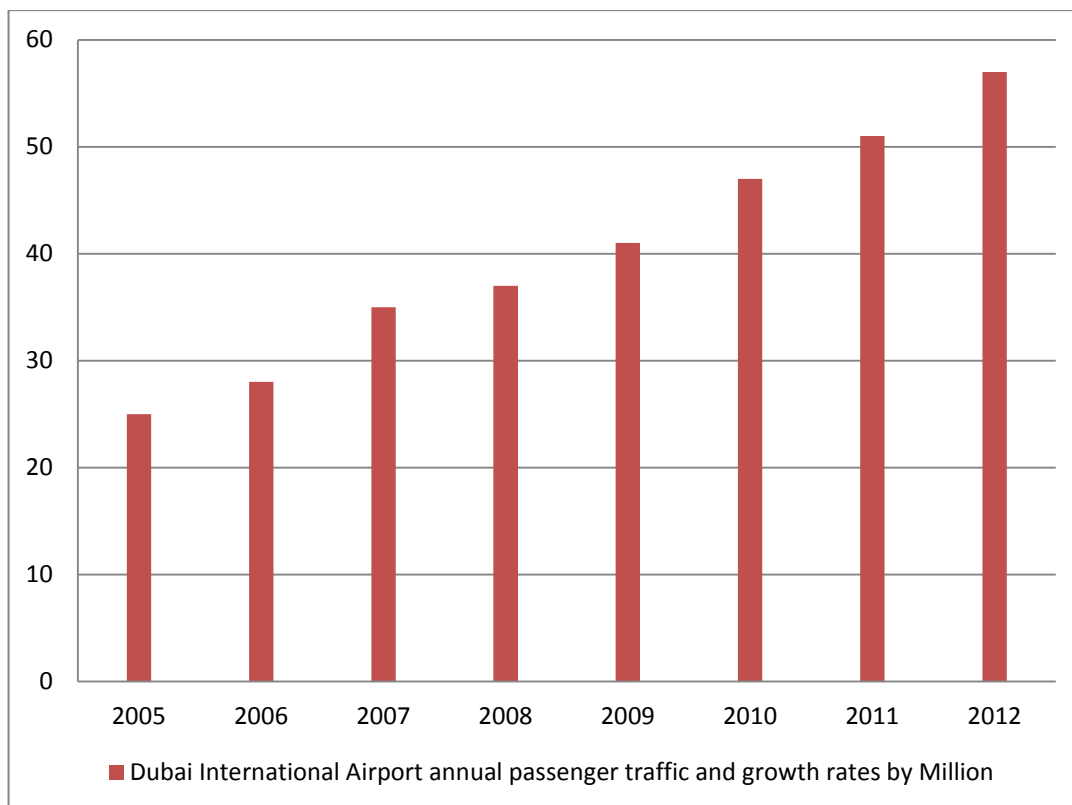


Figure 1.2 Dubai International Airport, annual passenger traffic and growth rates: 2005- 2012 (Capa Centre for aviation, 2013).

Figure 1.1 shows that passengers for international flights increased significantly between 2005 and 2010. The year 2005 recorded approximately 2,500,000 passengers, this rose during subsequent years to reach more than 5,000,000 passengers in 2010, before it dropped in 2011 and recorded about 3,500,000 passengers because of security conditions. This shows that air transport industry in Libya could reached up to excellence level given its potentials.

Figure 1.2 shows the international passenger traffic at Dubai International Airport between 2005 and 2012. Here we can see increase in the number of passengers during this period. The 25,000,000 passengers figure during the year 2005 rose during the subsequent years to more than 55,000,000 passengers 2012.

1.2 Background of the Study

It is clear that some countries depend heavily on revenue from air transport industry for national income. Country such as United Arab Emirates is fully supporting Emirates Airline to become one of the world most developed and sophisticated in the past two decades.

Owing to Dubai's geographical location, which serve as a bridge between the countries of eastern and southern Asia, Australia, and Europe. The airport is fast growing into a very busy pathway. Passengers are most attracted to travel on Emirates Airline for easy access to any point in the world, as well as high-end services and welfare provided by the company to its customers.

Needless to say Emirates Airline is one of the most important international companies in the field of air transportation on the international and regional level and the first air hub in the region.

However, there is a significant challenge, which may require the expansion of Dubai International Airport. It raises the question of whether the small spatial space for Dubai may not accommodate more expansion.

“The challenge now is to make Emirates larger than Dubai. This success of one feeds off the other- but Dubai alone is not big enough to sustain Emirates” (Sull, 2005).

Jomo Kenyatta International Airport, Nairobi-Kenya, is of the most important regional hub of air transportation in Africa. It is represented by Kenya Airways, which plays an important role in the east African. The airport serves for the

transportation of both human passenger and goods such as vegetables and flowers to and fro Europe, other parts of Africa and the world on a daily basis. Also, some international airlines operate from Nairobi, which also serves as a regional center for training and maintenance of both aircraft and personnel, one of such airlines is British Airways.

However, Jomo Kenyatta International Airport is facing financial difficulties. The required funds to spend on infrastructure, development, and expansions “the airport infrastructure at JKIA is dilapidated and need an overhaul if the airport is to compete effectively with other regional air hubs “(Sull, 2005). In addition, there are some other difficulties such as airport passenger’s service cargo.

It has been observed that, “Passenger service charge at JKIA was much higher than other than other airports in the region” (Iranu, 2004). Moreover, the price of jet fuel “The cost of jet fuel at JKIA is high, and thus creates inevitable pressure for increase in cargo rates “(Sull, 2005). All these problems are facing the Air transport industry in Kenya, which requires government intervention to support this development.

Despite, all the successes achieved by each of the United Arab Emirates and Kenya to be the hub for air transportation at regional and international level. The research will study Libya and its airports potential as a hub of air transportation at regional and international level.

Libya has an ideal geographic location. It is located in the center of North Africa and is close to the airports hubs in Europe. Libya geographical location is mediating the continents of the world; there is a possibility to become an important focal point for air transportation between Asia, Europe, North and Latin America, and the entire Africa.

What Dubai is facing from spatial size and lack of capability for geographical expansion of Dubai Airport, notwithstanding the large financial backing from the government does not apply to Libya. Libya does not have this problem of land that can build airports as big and modern as anywhere in the world.

Furthermore, Nairobi is facing financial problems in infrastructure, rising fuel prices and passenger services. This may affect Nairobi in continuing as a regional hub for air transport. Libya, on the other hand, may not have these problems since it is a country with huge financial potential and a leading producer of the finest oil in the world.

Libya may serve as an attractive hub for major international airlines to refuel. Most importantly, the Libyan government has a very ambitious plan to support the air transport industry, especially in areas of re-development and maintenance of airport, airstrip, navigation devices and aerial surveillance have already begun efforts to promote international level of air services.

Again, Libyan government has allocated a huge budget to develop the airports in Tripoli, Benghazi and Sebha and some other small airports around the country. Also, there is a commitment to build terminals for passengers to accommodate the increasing number of passengers every year. This has led to setting aside certain amounts for the development of infrastructure, roads, communications, and other services. In this direction, hotels restaurants and tourism are being repositioned to attract attention to the Libya-old archaeological wealth.

In spite of geographical location, natural wealth, and high national income, the government also plans to make Libya as one of the key countries in the field of air transport industry most especially in Africa continent.

This research work is based on the study of many potential of Libya airports as a prime hub for air transportation in terms of geography, economic, technical, especially when compared to Dubai International Airport at international level and Jomo Kenyatta International Airport at regional level.

1.3 Problem Statement

Many researchers believe that the ideal geographical location, accessibility and financial potential are major factors in the determination of a possibility of becoming a country's hub of air transportation both at regional and international level.

With an ideal geographic location, climate has been relatively stable throughout the year. Libya is covered with the Mediterranean climate. It also has a potential of huge financial ability to support the national carrier, and the development of airports and infrastructure. Libya oil wealth has equally helped in maintaining low cost of fuel prices. An important factor responsible for reducing cost of air transportation. Perhaps the air transport industry would have enjoyed much progress but for the US embargo and isolation by UN which lasted close to three decades.

Government's interest in air transportation, as an alternative national income, has been greatly affected by political factor. For example, five years ago Libyan government came up with the ambitious plan to raise the level of air transportation in Libya. This was largely unsuccessful for political reasons in a local level, regional and international.

Status Quo: Despite the positive geographical factor and climatic conditions together with enormous financial potential hand-in-hand with government support, air transportation is underdeveloped because of limited capacity. Airports could receive a large number of aircraft as well as passengers. Terminals still need expansion, also, infrastructure needs to develop that will help the air transport industry to improve and reach the international level.

Destabilizing condition: The period of the U.S. embargo on Libya, and international isolation imposed by the United Nations for three decades, has a significant role in weakness in the air transport industry. As well as, the huge oil income beyond the government's interest in air transport as an alternative national income, political factors that have been neglected air transportation for several decades has exacerbated the problem. These basic elements, such as the ideal geographical location, easy accessibility, connectivity between other hubs and financial potential with government and political support, if well managed could help to turn Libya into a hub of air transportation at international level.

Consequences: The failure to pay attention to these factors may cost Libya its potential to rise to its capacity in air transportation. The geographical proximity, together with cheap energy source, if well directed, could serve to relieve pressure on air traffic already congested. Well-managed air transportation in Libya would no doubt help in easing the crowded airspace by aircrafts, causing delays in takeoff and landing.

Proposal: A close study of the potential of Libyan airports (Tripoli - Benghazi - Sebha) and a careful geographical analysis of these potentials will help to develop the field of air transport industry in North Africa. This study will come out with some answers and solutions for the above.

1.4 Research Objectives

The research aims to study the potential of some Libyan airports as a potential hub of air transportation from the perspective of geographical location, climate and topography, and the possibility of a good linkage between the continents of the world.

As well as measuring distances and time between the Libyan airports and other important international airports comparing Dubai International Airport in the United Arab Emirates and Jomo Kenyatta Airport, Kenya. In addition to focus on the ability of Libyan government to support air transportation and the creation of appropriate opportunities to lift it to the international level required.

Finally, examine the current situation of Libyan airports and their potential, government's program and plans for the future of aviation industry in Libya.

The following are the objectives:

- a) To study Libya geographical location in terms of climate, and topography, the United Arab Emirates, and Kenya, and the accessibility to the International Hubs.
- b) To measure distances and calculate the time between Libyan airports and the International hubs, compared to Dubai and Kenya.
- c) Current Libyan airports and airlines companies and their situation.

1.5 Research Questions

1. Is the geographical location (spatial) *centrality and intermediacy* the most important factor to create a hub?
2. Is the distance and time between Libya and the major hubs far or near, what are the cost implication when compared with Dubai and Kenya?
3. What is the current situation of Libyan airports, the necessary infrastructure needed by Libyan airlines to reach the level of regional and international standard in air transportation?

1.6 Scope of Research

The study will cover the geographical location (spatial), climatic, and topography effects on the areas targeted by the study as well as the case of the Libyan airports and the availability of basic facilities and infrastructure necessary to reach international standard.

What role should airlines operating in Libya play? Again, what is the ability and capability needed to meet up with the requirements of both local and international market, be it passengers or freight? To answer these questions, the study will focus on the following:

- 1) Impact of geographic location, climate, and topography, on air traffic in the study areas.
- 2) Libyan airports condition in terms facilities and infrastructure.

- 3) The abilities of Libyan airlines, national carrier, or private companies, passenger, or freight.

1.7 Research Limitation

This study will focus on geographical analysis (spatial), climatic, topography effects for Libya, Kenya, and the United Arab Emirates .Also, the study will analyze and measure the distance between Libya, Kenya, and United Arab Emirates and the world's hubs of air transportation. In addition, to calculating the time it takes to reach the destination.

Moreover, it will focus on passenger demand on these areas and the annual capacity of these airports to receive passenger, freight, and compare between them the ability of these airports and the availability of facilities and the necessary infrastructure. In addition, airlines operating on the rapid response to the market demand currently and in the future.

1.8 Research Assumption

In this research, the researcher will try to explain the relationship between geographic location and site selection of the hub, in terms of the *centrality and intermediacy* and other international hubs, as well as the accessibility to it and out from it to other destinations, as well as the effects of climate, topography and their impact. In addition, the researcher will try to measure the distance, and time, between the hubs to be studied (Dubai - Nairobi) and the rest of other international

hubs to show, which is more suitable to be a hub among them. Finally, try to prove that the government's role, its intervention and support has a very important influence in the success of the hub or not.

1.9 The Output of Research

Researcher expect that, the search will find that geographical location is very important to the selection of the hub and its success, as well as the *centrality and intermediacy* between the proposed area of study among other international hubs that will be an attraction for international airlines operating to and from it.

Expect that the study area may have a potential to relieve the pressure quotient of air traffic in Europe and lead to a delay in landing and takeoff. Therefore, the study area is close to the most important air transportation hubs in Europe, such as, London, Frankfurt, Amsterdam, Zurich, and the area could have potential to be a regional hub for Europe and international hub for the rest of the world. Also, the cost of air transport of the study area is lowest compared to other regions, Dubai, and Nairobi and that will be seen by measuring the distance, and time.

Finally, the researcher expects that research will provide a geographic database to the Libyan government with regard to the future of air transport, and to national airlines and international airlines as well.

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