CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

The deregulation and liberalisation of the air transport industry have influenced significantly the operational and institutional structure of the aviation industry globally. This regime has created a strong competitive environment among airline operators with a clear-cut impact scale from local to global aviation markets. This has brought about the formation of alliances, mergers and acquisitions to gain a competitive edge.

The United States of America pioneered the deregulation of domestic air transport market in 1978 (Miyoshi, 2007). The deregulation of the US domestic market and the Canada-US open skies agreement greatly relaxed the regulatory restraints of the advancement of airline networks in North America (Oun and Lee, 2002). Page (2005) following the work of Chou and Shaw (1993) observed that from the transport geographer's point of view, a distinguishing spatial structure in air travel has emerged in the USA, whereby the major US airlines have initiated a hub-and-spoke structure as spatial and commercial strategies for arranging airlines operations in a deregulated environment. This is in contrast with the Civil Aeronautic Board (CAB) regulation era where inter-urban routes were often 805km or more in length while little or no attention was given to integrating the route networks amongst operators.

O'Kelly (1986), on the spatial effects of deregulation on Aviation in the US, posits that hub and spoke spatial structure have developed, as hubs are least-cost solutions for airlines and may combine a range of airports in a region, helping the airline in running a high-frequency service along trunk routes between hubs. As it were, along the spokes, regional carriers, often code sharing under the major's identification to provide feeder services. The outcome has been a geographical concentration of airline hubs in major US cities, based on historical ties with certain airports, airline mergers, the servicing of niche tourist markets, and responses to competitors so that major operators provides 100-200 departures each day from some of the key hubs.

In Europe, the process of liberalisation was accomplished bit by bit in three phases, and took ten years from 1987 to 1997 (Chang and Williams 2002). A standout amongst the hugest results of deregulation in Europe has been the emergence of low-cost scheduled airlines. The low-cost sector has been expanding rapidly and growing at between 20 and 25% a year. This has upgraded the business relationship that exists between airports and low-cost carriers (Barrett 2004). Barret (2004) argues that the amalgamation of low-cost carriers (LCC) and secondary airports has been noteworthy both in terms of LCCs' gaining market share and expanding the size of the overall market, as a result of willingness of passengers to use remote airports which are normally more distant than the traditional hubs from the major cities.

Near similar outcomes were noted in Asia and Japan, on the effects of deregulation on the aviation market. Miyoshi (2007) on the effects of liberalisation on the domestic market in Japan observed that the Tokyo route market has high volume demand, influence of slots, different features of each market category, relatively low load factors, significant market seasonality, competition among network carriers, competition with high-speed rail and high fares. Conversely, these outcomes of the study when compared with the experiences in the intra-EU liberalized market serving the UK which showed three significant effects among which include decreased demand, increased fares and new entrants' failures.

Whilst studies on deregulation and liberalisation in air transport in US, Europe and Japan (Chou and Shaw, 1993; Oum and Lee, 2002; Barrett, 2004; Page, 2005 and Miyoshi, 2007) have shown that deregulation and liberalisation have led to the development of airline network, distinctive spatial network structure such as hub and spoke, emergence of low-cost scheduled airlines, enhanced service levels, flexible airfare regimes, increased route and network structure and increased passenger demands on niche route.

Following the impacts of the execution of air liberalisation policies in the US and Europe, African states arrived at the general accord on the need to draft a new policy that requires the liberalisation of the African airline industry. This agreement known as the Yamoussoukro Declaration is planned to avoid the bilateral air service agreements (BASA) that impose several restrictions on African carriers and rather create a single domestic market in Africa (Abate, 2007;Aberyratene, 2003). The African civil aviation liberalisation is based on the fifth air transport right. This is the right to carry a passenger from home country to another intermediate

country and from that to the third country. The commencement date for the African civil aviation policy dated back to the year 2001.

1.2 Statement of Problem

Globalisation has no doubt reduced the world to a global village. Distance no longer seems to be a major consideration in inter-governmental relations, choosing locations for global events, conventions and inter-governmental meetings. Similarly, corporations now have outstations and offices where manufacturing and distribution activities are carried out. One major transport mode that has contributed immensely in redefining the way socio-economic relationship across the world is organised is the air transport. As the pair, farthest location on the earth can be traversed under twenty-four hours (Bel and Fageda, 2008).

The deregulation of the air transportation is perceived as the major policy adoption that has changed the global aviation subsector. The US pioneered the deregulation of her domestic aviation market. The benefits include the emergence of a hub and spoke spatial structure, route integration and high-frequency service along trunk route between hubs. The success recorded prompted other parts of the world to quickly embrace the policy in order to improve and enhance air travel (Miyoshi,2007; Oun and Lee, 2002).

The actual and perceived gains of this policy made African countries to come together to draft a new policy that requires the liberalisation of the African air transport subsector. It was expected that the treaty dubbed Yamoussoukro Declaration which was signed in 1988 would transform the continent and regional aviation sector. The goal is to remove the restriction naturally imposed by the need to sign bilateral air service agreement before air services between countries is allowed. It was expected that between these periods the air transport sub-sector of the region would have been greatly enhanced. Consequently, the fifth freedom right would be fully maximised to the growth of regional aviation subsector (Richman and Lyle, 2005).

In Nigeria, earlier studies on air transport, air transport deregulation and liberalisation have focused mainly on the domestic air travel market (Filani, 1972; 1973; 1975; 1978; Akpogomeh, 1984; 1999; Olojo, 1996; Ogunsanya, 2005; Ogunbodede, 2006; Aderamo, 2010 Daramola and Jaja, 2011). Some of the works mainly examined the changing spatial configuration of aviation network since deregulation and the emergent structure. Most of these studies fail to establish the

spatial patterns of regional airline service structure from Nigeria given the importance of liberalisation as collective regional efforts for the West African socio-economic development. Also, the challenges militating against regional city accessibility and inclusion from Nigeria appears not to have been given consideration in the literature.

Moreover, the air traffic movements from Nigeria to the regional cities between 1988 and 2011 have been bewildered with a myriad of issues that have hampered the purpose of regional aviation liberalisation. The pattern of air traffic flow from Nigeria to other West Africa cities seems to be stagnant rather than expanding, and unpredictable. Issues of a flight delay, cancellation and non-availability characterised the nature of air traffic services from Nigeria to other West Africa cities. Against this background, this study seeks to provide answers to the following research questions:

1. What is the spatial pattern of air traffic flow between Nigeria and other cities in West African sub-region in a pre- and post-liberalisation eras?

2. What is the temporal pattern of air traffic flow between Nigeria and other West African countries in pre and post-liberalisation eras?

3. What are the challenges facing the air transportation in West African in pre- and post-liberalisation eras?

4. Has the city-pair category influenced regional passenger flow in West Africa since the liberalisation?

1.3 Aim and Objectives

The main aim of this study is to analyse the impact of liberalisation on air traffic flow from Nigeria to other West African countries. Basically, the study involves a spatio-temporal analysis of the regional air traffic structure from Nigeria to other West African countries in the pre- and post-liberalisation eras. The specific objectives are to:

1. Examine the spatial pattern of air traffic flow between Nigeria and the West Africa sub-region in pre- and post-liberalisation eras.

2. Examine the temporal pattern of air traffic flow from Nigeria to West Africa in pre- and post-liberalisation.
3. Provide a comparative analysis of the challenges of air transportation pre- and post-liberalisation.
4. Determine the significance of regional city pair passenger movement in West Africa since liberalisation.

1.4 Research Hypotheses

(i) The spatial pattern of airline route and network structure from Nigeria to West Africa cities has significantly changed from pre-liberalisation to post-liberalisation eras;

(ii) There is no significant difference in the volume of passenger movement before and after liberalisation;

(iii) There is no significant difference between number of flights between Nigeria and other West African before and after liberalisation;

(iv) There is a significant relationship between volume of passenger movement and number of flight movement in pre- and post-liberalisation;

(v) Arrival passenger movement and the departure passenger movement have influenced regional city pair passenger movement since liberalisation

1.4.1 Bases for Hypotheses Tested

The foregoing hypotheses, which are largely derived from the conceptual/theoretical framework and literature review, are tested. The basis for each hypothesis is briefly discussed.

(i) The hypothesis which states that the spatial pattern of route and network structure from Nigeria to West African countries significantly increased from pre-liberalisation era to post-liberalisation era is based on the fact that the deregulation or the liberalisation has been known to influence the air transportation network structure (Matsumoto, 2007). The spatial structure of modern transportation network is the interpretation of spatial distribution (Rodrigue, 2006). In addition, the deregulation of the United States aviation and the emerging route structure had been very significant given that deregulation policy caused a dramatic twist in the air transportation network from point to point to a hub and spoke network structure. This created a wave of restructuring in other spatial environment patterned after the US intervention. The outcomes

from other climes do not follow strictly the experiences of the United States. Though, similar or near similar experiences were noticeable in some cases, yet variations seem to exist in experiences after deregulation. In this vein, the liberalisation policy of the Africa Civil Aviation Authority adopted by the regional body, to stimulate socio-economic integration through enhanced air traffic flow within the sub- region is pursued. Therefore, understanding the emerging spatial structure of air transport network from Nigeria would further substantiate existing discussion in the literature on the effect of this policy on the air transportation network.

(ii) That there is no significant difference between the volume of passenger movement before and after liberalisation is based on the impact of liberalisation on passenger traffic flow extant in literature (Piemartini and Rousova, 2008). However, the comparison of the traffic flow on a regional basis showing longitudinal traffic flow both on the pre- and post-liberalisation eras has not been verified. Therefore, understanding the variation in the traffic flow in both dimensions will help to decipher the effect of the policy on traffic movement on the regional basis.

(iii) The hypothesis which states that there is no significant difference between number of flights between Nigeria and other West African countries before and after liberalisation is based on the fact that part of the main dimension of transport geography, understanding the flows, especially the aircraft movement within the spatial realities and entities is valid. The number of flight flow is a cumulative frequency of flight movement along city-pair in regional setting. Although, in some cases, a higher frequency may not necessary translate into increased passenger movement along city pair. However, the variation of the flight flow in the pre and post-liberalisation era is effective in determining the influence of policy on flight flows.

(iv) The hypothesis states that there is a significant relationship between the volume of passenger movement and a number of flight movement in the pre- and post-liberalisation. The spatial interaction concept/model help understand the basis for spatial interaction. The impact of liberalisation policy on passenger movement and flight movement pattern in the pre- and post-liberalisation is important. One fundamental question is, has there been any significant influence of liberalisation policy on enhancing the strength and direction of passenger and aircraft flow generated from Nigeria to other cities in West Africa. Therefore it is very important understanding the ratio of covariance between the variables to the product of their standard

deviation. This is important to make a decision relating to capacity enhancement along this route from Nigeria to West Africa countries.

(v) The hypothesis states that arrival passenger movement and the departure passenger have influenced regional city pair passenger movement since liberalisation. The significance of this hypothesis is to ascertain if the regional flow from Nigeria have been influenced by the arrival and the departure passenger flow since liberalisation.

1.5 Rationale for the study

The liberalisation policy is aimed at transforming the air transport sector in Africa by creating open skies dubbed as Yamoussoukro Decision. The objectives of the decision are full-liberalisation of the intra-African air transport market. It provides for free exercise of first, second, third, fourth and fifth freedom rights for passenger and freight air services. The policy framework removes a barrier to single regional aviation markets thereby lifting the restrictions imposed by bilateral air services agreements. This study undertakes an understanding of the effects of this policy on the West African regional aviation market; specifically on the emergent spatial patterns of inter-city air transport linkage from Nigeria to other West African countries is necessary given the position of Nigeria within the regional setting.

Moreover, the challenges since the full implementation of the Yamoussoukro decision in West Africa sub-region aviation market would be known. This study would also help understand the implicit socio-economic benefits of regional intercity linkages and factors militating against regional nodal city accessibility and the patterns of air traffic flow from Nigeria to other West African countries. One of the core elements in transport geography research is the network presentation. Rodrigue (2006) defined the network as "Framework of routes within a system of locations, identified as nodes". He described the route as "a single link between two nodes which are part of a larger network". He identified two types of routes - tangible route and less tangible route. The tangible routes are the road and rails, while the less tangible routes are the sea and air corridors. Of all the modal transport, the air transport route and network structure seem to have been affected more by policy intervention. The changing policy intervention has been known to influence the air transportation network structure (Matsumoto, 2007). The spatial structure of modern transportation network is the interpretation of spatial distribution (Rodrigue, 2006). The deregulation of the United States aviation and the emerging route structure had been very

effectual. Before the policy change, the dominant network pattern in the US is a point to point network structure across the cities in the US. However, the deregulation policy caused a dramatic change in the air transportation network from point to point to a hub and spoke network structure. This created a wave of restructuring in other spatial environment patterned after the US intervention. The outcomes from other climes do not follow strictly the experiences of the United States. Though similar or near similar experiences were noticeable in some cases, yet variations seem to exist in experiences after deregulation. In this connection, the liberalisation policy of the Africa Civil Aviation Authority adopted by the regional body, to stimulate socio-economic integration through enhanced air traffic flow within the sub-region was pursued. Therefore, understanding the emerging spatial structure of air transport network from Nigeria would further substantiate existing discussion in literature on the effect of policy on the air transportation network. To this end, it is important we understand the impact of liberalisation on the route structure of regional air travel from Nigeria to West African states in the pre and post-liberalisation period.

1.6 Scope of the Study

This study is basically a comparative study of the spatial and temporal patterns of air transportation from Nigeria to West Africa countries. The research design seeks to relate spatial interaction model to understand the traffic flows from Nigeria to other West African countries. The study seeks to understand the impact of liberalisation on the regional market. on the regional market from Nigeria to other West Africa countries. The study also provides a comparative understanding of the challenges faced by the traffic from Nigeria to other West African countries over time. For the purpose of this study, the pre-liberalisation era is defined as the period from 1988 to 2000, while the post-liberalisation era is between 2001 and 2011. However, aggregated data were available for the pre liberalisation period.

The characteristics of this period are such that, in the pre-liberalisation era the Nigerian airways is the major airline dominating the regional route network from Nigeria. But in the post-liberalisation era other airlines joined the regional route network carrying passengers from Nigeria to other countries in West Africa. The early post-liberalisation period, coincides more or less with the liquidation of Nigeria Airways. Though, the airline was soon replaced with Virgin Nigeria, who bought into her shares.

1.7 Development of Air Transport

This section examines Chicago convention and freedom of the air. The Yamoussoukro Treaty and development of ECOWAS air transport is discussed. The development of regional air transport market and the development of air transport in Nigeria

1.7.1 Chicago Convention and Freedom of the Air

This section presents the basis for the civil air transportation, the basis for regional and international air transportation regulation as provided for by Rodrigue (2006). It is the rationale for global aviation guidelines and interaction which is tied strongly to the Chicago Convention. The Chicago Convention of Ist of November 1944, where delegates from fifty-four countries met at the Stevens Hotel in Chicago set a milestone that turned around the history of aviation regulation. Part of the goal of Chicago Convention was to advance international traffic and develop an entry procedure that would allow healthy growth in the aviation industry. This conference led to the establishment of the International Civil Aviation Authority (ICAO) and the International Air Transport Association (IATA).

Also, issues such as routes, frequencies, pricing and fares, aircraft registration, navigational aids and safety standards were deliberated upon. It was at this conference that what later became the driving force for the Yamoussoukro meeting was first promoted - the Open Skies Regime. This serves as the fulcrum for regional air services from Nigeria to other West Africa countries. Also, the concept of Freedom of the air which supported the initiative behind the Africa Civil Aviation Authority for continental and regional open skies was informed by this meeting. The air transportation had the advantage of enhancing the concept of gateways and promoting accessibility that can enhance socio-economic integration and relations. The fifth freedom of air enhances this notion strongly. On this ground, the Yamoussoukro declaration and decision which is the basis for the liberalisation of African airspace was founded. It was believed that if the continental and regional economies were to be integrated, and the social and economic enhanced, then issues relating to bilateral air service agreement among the African States and regional bloc ought to be removed. Therefore, the concept of Open Skies among African States was strongly promoted and supported. This can be seen as the basis for encouraging the regional air services for the socio-economic development of African communities.

One of the significant outcomes of the Chicago Convention is the evolution of the Freedom of the air. The freedom of the air is the backbone of bilateral air services among the different countries. However, for the purpose of this study which basically focuses on the impact of liberalisation and the spatio-temporal patterns of air transportation structure in West Africa. This treaty of Freedom of the air forms the basis for this study as shown in Figure I. The fifth freedom of the air holds the key for every discussion that follows on this work. The initiative and the development of the regional air services from Nigeria are largely rooted in the fifth freedom of the air. It might be interesting, however, to briefly discuss the rights expressed in the freedom of the air for civil air transportation purpose. They are:

i. First Freedom: The privilege to fly and convey traffic over the territory of another partner to the agreement without landing.
ii. Second Freedom: The privilege to land in those countries for specialised reasons such as refuelling without boarding or deplaning passengers.
iii. Third Freedom: The privilege of an airline from one country to land in an alternate nation and deplane passengers coming from the airline's own nation.
iv. Fourth Freedom: The privilege of an airline from one nation to land in an alternate nation and carry passengers travelling to the airline's own nation.
v. Fifth Freedom: The privilege of an airline from one nation to land in a second nation, to land in an alternate nation and carry passengers and fly on to a third nation where the passengers then deplane.
vi. Sixth Freedom: The privilege to carry traffic from one nation through the home nation of the airline to a third nation.
vii. Seventh Freedom: The privilege to carry traffic from one nation to another nation without going through the home nation of the airline.
viii. Eighth Freedom: The privilege to carry passengers between two or more points in one foreign nation with continuing service to or from one's own nation, known as "True Cabotage".
ix. Ninth Freedom: It is privilege to carry traffic within a foreign nation without continuing service to or from one's own nation, known as "Stand-alone Cabotage".

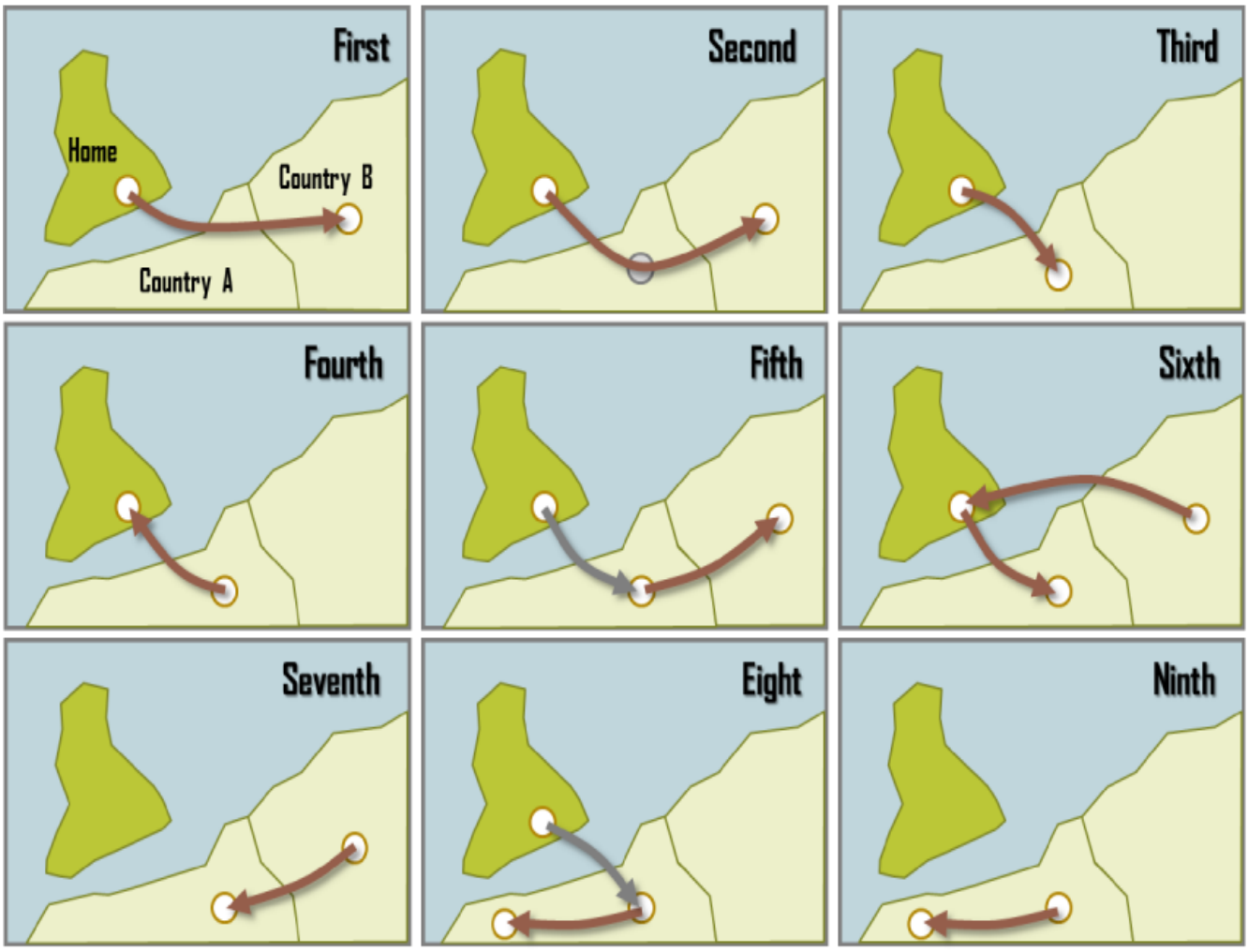

Fig.1 : The Freedom of the Air

Source: Rodrigue (2006)

1.7.2 Yamoussoukro Treaty and Development of ECOWAS Air Transport Policy

As part of the efforts to transform air transportation in Africa, creation of an enabling environment for business, trade, cultural integration and socio-economic interaction, the African Ministers of Transport and Aviation met in Yamoussoukro in 1988 to foster a new development for the African communities through reform in the air transport sub-sector of the African economy. The new strategy was dubbed as the Yamoussoukro Declaration. Thus, the new African civil aviation policy was addressed towards thorough reform of the air transport industry, and the unification of the fragmented African air transport market.

Among the objectives, cooperation between the African States against protectionism was proffered. Also, the integration of African airlines, a creation of joint ventures, mergers and acquisitions of the ailing airline were mooted. Besides, issues relating to pooling, fleet enhancements, fleet maintenance, elimination of traffic rights, reduce tariffs, effective computer reservation system(CRS), secure effective streams of spare parts supply, enhance training and capacity development were among the other objectives.

Moreover, as the need to fully realise the potentials of the Yamoussoukro declaration, this was soon translated into Yamoussoukro decision. The Yamoussoukro decision was the adoption of critical policy outcomes from the evaluation of needed direction to realize the potentials of the Yamoussoukro declaration. Part of the decision was the recognition of the need to remove the protection that many national carriers enjoyed which may hamper air traffic growth. The decision mandated its signatory members to liberalise air services and promote intra-Africa competition in continental and regional air markets. The essence was to attract flow capital into the African aviation sub-sector.

Specifically, the Yamoussoukro Decision meeting was to address the following:

(i) The unrestricted exercise of first, second, third, fourth, and the fifth freedom rights of passengers and freight air services by qualified airlines.,

(ii) ensure fair competition on a non-oppressive basis.,

(iii) full liberalisation of intra-African air transport benefits relating to capacity, access, tariff and frequencies., and

(iv) strict consistency with international regulations and safety standards

The primary objective of the ECOWAS air transport policy is to fully implement the Yamoussoukro Decision for air transport liberalisation. Notable among these objectives is the strengthening of aviation security and safety. Also, it tries to advance capacity building for the Civil Aviation Authorities within the region. In addition, it helps to facilitate operation and cooperation of West African airlines and other relevant stakeholders (airports, air navigation services providers and ground handling companies.

Besides, the ECOWAS Commission assisted member states to provide a safe, reliable and coordinated air transport system. The ECOWAS air transport Mission was carefully crafted to build up a sound and consistent regional air transport system with safe, reliable, efficient, and affordable air services, well connected within West Africa and integrated with the global network.(Ecowas Commission, 2013)

Part of the agenda towards developing a regional air transport system includes the establishment of a single air transport market within ECOWAS. Also, there is the provision for the creation of a conducive environment for the airline's within the region to identify and promote a regional cooperation. There is in addition, the establishment of a regional aircraft maintenance facility and sound regional air transport base and the establishment of cooperation with regional bodies to enhance aviation safety. Added to this, the ability to negotiate horizontal agreements among members on some areas of air services with third parties was ratified. Finally, there is also the cooperation and technical agreement with other international organisations with the aim of developing air services within ECOWAS member states. These cover information sharing and communication on aviation safety, security matters, sensitization of focal points and training

1.7.3 Development of Air Transport in West Africa

The development of regional air travel market in West Africa can be traced back to the mid twentieth century. The foremost airline to operate regional air travel market was the West African Airways Corporation which was formed by the British Overseas Airways Corporation (BOAC). The West African Airways Corporation (WAAC) was mutually owned by the Government of Britain's four West African colonies namely: The Gambia, the Gold Coast (now Ghana), Nigeria, and Sierra Leone. Nigeria was the lead shareholder (68%), followed by the Gold Coast (29.5%), Sierra Leone (2%) and the Gambia holding the 0.5%. The carrier had its headquarters at the Airways House, Ikeja, Lagos, Nigeria. The airline worked from its hub in Lagos Airport. It started operation in October 1947.

This airline was built to provide the British West Africa with air transport facilities by connecting it with Dakar and Khartoum. This was to offer passengers with a gateway to the Americas and the Middle East respectively. It also provided feeder flights that connected with Europe-bound BOAC Hermes services at Accra, Lagos and Kano. The route structure then made WAAC act as the agent for the British state carrier in Nigeria and the Gold Coast.

On March 31st, 1948, WAAC took full liability for the service of the inter-colonial West African coastal services and extended operation to Freetown, Bathurst and Dakar. This was the beginning of regional air service from Nigeria to West Africa coast. The services to other parts of Africa began with Lagos-Khartoum service with Bristol 170s in April 1950. The services were however, suspended in August 1953.

WAAC had the primes in the early 1950s for offering at least four Bristol Freighter-operated second class services at discounted airfares, cheaper than other service offerings during the period. They offered the "Coastal Flyer" that covered the 250 miles (400km) between Accra and Lagos in 1¾ hours for £4.00 at 1951 prices. Also, the "Hausa Flyer" that covered the Accra-Lagos-Ibadan-Jos-Kano route, for which the Lagos-Kano leg took four hours against an almost two day's journey by train. The fare was £3 at 1951 prices, cheaper than the train.

The strength of WAAC airline began to diminish as the member status from the United Kingdom, they set up their own as carriers states gained commonwealth status from the United Kingdom, and set up their own carriers-Ghana Airways, Sierra Leone Airways, and Gambia Air Shuttle. WAAC was formally dissolved in 1958 as it was mainly a Nigerian affair. The asset and liabilities were inherited by WAAC (Nigeria), which operated as "Nigeria Airways "effective

from October 1st,1958. However, the regional air service from Nigeria has grown with a linkage to all the capital in the sub-region, with four major hubs, two within Nigeria and two outside the country.

1.7.4 Development of Nigerian Air Transport

The evolvement of air transport in Nigeria started in 1925 in the northern city of Kano. Sometimes in July of that year, the northern city was engulfed in a stand-off between the residents and the colonial government officials. During this time, the British government sustained an active Royal Air Force (RAF) base in Khartoum, Sudan. The fracas prompted the colonial government to signal the commanding officer of the Khartoum Royal Air Force Squadron, obliging him to fly to Northern Nigeria city of Kano and report the situation. The pilot flew a Bristol Fighter; he made a frightening but safe landing on the horse race course in Kano. Thus, this became the first in history, the first aviation activity in Nigeria. After the inaugural flight into Nigeria, the RAF began yearly flight to Kano and Maiduguri from Sudan, relying solely on available air transport facilities in Nigeria which dated back to the colonial administration in Nigeria. The first flight into Nigeria was a British Royal Air Force (RAF) fighter that landed on a polo ground with intelligence reports and navigational aids on the aircraft (Ajulo, 2002).

The first commercial aviation activity was credited to Bud Carpenter, who owned the earliest type of light aircraft known as de Havilland Moth, which was to take a high- risk flight between Kano and Lagos, using the rail tracks as guide, thus gaining more distances as a result. Moreover, in the early 30s, an astute pilot conveyed a few fare paying passenger in a seaplane between Lagos and Warri. With the continuation of regular flight of the Royal Air Force into Nigeria, the need for the development of aerodromes was earmarked. On the visit of representatives of Air Ministry in London to Nigeria, sites were selected at Maiduguri, Oshogbo, Lagos, Minna, Kano and Kaduna as landing grounds.

The operations of the Royal Air Force (RAF) were replaced with the Imperial Airlines which began a regular flight between UK and Nigeria in 1935. These operations gave birth to the commercial international operations in Nigeria. Although, it was not until 1936, that commercial aviation actually started in Nigeria. The development of the infrastructure- aerodrome was enhanced with the start of the Second World War. By 1940, all the airports earmarked for Nigeria have been fully put in place. At the end of the Second World War, the British Overseas

Airways Corporation organised a passenger and mail traffic between Lagos, Port-Harcourt, Enugu, and Jos. At this time, services were largely limited to government business. The services then also linked Nigeria with the British colonised West African Gold Coast (now Ghana) and Sierra Leone.

The West African Airways Corporation (WAAC) was formed on May 15th, 1946, and started air transport business in the West African sub-region. The West African Airways Corporation (WAAC) was defunct in 1957 when Ghana gained independence to start its own airline. As a result, the assets of WAAC were divided and Nigeria inherited some aircraft and landed properties which were eventually transferred to the latest founded company called the West African Airways Corporation (Nig) Limited. The new company was incorporated by the Federal Government in partnership with BOAC and Elder Dempster Limited on 23rd August 1958, with the Certificate of Incorporation No. 1740 (Filani 1978:339).

By 1961, WAAC was registered again and the name changed to Nigerian Airways Limited (NAL), after the government's acquisition of the joint interest of BOAC and Elder Dempster Lines. During this period, airlines operations were only within the ambit of Nigeria Airways, which had the monopoly of operating scheduled services, and a number of private companies that later obtained licenses to operate charter flights. Before 1970, Nigeria had two airports located in Lagos and Kano. The 1970-74 second National Development plan had a plan for the development and construction of seventeen modern airports with up – to – date facilities (Filani, 1978:346).

1.8 Organization of the Thesis

This thesis is divided into six chapters. Chapter one discusses the background to the study, statement of the problem, the aim and the objectives, the hypotheses tested, the rationale for the study and the basis for the development of Nigeria and regional air transport development. Chapter two discusses the conceptual/theoretical framework and the literature review, while chapter three discusses the research methodology which details types and sources of data, the sampling technique and the data analysis procedure. Chapter four focuses on the spatial and temporal patterns of flow and it determinants in both the pre- and post-liberalisation eras. Chapter five discusses the regional travel characteristics and attributes from Nigeria to other West African countries. Chapter six provides the summary of findings, conclusion and recommendations.

CHAPTER TWO
CONCEPTUAL/THEORETICAL FRAMEWORK AND LITERATURE REVIEW

2.1 Conceptual /Theoretical Framework

The relevant concepts/theories reviewed here are accessibility and spatial structure, contestability and air travel demand model, transport network, spatial interaction model and core periphery concept

2.1.1 Accessibility and Regional Spatial Structure

Accessibility is the degree of the capacity of a location to be attained by or to reach other locations. Therefore, the limit and the structure of transport infrastructure are key factors in the purpose of accessibility (Rodrigue, 2006). Locations are relational to one another. Also, it is important to note that locations do not possess a constant attribute as transportation provision and infrastructure, to a very large extent, determine the levels of accessibility and interactions between locations.

The distinctive features of locations make different locations vary in terms of relative uniqueness and distance. And the development of any location in space is a cumulative outcome involving transport infrastructure, levels of economic activities and the environment. Hence, effective transport infrastructure enhances accessibility and remains one of the major factors in shaping the spatial structure. The connectivity within a specified spatial structure is a function of reliable and effective transport networks. This transportation network provides an effective link between defined locations. One of the core areas of transport geography is to ensure an adequate flow between locations. Hence transnational regional spatial linkage structure and interaction relies strongly on efficient air transportation terminal which helps to provide access to the specified spatial reality. Thus, improvement, innovations in transport infrastructure and transport provision improves the level of accessibility (Papatheodorou and Arvanitis, 2009).

The essence of this for regional air services from Nigeria to other West Africa countries is the accessibility enabled by the availability of flight services and standard air terminal that can handle regional transnational air services within the sub-region from Nigeria to other West Africa countries. One of the major challenges facing the regional air services provision has been the paucity of adequate flight linkages and connections. Therefore the level of flight frequency

and activities from Nigeria to some countries in West Africa remained low. Also, the passenger movement from Nigeria to some West Africa countries has suffered because of the limited available flight services. Thus, this concept of accessibility and spatial structure offered the contextual basis for the understanding the conceptual framework on the influence of accessibility and regional spatial structure evolvement.

2.1.2 Contestability Theory and Air Travel Demand Model

Contestability theory holds that there are markets served by a few firms, which are nevertheless described by competitive and desirable welfare results because of the existence of potential short-term entrants. The basic significance of the new theory of contestability has been to demonstrate that the structure of an industry – the number of competing firms – may make little difference to which production will be efficient and welfare maximized (Starkie, 2008 p.8). This is in contrast to the traditional theory, which is predicated on monopoly (Bailey and Baumol, 1984). The contestability theory contends that the threat of entry of a new actor was sufficient to frustrate a monopolist's ability to impose monopoly pricing (Rodrigue, 2006). The solution, therefore, is to lighten up entry thresholds, by allowing new firms to enter the market without hindrances.

The potential to contest a market has a number of essential results as far as welfare. First, a contestable market, in long run equilibrium, does not give in excess than a normal rate of profit. The subsistence of supernormal profits will draw in equal firms willing to provide the same output at lower prices. As a result, a monopolist, provided his position in the market is perfectly contestable, will earn zero economic rent. Second, production shortfall also will be totally absent in long run equilibrium – needless cost (like abnormal return constitutes an invitation to entry). Third, in long run equilibrium, no item produced in a contestable market can be sold at a marginal price less than its marginal cost. A price less than marginal cost will permit a rival firm to enter the market and offer a smaller output at a slightly lower price and yet by erasing the unprofitable marginal unit, earn at least as much as the incumbent. Fourth, if a market has at least two firms, once more, in the long run, prices cannot surpass marginal cost.

Following from the foregoing, contestability theory is envisaged to enable competitive tendencies among the airlines from Nigeria plying the regional market and impact on passenger access of regional nodal links. Thus, this brings about a reliable change in the regional links from

Nigeria as well as facilitates the passenger accessibility of regional nodal links. The validity of contestability theory to this regards, especially in relation to aviation regional market is yet to be studied. This study would help establish the relationship of contestability theory as an agent of liberalisation to effect changes in regional air traffic links outbound from Nigeria.

However, the demand models are arithmetic representations of the relationship between demand and chosen explanatory variables. Through mere description, models do not and cannot reproduce all of the factors that affect demand for air travel in a market (Belobaba, 1987; Doganis, 1991; Simpson and Belobaba, 1992 and Simpson, 1995). The goal in demand modelling is to clarify however much of the variation in demand as possible, either across markets or over time within the same market, by identifying the explanatory variables that have the greatest and most direct impact on the volume of origin-destination market demand.

All demand models depend on suppositions of what influences air travel in an origin-destination market demand. The key factors influencing the volume of air travel in an origin-destination market are the price of air travel, total trip time (T) and socio- economic variables connected to the market itself. The specification of a mathematical model of demand reflects assumed expectations of how demands respond to differences in the explanatory variable(s).

In the most straightforward case, air travel demand can be modelled as being influenced by the prices being charged. The arithmetic formulation could be additive (linear) or multiplicative (non-linear). An additive or linear price – demand model is written thus: $D=a- bP$, a and b are parameters that represent intercept and slope of the demand functions with respect to price where D is the market demand and P is the average market price. Where $b < 0$, the multiplicative price –demand model takes the form of $D=aP^{b.}$ This function is still downward sloping, but the relationship between demand and price is constant in percentage terms, rather than absolute terms.

Rather than price alone being the real determinant of the flight demand functions in an origin - destination pair, a socio-economic benefit gained from regional city link is tacit to impact demand for flights in an origin - destination pair. However, the influence of socio-economic benefits as a factor for regional city links in an origin-destination pair in regional air market remains effective.

2.1.3 Transport Networks and Spatial Interaction Model

The spatial structure of modern transportation network is the interpretation of the spatial structure of distribution (Rodrigue, 2006). These networks fill in as spatial linkage towards bigger distribution centres, and frequently serving significant trans-national catchments. It is essential to note that air transport route and networks fit into transport network models. Four transport network model procedures have been identified in the literature (Woxenius, 2002 and Rodrigue, 2006). These are shown in Figure 2.1 and as follows:

(i) Point to point: This is basic when specialised and specific one-time orders have to be fulfilled, which often creates less-than-full-load as well as unfilled return problems.,

(ii) Corridor: This regularly interfaces high-density agglomerations with passengers and freight services. Traffic along the corridor can be loaded and unloaded at local/regional distribution points, acting as sub-hubs in this distribution system (Rodrigue, 2006).,

(iii) Hub-and-spoke network: This showed up with air freight and/or passenger distribution and with high throughput distribution points. Ordinarily, a noteworthy circulation centre located at the hub will have privileged access to a terminal., and

(iv) Routeing network: It tends to utilise spherical configurations where passengers can be transited from one route to the other at a particular hub.

The study identifies if the regional air routes and networks conform to the above spatial air patterns or a distinctive spatial pattern over the network.

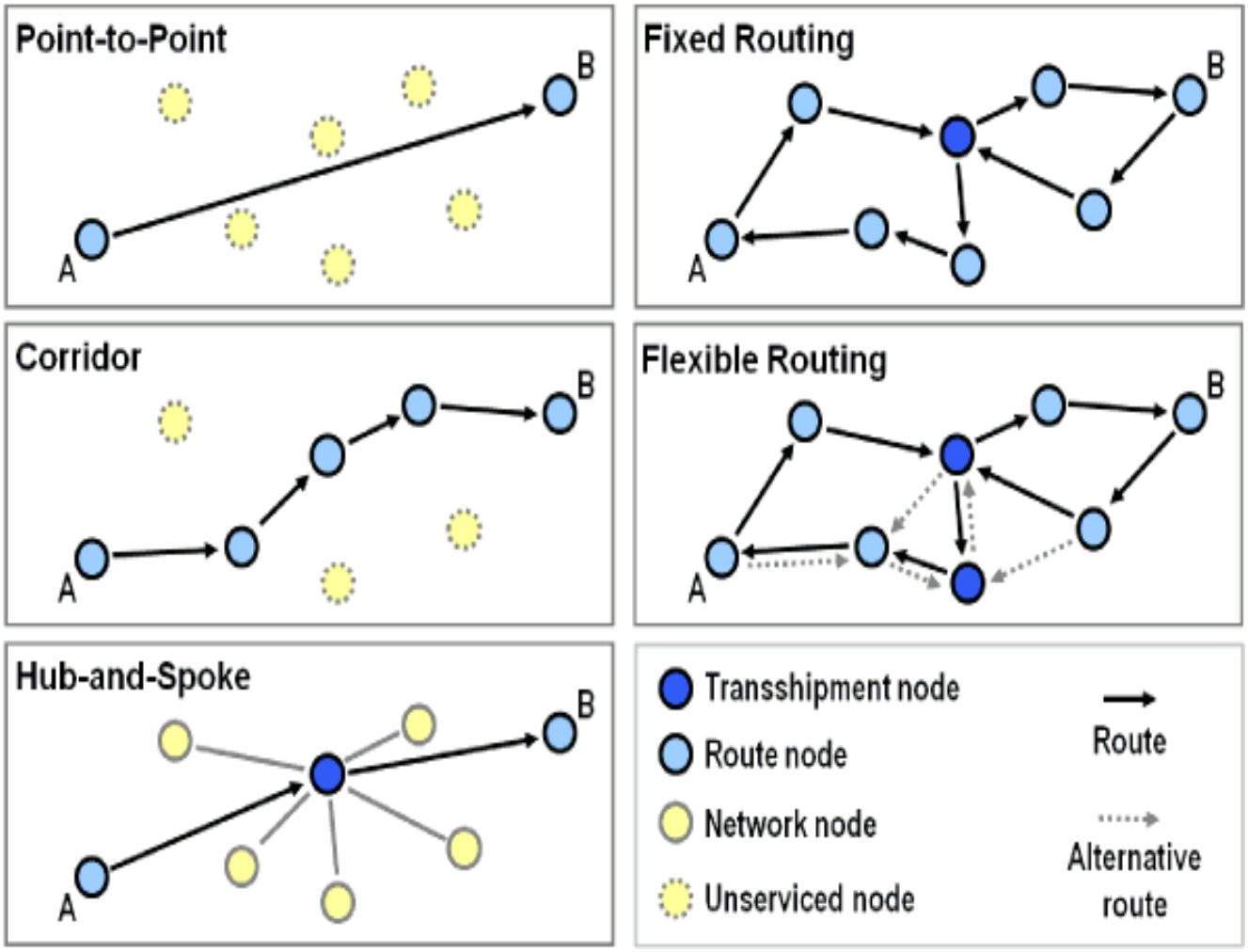

Figure 2.1: Transport Network Strategies
Source: Rodrigue (2006)

The vital postulation regarding many spatial interaction models is that flows are a part of the attributes of the locations of origin, the attributes of the location of destination and the friction of distance between the concerned origins and destinations (Rodrigue, 2006). The broad formulation of the spatial interaction model is based on the following:

Tij = f (Vi, Wj, sij)

Tij = interaction between location i (origin) and location j (destination). The units of estimations are fluctuated and can include people, tonnes of freight, traffic volume etc. It additionally concerns a time period such as interactions by the hour and day.

Vi = characteristics of the location of origin i. Variables often used to convey these characteristics are socio-economic in nature.

Wj = characteristics of the location of destination j.

Sij = characteristics of separation between the location of origin i and the location of destination j. Variables to describe these characteristics are distance, transport costs, or travel time.

Within this general formulation, three fundamental types of interaction models can be built:

(i) Gravity model-estimates exchanges between all the possible location pairs. The degree of interaction between two locations is measured by multiplying their attributes, which is then divided by their level of separation.

$$T_{ij}=V_I*W_j/S^2_{ij}$$

(ii) Potential Model- estimates exchanges between one location and every other location. The degree of interaction between one location and all the others is measured by the summing up of the characteristics of each other location divided by their level of separation.

$$T_i=\sum_j W_j/S^2_{ij}$$

iii) Retail model- estimates the frontier of the market areas between two locations contending over the same market. This model focuses on the boundaries, instead of exchanges.

$$B_{ij}=S_{ij}/1+W_j/V_i$$

It is important to note that regional aviation markets are expressed in an origin and destination pair. The volume of air traffic in any O-D pair largely depends on the location attributes of the origin and destination pair. Air transport liberalisation policy as adopted by regional governments within the West Africa regional aviation market is assumed to have engendered an increase in passenger traffic between origin and destination pair in a regional aviation market. This study is expected to validate this assumption.

2.1.4 Core-Periphery Concept

The core-periphery model is a four phase model of regional expansion, delineating that where economic growth is supported over long time periods, its occurrence works towards a dynamic incorporation of the space economy (Friedman, 1966, pp.28-31). The core-periphery model helps to understand the relativity in the organisational structure of the candidates set of locations in space. It offers the rationale for the discrepancies in the development of the nodes in space. While some nodes seem to benefit from high level of relational interaction, spatial growth and development, others are less favoured and do not benefit significantly from flows of activity. Hence the perceived spatial relational dysfunction is strongly due to the differentiation in the level of accessibility of nodes in space. The different location in space assume a different level of accessibility as there are no two locations with the same level of accessibility in space is noteworthy. However, the differences in the level of accessibility are defined by the level of transport infrastructure and service offering availability. Not all locations have the same level of transport infrastructural provision and service offering. This helps to understand the level of accessibility such location is bound to attract.

When this model is applied to regional air transportation sub-sector, it helps to understand the variations in traffic patterns across cities/countries within the West African sub-region. As different countries within the sub-region presents different economic potentials and realities to which transport infrastructure and service offering is secured. Some nodes within the sub-region enjoy a higher level connection and activities while some nodes within the sub-region enjoy a low level of connection and activities. This model provides an invaluable knowledge and understanding of the regional air services from Nigeria to other cities in West Africa. It offers the framework for unravelling the challenges facing air transportation within the West Africa sub-region

2.2 Literature Review

The literature on liberalisation and spatial structure of air transportation focuses on five major themes. These are (1) Deregulation and changes in hubbing and nodal accessibility, (2) the geographic effects of air traffic deregulation and network efficiency, (3) the geographic changes in consumer and passenger pattern, (4) the geographic changes in employment, population and safety, and (5) air traffic, liberalisation and domestic market in Nigeria.

2.2.1 Deregulation and Changes in Hubbing and Nodal Accessibility

The concept of deregulation has continued to be one of the most significant forces shaping the air transportation subsector and the resultant air traffic patterns. It tends to provide a framework to improve the economic efficiency of air traffic operations, induced innovations in air traffic market and restrict government overbearing dominance in the running and provision of air transport services. Deregulation was to a great extent embraced as an approach for minimising government participation in economic affairs. The political functionaries frequently respect regulators with expanding contempt; they are perceived either as captives of the industry they are apparently regulating or as unnecessary bureaucrats inhibiting the progression of business (Derthick and Quirk, 1985; Braun, 1987; Himmelberg, 1994 and Goetz and Sutton, 1997). Deregulation was chiefly set on the principle of theory that the market for an unregulated airline industry would fairly accurate a perfectly competitive one with several carriers (because sunk costs were minimal) and no significant economies of scale or barriers to entry (Kahn 1977).The theory of contestable markets supported the predominating view by hypothesing that even the intimidation of new firm would not allow large firms to exercise monopoly power (Bailey and Panzar 1981 and Baumol et al, 1982).

The geographical analyses of the impact of deregulation on air traffic abound in the literature (Graham, 1995, Goetz and Sutton, 1997; Reynolds-Feighan, 1998; O'Kelly, 1998; O'Connor, 2003 and O'Connor and Fuelhart, 2012). These studies suggest a relationship between adoption of deregulation policy and changes in air traffic patterns. The emergent spatial pattern observed resemble a concentration of airline services between core airports within urban and regional hierarchies. The outcomes of these studies seem more of universal generalisation of the relationship to the neglect of specific locale factor which might alter the supposed spatial outcomes. However, geographical location peculiarities and its attributes have largely seemed to

influence inter-city linkages and patterns of flow within regional hierarchies of air traffic movement (Bruecker, 2003).

Airline deregulation and impact on nodal accessibility have attracted the interest of researchers. Nodal accessibility can be defined as the extent to which people in a city are capable to travel to other cities through thriving airline services among them (Goetz and Sutton, 2007). There exist some level of differences in nodal accessibility of air transportation following deregulation (Chou, 1993). He analysed data from the origin and destination surveys of airline passenger traffic from pre-deregulation and post- deregulation era among eighty-four cities in the US. The impacts of deregulation on nodal accessibility are validated using multiple regression analyses. The distribution of changes in nodal accessibility between 1970 and 1980 illustrate the clear southwest-northwest pattern. The trend was stabilised in the post-deregulation period. The study demonstrated that expanded hubbing operations since deregulation have not enhanced spatial concentration of nodal accessibility.

Moreover, in Europe, the effects of deregulation in the European Union on airline hub operations in Europe was studied, it was observed that air transport deregulation in Europe makes hubbing an increasing strategy for Europeans airlines (Dennis, 1994). The ideal geographical location for a distinct European hub is found to be Paris and Brussels. KLM at Amsterdam and Lufthansa at Frankfurt were appeared to be the two noteworthy airlines providing the most effective hubbing operations. Notwithstanding their large networks, British Airways at London Heathrow and Air France at Paris Charles de Gaulle (CDG) have lesser connectivity. Amsterdam and Paris are the airports with the best extension for increasing capacity, although there is also a potential for certain regional hubs.

Moreover, other theoretical and empirical research in literature relates to airline network configuration. Many of these studies on airline network setup underscore on the spatial extent of airline networks. The hub and spoke network are generally seen as a spatially concentrated network. The hub and spoke network, often reflect a structure, where routes are deliberately concentrated on a few key nodes in the network (Bootsma, 1997; Burghouwt and Hakfoort, 2002; Button, 2002; Goetz and Sutton, 1997; O'kelly and Bryan,1998; Pels, 2000;Rietveld and Brons, 2001; Veldhuis and Kroes, 2002). These studies mainly focused on the spatial and temporal concentration of flights to qualify as a hub and spoke structure. However, these studies

did not consider such factors as interacting city population, city political status, and available infrastructure among other factors as responsible for concentrating flight between hub cities.

2.2.2 The Geographic Effects of Air traffic Deregulation and Network Efficiency

The spatial effects of air deregulation on airline operation in the US are extant in the literature. The hub structure of major US passenger airlines is seen as part of the spatial effect of deregulation on the airline services (Shaw, 1993).It was a paradigm shift whereby the major US airlines have advanced a hub-and-spoke structure as spatial and commercial strategies for setting up airline operations in a deregulated regime. This was in contrast to the CAB regulation era where inter-routes were often 805km or more in length and little attention was given to incorporating the route networks amongst operators.

Similarly, the geography of deregulation in the US airline industry explained the spatial patterns of deregulation in terms of core-periphery concepts (Goetz and Sutton, 1997). It distinguishes between two types of hubs: domestic hubs and international gateways. It expanded on Shaw's (1993) analysis by categorising the international gateways as funnels for international services and linkages to domestic destinations but they did not function as domestic hubs. It noted that the gateways are largely located in littoral cities whilst the domestic hubs are the central point for the domestic system.

Also, the changes in hub service in the US domestic air transport network since deregulation follow a pattern that the major air carriers have increased their networks to become more competitive, and the number and types of hubs have grown respectively. It leads to a development of the traditional matrix approach to derive indices which are the basis for the evolvement of a connectivity categorisation plan (Ivy, 1993).

The emphasis on the spatial effect on deregulation in literature majorly focuses on the geographic effects as it affects industry structure, service, and pricing (Goetz and Sutton, 1997). In particular, its influence on the core-periphery divide especially changes in pattern of urban hierarchies. Besides, these may also affect the regional pattern of change in market concentration, employment, service frequencies, and passenger flows and air fares (Goetz and Sutton, 1997; Burghouwt and Hakfoort, 2002; Graham, 1995; Bowen, 2002 and Vowles 2000).

However, the spatial effect of deregulation as described in foregoing literature seems to describe patterns in the developed countries where these studies were carried out. Therefore, the implication for a developing countries cities linkage might deviate from the observed patterns.

Studies on the impact of spatial effect on air deregulation on cost, route and network efficiency have been documented in literature; it was observed that in a deregulated regime where cost savings are a core element of the business strategy, least-cost solutions and network maximisation are a priority to get efficient operations (Page, 2005). Airline services ought to be receptive to demand and there has been greater importance on airlines linking all the nodes in the network. In this regards, a hub and spoke system may enable airlines to serve a large number of people over a wide area, the hub acting as an interchange for passengers travelling on feeder routes along the spokes that cannot continue on a trunk route.

In a different study, that examined the location of interacting hub facilities; it was noted that hubs are slightest cost solutions for airlines and may connect a variety of airports in a region, helping the airline in running a high-frequency service along trunk routes between hubs. However, along spokes regional carriers, often code sharing under major's identification, provide the feeder services. This resulted in a geographical concentration of airline hubs in major US cities, based on historical ties with certain airports, airline mergers, the servicing of niche tourist markets and responses to competitors so that major operators provide 100-200 departures each day from some of the key hubs (O'Kelly, 1986).

Several kinds of literature agreed that deregulation has enhanced both passenger and aircraft flow over-air networks (Reynolds-feighan 1992; Graham 1995; Franke 2004; Aykin 1990, Ivy 1993; Oum and Tretheway 1990). However, many of these studies focused basically on niche route and network configuration, characterised by concentrated flow between hubs in the network. The implication for route network from Nigeria cities to other West Africa cities is unclear. This may assume a pattern between a diverse concentration and dispersal between city hierarchies within the regional cities linkage from Nigeria.

2.2.3 Geographic Changes in Consumer and Passenger Patterns

Air deregulation affects consumer and passenger pattern across different climes, the analysis of deregulation post – 1978 in the US observed that this spatial pattern of aviation mean that more passengers had to switch planes stopping at hubs (i.e. 80 percent had direct flights in 1978 but this reduced to 64 percent in 2000) (Lee, 2003). However, latest developments in the boom of low-cost airlines have offered new airline strategies that compete with the hub-and-spoke concept. The point-to-point services of the low-cost airlines such as Southwest airlines have proved to be efficient, now that they are ranked fifth in market share of US air traffic in 2001 with 15.7 percent of the market.

In the same vein, the effect of deregulation on consumers (tourists and non-tourists) abounds in literature. This argues that deregulation has led to a fall in service quality as smaller communities not directly linked to trunk routes faced fare increases and less frequent services (Kihl, 1988). Also, part of the impact is that 'smaller turboprop carriers have subtituted jet services and service quality has reduced (Goetz and Sutton (1997). These changes in service provision to less-accessible communities were the result of the recession and greater fuel costs rather than deregulation (Jamiolo and Oster (1981).

However, the Canadian liberalisation had streamlined international passenger traffic over the period 1975 to 1994 (Clougherty, 2001). The available literature corroborates the observation that United States liberalisation policy witnessed to expanding traffic, lower prices and other user benefits. This fallout has been seen as the key effects of deregulation in Japan (Miyoshi, 2007). Corresponding results are demonstrated in the case of the European markets (Chang and Williams, 2002).

From the foregoing, the literature reveals that liberalisation influence passenger pattern, enhanced and varied consumer benefit and impact service rendering. Therefore, since the liberalisation of Africa air transport, especially in the regional route and network structure from Nigeria, what is the geographic effect on the pattern of passenger demands and consumer benefits?

2.2.4 Geographic Changes in Employment, Population and Safety

Air transport deregulation has shown huge impact on passenger safety (Moses and Savage, 1990). The expansion of hubbing operations led to a fall in safety as more activities and take-offs/landings were concentrated into specific areas, raising the vulnerability for accidents. However, the US civil aviation statistics for the period 1975-90 shows that the number of facilities actually reduced from 663 to 424, whilst the rate per million aircraft miles flown has lingered at 0.001 for scheduled services (Golich,1998).

Besides, work on the airline deregulation, commuter safety, and regional air transportation observed that safety record in the air transport commuter industry after deregulation has improved over time. One reason for the enhancements is the eventual impact of the 1978 re-jigs of safety regulation. It offers tighter safety standards seem to be associated with a better a better safety record (Oster and Zorn, 1983).

Similarly, the aftermath of airline safety after deregulation, the safety data for the period 1977-86 from more than 30 U.S. domestic and 80 international flag carrier are analysed. These data were examined in conjunction with other from an earlier MIT study about the previous two decades. The basic safety measure used is death risk per flight, which weights each fatal accident by the proportion of passenger killed and exploits statistical evidence that the risk arising from a non-stop is uncorrelated with its route length (Barnett and Higgins, 1989).

Also, in the US, the airline deregulation, safety, and profitability are studied. The study analyses the most up to date air travel safety and financial data in order to investigate the relationship between air travel safety and profitability of airline firm and deregulation. The methodology used was quantitative, Granger causality test and series of statistical test were used to detect correlation, co-movement, and causality between profitability and air travel safety between air safety, profitability and air travel safety before and after deregulation (Adrangi and et al, 1997).

In another vein, the effect of deregulation on workforce observed that airlines have exercise dominion over their workforces since deregulation, in quest of inexorable increases in productivity and superior economies of scale (Humphries (1992). Notwithstanding, the success of the model of low-cost production used by Southwest as the worthwhile success story of deregulation is of great commendation (Gittel, 2003).

Also, the study of the effect of deregulation on the US airport system observed that changes caused by deregulation have also had a significant impact on the US airport system as the demand for air travel has continued to multiply despite restraints on the supply of airport capacity. Deregulation and the advancement of trunk routes and hubs have heightened congestion at major US airport (Sealy, 1992).

Furthermore, literature has revealed an unswerving linkage between a city's air linkage and its population and employment growth (Irwin and Kasarda, 1991; Goetz, 1992; O'Connor and Scott, 1992; Ivy et al. 1995). These agreed that air transport linkage enabled population and employment growth. However, the implication for transnational cities within a regional economic zone need be studied. Thus, this study would contribute to the literature by examining other benefits of intercity linkage through air link.

2.2.5 Air traffic, Liberalisation and Domestic Market in Nigeria

Studies in air transport, air transport deregulation and domestic market are extant in literature (Filani, 1972; 1973; 1975). These pioneering works, provides bedrock for air transport research in Nigeria. The study on the structural characteristics of domestic air transport in Nigeria observed the importance of Nigerian airways as the only competitive airline operating both the domestic, regional and international route in Nigeria. During this period, the load factor, as well as the market share of the Nigerian Airways, was high. And that before the middle of 1970's the general performance of Nigerian Airways; the only domestic airline in the country at that time was above the world average.

The importance of air transport to spatial development sees air transport as a catalyst for spatial development in Nigeria, which could contribute tremendously to the spatial development of Nigeria (Filani, 1978). The study emphasised that improved air transport infrastructure could help allay the administrative bottlenecks of governance even with the proposed relocation of the national capital from Lagos to Abuja. As good air network from the capital to every other part of the country would accelerate spatial development. The development of air transport infrastructure as the airport, runways, apron, and hanger would impinge on the spatial and economic development of Nigeria.

Pioneering recent work on air transportation and partial deregulation, studied the development of air transportation in Nigeria from the perspectives of institutional framework, partial deregulation, infrastructural provision and passenger traffic. The comprehensive study on the development of the Nigerian aviation sub-sector, was carried out from the colonial and post-colonial era, and the various factors hindering the development of air transport in Nigeria was discussed. The major observation was that there was a crisis in Nigeria's civil aviation industry, the fall of Nigerian Airways; it blamed problems on the absence of a sound air transport policy, excessive bureaucracy, terrible management and a failure to adopt stringent and effective business principles (Akpoghomeh, 1999).

A very recent work on deregulation and spatial configuration of domestic network, studied the effect of air deregulation in Nigeria' domestic market .The structure of route and network pattern following deregulation. The work used the passenger movement across the existing node between a period of 1986-2006.The methodology involved the calculation of individual city nodal accessibility index. The study revealed that there has been an increase in the number of nodes since deregulation. The emergent of a core-periphery structure in the spatial patterns, as well as the dispersal of traffic among many nodes, were noticed (Daramola and Jaja, 2011).

The distinguishable area of difference between my work and the foregoing is that while they examined Air deregulation in the Nigerian's domestic market, this study focuses on the effect of Nigerian's air transport deregulation in the regional market within the framework of the fifth freedom of the air.

CHAPTER THREE
METHODOLOGY

3.1 Types and sources of data

This study uses both primary and secondary data. Maps and charts were used to depict the changing regional route network in West Africa from Nigeria during the pre-liberalisation and post-liberalisation eras. The study covered between 1988 to 2011. The period was further divided into the pre-liberalisation era (1988-2000) and post–liberalisation era (2001 to 2011). Data on passenger movement were obtained for the period under consideration (this represents the city pair in the year) and data on aircraft movement for the period. These data were collected from the Federal Airport Authority of Nigeria (FAAN) and the Nigeria Civil Aviation Authority respectively. However, passenger movement and aircraft movement were disaggregated for various city pair flow from Nigeria to other West African countries from 2001 to 2011. All the data available from Nigeria to West Africa before this period were aggregated. It was from 2001 that all data from Nigeria to West African countries were disaggregated.

The liberalisation of African airspace was first mooted by the African Ministers in charge of transport and aviation in Yamoussoukro in 1988 at Cote d'lvoire. The treaty was ratified in 1999 at the Abuja accord. However, the commencement date for the implementation was from 2001. Therefore the post-liberalisation period is deemed to have started from 2001.

Origin-destination data on passenger and aircraft movement were available only during the post-liberalisation period specifically from 2001 to 2011. Prior to 2000, available data on the regional route from Nigeria were aggregated. However with the creation of a central database for West and Central African states, Nigeria was chosen for the location of the database. The Nigeria Civil Aviation Authority was charged with the responsibility of managing the database. Hence since 2001, the data from Nigeria cities to other West African countries were disaggregated into city pair from Nigerian cities to other West African countries. The available data from 2001 were disaggregated into a number of passenger and aircraft movements from Nigeria cities into other West Africa cities.

The location of the scheduled regional flights from Nigeria to other West African countries, the airlines, flight frequency and the timetable were indentified during the reconnaissance survey. The primary data was obtained using a structured questionnaire to collect information on challenges faced in air travels from Nigerian cities to other West African countries. The questionnaire was designed to elicit information on demographic and socio-economic factors. These characteristics include among others: age, sex, marital status, the nationality and household size, educational status, occupation and estimated income. It also sought information on the trips patterns from Nigeria to other West African countries. These include among others, the number of the regional intercity trip within a month. The purpose of regional intercity trips and frequency of the regional intercity trips were obtained. Information on the difficulties often encountered and travel characteristics in regional travel from Nigeria were obtained. Purposive sampling technique was adopted for the questionnaire administration. Basically, the population comprised the regional route outward from Nigeria to other West African countries. The population of interest are those who have made use of air transport services between 1988 and 2001 (before the commencement of liberalisation of regional air transport) and have equally used the services after the commencement of the African civil air liberalisation policy (from 2001 to 2011).

The purposive sampling technique is a representative or selection of specific individual or sample from the population. These individuals were deemed to possess peculiar characteristics and attributes that contribute to effective research design and help validate the research study process. The purposive sampling is a non-probability sampling technique which does not adopt a randomized principle in the selection of the sample to be chosen. (Richardson et al,1995).

In this study, the sample was taken from Lagos and Abuja which are the gateway for regional air travel service from Nigeria to other West African countries. Regional travel experience a total of 428 respondents who had regional travel experience in both the pre- and post-liberalisation periods was selected. In transport survey research, Richardson et al (1995) examined the factors that are very important in determining the sample size for population parameter estimation. The first factor is the variability of the population in the parameters to be measured. The second factor is the degree of precision required for each of the parameter estimates while the last is the population size. For this study, the size of the population of interest was quite difficult to

determine given that the nature of the population of interest (regional air travellers who had both the pre- and post-liberalisation air transport experience). However, as a result of the nature of the population of interest, the degree of precision of the parameter estimate from respondents, timing constraint on the part of an ever busy traveller on boarding line at the departure and arrival hall at the International airports. A total of 428 respondents willingly participated on the survey. The questionnaire was administered while passenger were on the queue to be screened for boarding and on arrival and after the passenger have been confirmed to have both pre and post liberalisation regional travel experience. The questionnaire administration, interview and fieldwork were carried out between December 2015 and July 2016.

Secondary data were collected from published sources. These includes National Bureau of Statistics digest (NBS) and ECOWAS (Research and Statistics Directorate). The longitudinal data showing the city pair passenger and flight traffic from the two major gateway cities in Nigeria (Lagos and Abuja) to other West African countries was obtained.

In-depth interviews were conducted with the officials of some of the airlines who offered scheduled regional air travel from Nigeria to other West African countries. This was necessary in order to understand the challenges faced by the airlines at both periods. In the pre-liberalisation era, the Nigeria Airways was the major airline from Nigeria on this route from Nigeria. Therefore, some of the staffs who were in charge of regional route operation but now retired were interviewed on the challenges faced on this route from Nigeria. For the post-liberalisation era, some of the senior managers of the Aero Contractor and Arik Airways were interviewed on the challenges faced in the post-liberalisation regime.

3.2 Data analysis

The analytical tools used in this study are presented in this section. The hypothesis which states the spatial pattern of route and network structure from Nigeria to other West African countries was tested. Charts and alpha index were used to analyse nature and changes in the configuration of the route structure and the network in pre-liberalisation and post-liberalisation eras.

T-test was used to test the hypothesis which states there is no significant difference between the number of passenger movement between Nigeria and West African countries before and after liberalisation. The variable of interest for analysis here is the composite aggregated annual data for 23years for passenger flow during both periods (pre- and post-liberalisation eras). The periods cover twelve years from 1988-2000 (pre- liberalisation) and eleven years from 2001-2011(post-liberalisation). The dependent t-test sample is used when the samples are paired. Any statistical test involving paired samples and using t-distribution test can be called t-test. This denotes that each individual observation of one sample has a unique corresponding member in the other sample (Richardson et al, 1995). The two scores for each period of pre- and post-liberalisation era are identified and labelled as the differences di= [xi-yi] and used to determine the test statistics and consequently the p-value. Two sample t-test is used to test whether the sample mean are significantly different from each other, while using the means from randomly drawn samples. The paired t-test is effective in this regard because of the nature of data and the intended tendency to validate the impact of policy. In this circumstance, the control group is the pre-liberalisation era and the post-liberalisation era is the period when a form of treatment is applied. The treatment in this regards is the liberalisation policy. The paired sample t-test enables us to ascertain if the mean of passenger flow in the pre-liberalisation era is significantly different to the post-liberalisation era.

In the same vein, the t-test was used to test the hypothesis which states there is no significant relationship between the numbers of flight between Nigeria and other West African states before and after liberalisation. The flight flow represents to a large extent the spatial interaction between Nigeria and other West African states. The variable of interest for analysis in this hypothesis is the composite aggregated annual data for 23years for flights flow for the two periods. However, in order to fulfil the basic requirement for paired sample, the number of years for the pre- and post-liberalisation periods that were used for the analysis is same. The dependent t-test sample is used when the samples are paired.

The hypothesis which states that there is no significant relationship between the volumes of passenger movement and flight movement in the pre- and post-liberalisation was tested using the Pearson Product Moment Correlation. Since airline run on schedule and there is no such requirement as full enplanement before takeoff, it is very important to understand the strength of

flight and passenger movement on the regional route from Nigeria to West African states in the pre- and post-liberalisation. The nature of the relationship, whether positive or negative, is also very important. This was tested using the Pearson Product Moment correlation. This is a measure of correlation between two variable y and x. It is defined as the covariance of the two variable divided by the product of their standard deviation.

$$\rho_{X,Y} = \frac{\operatorname{cov}(X,Y)}{\sigma_X \sigma_Y} = \frac{E[(X-\mu_X)(Y-\mu_Y)]}{\sigma_X \sigma_Y},$$

Y=Flight Movement

X=Passenger movement

This is a statistical techniques that tells if two variables are related. The variable of interest in this analysis is the number of flights and passenger in the pre and post-liberalisation era are correlated with each other. Statistical correlation is measured by the coefficient of correlation(r). The numerical value ranges from -1 to +1 . Generally, it gives an indication of the strength of the relationship. In this analysis, r > 0 indicates positive relationship, r < 0 indicates negative relationship while r = 0 indicates no relationship (or that the variables are independent and not related). Also, r = +1.0 describes a perfect positive correlation and r = -1.0 describes a perfect negative correlation. The closer the coefficients are to +1.0 and -1.0; greater is the strength of the relationship between the variables.

The hypothesis which states arrival passenger movement and the departure passenger have influenced regional city pair passenger movement since liberalization. In this analysis, the passenger flow was aggregated into city pair showing the both departing and arrival from Nigeria to other West African for 280 city pairs. This unit represents the respective arrival and departure cities flow that constitute the total flow. Paired sample t test was use to determine the significance of the arrival city passenger movement and the departure city passenger movement to the regional movement flows since liberalisation. The variable of interest is the passenger flow in the respective individual arrival and departure airport constituting the total city pair.

The primary data collected was analysed through descriptive statistics. It was not subjected to standard test statistical analysis techniques because non-probability sampling techniques-purposive sampling was employed in the data collection. Therefore the application of the

standard test for drawing inference may not be valid. However, the use of descriptive statistics was employed in the analysis of the responses from the questionnaire. Also the use of percentages, charts for qualitative description and illustration of responses.

CHAPTER FOUR

SPATIAL AND TEMPORAL PATTERNS OF AIR TRANSPORT IN PRE- AND POST-LIBERALISATION ERAS FROM NIGERIA TO WEST AFRICA

This chapter examines the changes in the spatial patterns of airline route and network structure from Nigeria to other West African countries. It provides a comparative analysis of the volume, temporal pattern of passenger and aircraft flow from Nigeria in pre- and post-liberalisation eras. For the pre-liberalisation era, aggregated data was available, however, in the post-liberalisation, both aggregated and disaggregated data are used in the analysis. Using disaggregated data, the spatial pattern of the volume of passenger number and aircraft flow are analysed. Since the liberalisation, the relationship between the city pair total flow with arrival and departure flow are discussed. The factors determining regional passenger movement are also discussed.

4.1 Patterns of Air Flights from Nigeria to other West African Countries

This section examines the airline route and network structure in the pre- and post-liberalisation eras and changes in the route and network from Nigeria to other West African countries. The changes in the volume and temporal pattern of passenger movement from Nigeria to other countries in the pre- and post- liberalisation eras are discussed.

4.1.1 Pre-Liberalisation Era

The regional air network structure from Nigeria has changed significantly from the pre-liberalisation to the post-liberalisation eras. This sub-section discusses the patterns and the characteristics of the route and the network structure in the pre-liberalisation era. Figure 4.1 shows that the pre-liberalisation air network structure from Nigeria to other West African countries have a scheduled operations that was routed from a single dominant node in Lagos. All regional flights from other airports in the country destined for other West African countries are routed through the Lagos international airport. Although, during this period, other major international airports such as Kano, Port Harcourt and Abuja, only handled non-scheduled flight operation from Nigeria to Other West African countries. Other passengers to other countries from other cities within Nigeria such as Sokoto, Kaduna, Jos, Yola and Maiduguri, were either routed directly to Lagos or routed through other international airport to Lagos to other West African countries.

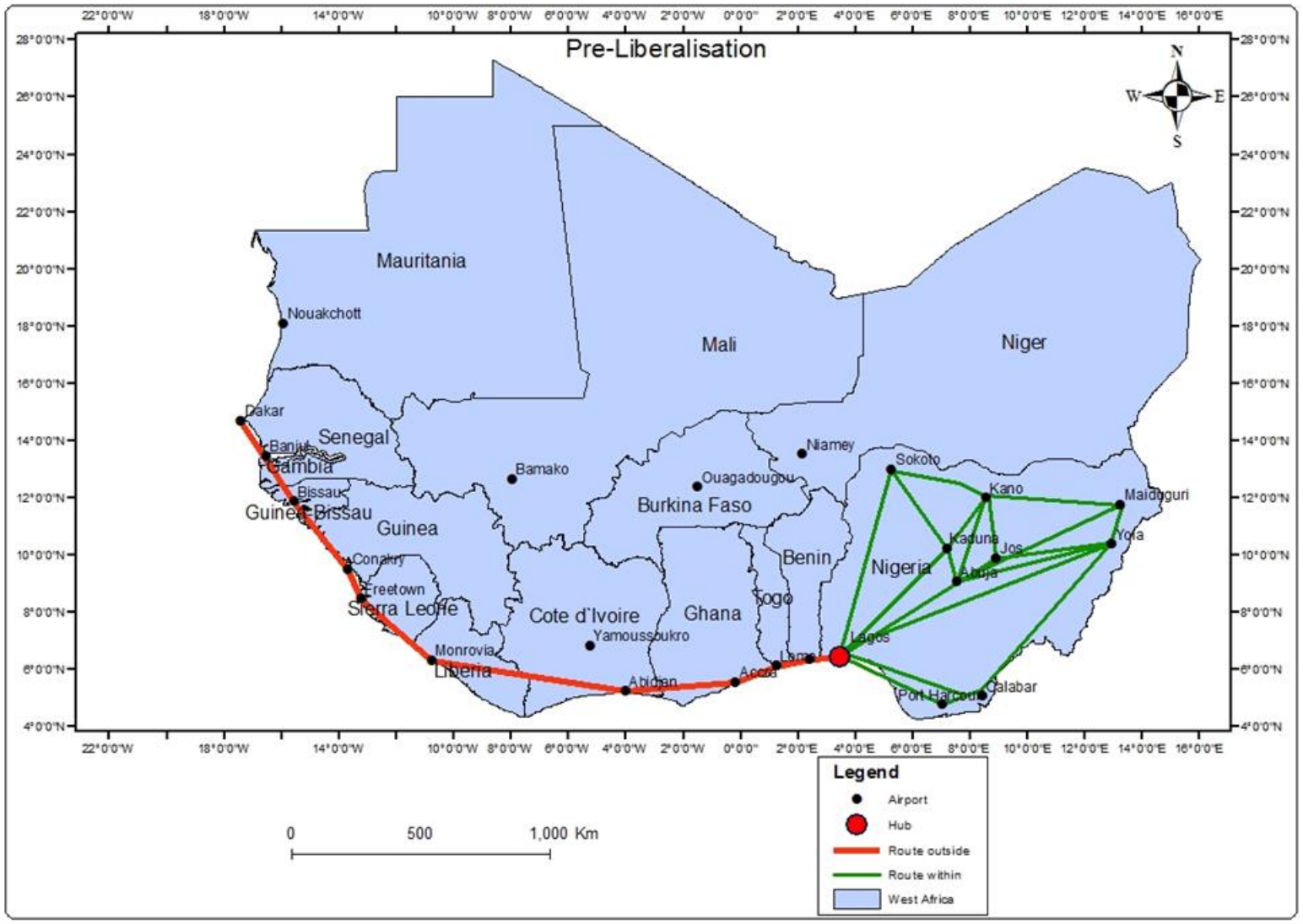

Fig.4.1: Pre-liberalisation Regional Air Network Structure from Nigeria, 1988-2000
Source: Author's Analysis, 2015

The regional air network structure from Nigeria consisted of both linear point-to-point network structure from Lagos to other West African countries and internal hub structure link to other major cities within the country. Figure 4.1 shows Lagos as the only hub within the country during this era. The dominant airline on domestic airline services during this period was Nigeria Airways. Similarly, the regional air route network from Nigeria to other West African countries was equally dominated by the Nigerian Airways. Besides the nature of the route and network structure from Nigeria was a linear point-to-point along West African coast from Lagos, Nigeria to Dakar making intermittent stops along the west coast to carry and discharge passengers along this route.

Figure 4.1 reveals the countries and their capitals that comprised the sub-region during this era. In the pre-liberaliastion era the total numbers of countries in the sub-region are sixteen (16). They are listed as thus: Benin, Burkina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra-Leone, Togo and Mauritania. But, Mauritania pulled out of ECOWAS in the year 2000.

Moreover, there exists a dichotomy in the colonial orientation of the countries in the West Africa region. Largely, the division is between the Anglophone and the Francophone nations and the third is of the Portuguese colony. In the light of the foregoing the ECOWAS Commission adopts English, French and Portuguese as the working language of the citizen in the sub-region. However, the socio-cultural affiliation may not significantly affect regional socio-economic relation and cooperation.

4.1.2 Post-Liberalisation Era

This sub-section presents the patterns and the characteristics of the route and the network structure in the post-liberalisation era. The regional air network structure from Nigeria in the post-liberalisation has changed significantly compared to the pre-liberalisation era. These changes are shown in Figure 4.2 when compared with Figure 4.1. During the period of the post-liberalisation era, the air network structure from Nigeria to West Africa for scheduled operations were routed from two major nodes within the country as compared to a single node during the pre-liberalisation era. These nodes served as the hubs from where the flights to Other West African countries are both concentrated and are dispatched. During this period the two major hubs in the country are located in Lagos and Abuja.

However, Lagos is the dominant hub, as significant flight operation from Nigeria to other West African route takes place at the Lagos hub. Other major characteristics of this period are that additional hubs were created as an extension of the links from the major hubs within the country-Lagos and Abuja. The extension hubs located outside the country from Nigeria are located in Cotonou and Lome respectively. For instance, the Lome hub was linked directly from Abuja to connect, Niamey, Ouagadougou, Bamako, Dakar to Praia. The Cotonou hub was linked to Lagos directly. From Cotonou, it linked the following cities: Niamey, Ouagadougou, Bamako, and Dakar to Praia.

Figure 4.2 reveals the hubs created within the country and the extension to other cities outside Nigeria. Though during this period, other major airports were added to the existing airports. These are Benin City, Uyo, Asaba, Enugu and Makurdi. The post-liberalisation period presents a denser route and network structure having Abuja and Lagos as a pivotal hub linking every other major airport within the country and act as the gateway to regional air network structure from Nigeria.

The regional air network structure from Nigeria to West Africa countries in the post-liberalisation era is majorly a hub and spoke network structure where the hub structure increased from one to four from pre- to post-liberalisation era. The hub structure is segmented into internal and external hub structure of both linear point to point network structure along the west coast from Lagos to Other West African countries and internal hub structure link from Lagos to other major cities within the country. Figure 4.2 reveals the changes in the countries and their capitals

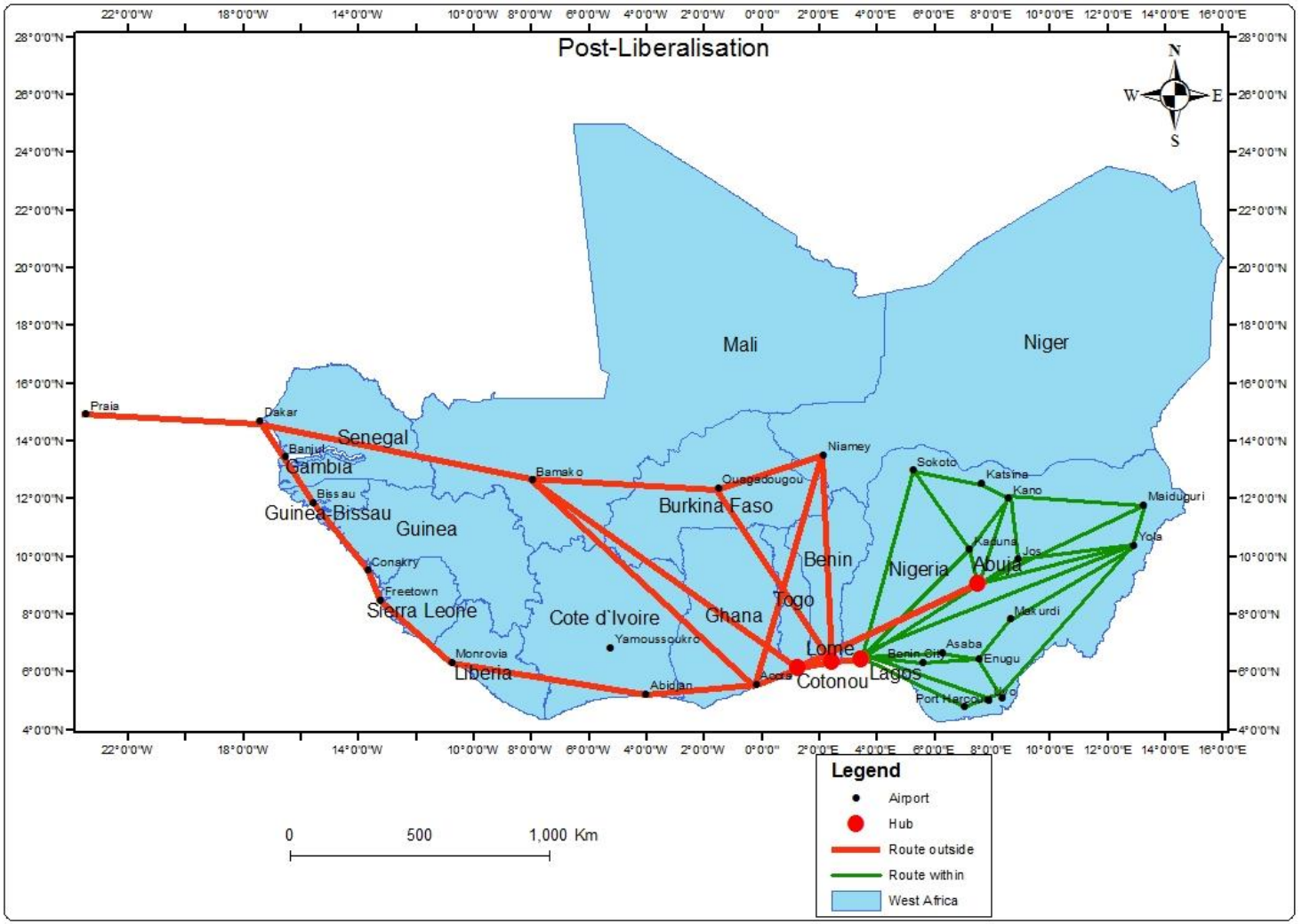

Fig.4.2: Post-liberalisation Regional Air Network Structure from Nigeria, 2001-2011

Source: Author's Analysis, 2015

that comprised the sub-region during this era. In the post-liberaliastion era the total numbers of countries in the sub-region have now reduced to fifteen (15). They are listed as thus: Benin, Bukina Faso, Cape Verde, Cote d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra-Leone, and Togo. Mauritania pulled out of ECOWAS in the year 2000.

The hypothesis which states that there is a significant difference in the spatial pattern of route and network structure from Nigeria to West Africa countries was tested. This was analysed using graphical representation of the route and network structure in both periods and calculating the alpha index to compare the level of connectivity in the pre- and post- liberalisation network. The calculated alpha index for the route and network in the pre- liberalisation era was 0.297 and the alpha index for the post- liberalisation era was 0.334.The alpha index ranges between 0 and 1, and 1 being the perfect network. The alpha index of the route and network is higher in the post-liberalisation when compared with pre- liberalisation. Hence the connectivity is better in the post liberalisation.

4.1.3 Post-Liberalisation Era Airline Market Share

This sub-section presents the post-liberalisation airline market share. It shows the aggregated market share of the dominant airline on this route in the post-liberalisation. It is difficult to disaggregate for this period as instability of airline was highly noticeable. This is due to the market contestability regime which provides for the free entry and exit for the airlines.

Table 4.1 shows that apart from Aero contractor that had 22,100 (21.4%) flights over the years, Arik had 21,230 (20.6%), other airlines had much less flights over the period under consideration. Indeed, Medview airline had less as 32(0.03%) of all the flights. In terms of number and percentages moved over the years, Aero Contractors and Arik moved 1755830 (18.99%) and 1,666,264 (18.02%) of all the percentages respectively. Other airlines each had less than seven percent of the passengers

It should be noted that the foreign airline listed does not have a scheduled operation from Nigeria to West Africa cities, but as part of their operations have connecting passengers from Nigeria to other West Africa countries.

Table 4.1: Schedule Airlines Market Share to/from Nigeria to West Africa cities between 2001 to 2011

S/N	Airline Operation	Number of Flights	% Market Share	Number of Passengers	% Market Shares in Pax Movement
1	Bellview	5926	5.75	382808	4.14
2	Aero contractor	22100	21.4	1755839	18.99
3	Arik	21230	20.6	1666264	18.02
4	Danaco	6210	6.03	553862	5.99
5	Air Nigeria	19884	19.3	1487687	16.10
6	Asky aviation	1920	1.86	166745	1.80
7	IRS airline	5990	5.81	527682	5.71
8	First nation	305	0.30	16994	0.18
9	Chanchangi	4250	4.13	450420	4.87
10	OAS/ allied	590	0.57	30024	0.33
11	Ghana airways	1109	1.08	76344	0.83
12	Cameroon airlines	725	0.71	50925	0.55
13	Ethiopian airlines	3642	3.53	282396	3.05
14	Emirate	2032	1.97	470585	5.09
15	British airways	1225	1.19	225000	2.43
16	Air France	2021	1.96	452090	4.89
17	Kenya airways	951	0.92	97912	1.06
18	Medview	32	0.03	6977	0.08
19	Overland air	285	0.28	29312	0.32
20	KLM	924	0.90	187903	2.03
21	Qatar	886	0.86	173173	1.87
22	South Africa	836	0.82	154623	1.67
	Total	103073	100.00	9245565	100.00

Source: Computed from Nigeria Civil Aviation Authority Statistics, 2001-2011

4.2 Volume of Passengers Moved from Nigeria to other West African Countries

One of the major emphases of transport geography is the study of the flow of economic activities over space. This section presents the flow of the passengers moved in the pre-and post-liberalisation from Nigeria to other West African countries.

4.2.1 Volume of Passengers Moved during Pre-liberalisation Era

This sub-section discusses the flow of passengers' movement from the Nigeria to other West African countries in the pre-liberalisation era. Here, the volume was disaggregated into arrival and departure data for each of the years under consideration. Table 4.2 shows the total number of passengers moved during the pre-liberalisation era as 3,171,335. Between 1988 and 1994, there was a fluctuation in the total number of passenger recorded. The percentage growth was 2.9% between 1988 and 1989. However, a negative growth rate of -0.7 was recorded in 1990. In 1991, there was a sharp increase in the percentage growth rate. The number increase to 10.2% from the preceding year. The deregulation of the domestic aviation subsector during this period might have influenced this change.

The lowest passenger moved had 214165 (6.75%) and 203278 (6.41%) for 1995 and 1996 respectively. The rationale for these numbers might be connected to the major sweeping change in the Nigeria's Aviation policy during this period. The policy effects cut across the whole strata of the aviation industry. The major institution in the Nigeria's aviation sector such the Nigerian Airways (NA), the Federal Civil Aviation Authority (FCAA) and Nigerian Airport Authority (NAA) were reorganised. The entire management team of the Nigeria Airways was sacked. The Federal Civil Aviation Authority (FCAA) and Nigeria Airport Authority were merged to form a new institution known as the Federal Airport Authority of Nigeria (FAAN).The new agency was saddled with the responsibility of providing regulatory oversight for the Nigerian aviation subsector.

During this period the Nigerian Airways which have the majority market share in the regional route from Nigeria was struggling to survive. All of the above factors contributed largely to the decline in the volume of the passenger for the period.

Table 4.2: Passengers Movement during the Pre-Liberalisation Era

Pre-liberalisation Passenger Flow							
Year	**Arrival in Lagos**	**% Growth**	**Departure from Lagos**	**% Growth**	**Total**	**% Growth**	**% Volume Share**
1988	96744	-	127624	-	224368	-	7.07
1989	96892	0.2	134040	4.8	230932	2.9	7.28
1990	101650	4.7	127633	-5.0	229283	-0.7	7.23
1991	111192	8.6	141703	9.9	252895	10.2	7.97
1992	111448	0.2	130637	-8.5	242085	-4.3	7.63
1993	91643	-21.6	140532	7.0	232175	-4.1	732
1994	98767	7.2	130809	-7.4	229576	-1.1	7.24
1995	115928	14.8	98237	-33.2	214165	-6.7	6.75
1996	103862	-11.6	99416	1.2	203278	-5.1	6.41
1997	134718	22.9	99043	-0.4	233761	14.9	7.37
1998	136395	1.2	116201	14.8	252596	8.1	7.96
1999	158815	14.1	143069	18.8	301884	19.5	9.52
2000	149330	-6.4	175007	18.2	324337	7.4	10.23
Total	1507384		1663951		3171335		

Sources: Computed from Federal Airport Authority Nigeria (1988-2000); Nigerian Airways (1988-1994)

Whereas the highest percentage volume share for the passenger movement from Nigeria to other West African countries was in the year 1999 and 2000. The number and the percentage volume share was 301884 (9.52%) for 1999 and 324337 (10.23%) for the year 2000. This period coincides with national political rebirth which opens up the country for regional socio-economic integration.

Figure 4.3 shows the trends in passenger growth over the pre-liberalisation era from 1988 to 2000. The percentage growth in passenger movement during the pre-liberalisation era was negative for 1990, 1992 to 1996. The negative percentage passenger growth range for the period was between -0.7% and -6.7%. However, in the pre-liberalisation era for the same period, the other growth percentage was positive. The range was between 2.9% and 19.5%.The lowest growth was recorded in 1989 and the highest was in 1999.

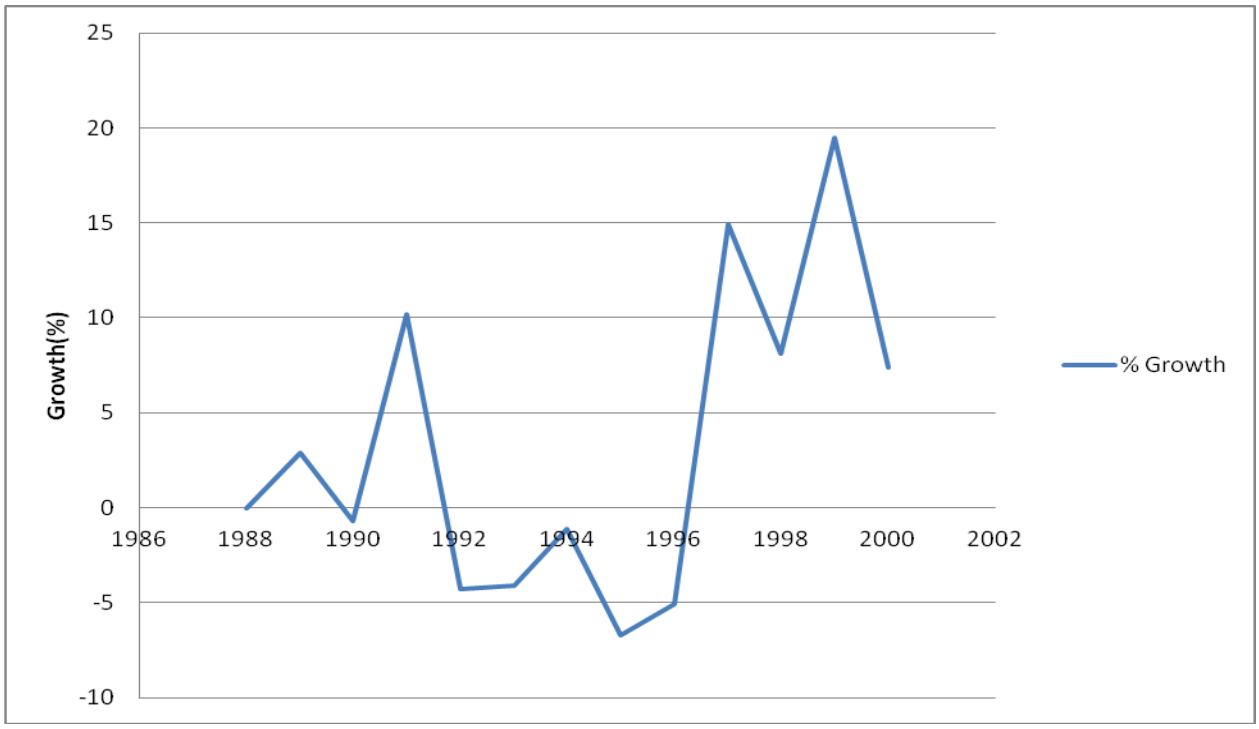

Fig 4.3 Passenger Movement in Pre-Liberalisation Era, 1988-2000
Source: Federal Airport Authority of Nigeria (1988-2000)

4.2.2 Volume of Passengers Moved during Post-liberalisation Era

This sub-section discusses the flow of passengers' movement from the Nigeria to other West African countries in the post-liberalisation era. However, in the post-liberalisation, the volume and the temporal pattern of passenger flow from Nigeria to other cities in West African were discussed using two types of the data set. The first is the aggregated data of cumulative flows of arrival and departure of the passenger from Nigeria cities to other West African countries. The second data type used in the analysis for this section is the disaggregated data showing the city pair flows in arrival and departure from Lagos and Abuja to other West African countries. Table 4.3 shows passenger movement as 16,195,289 for the period under consideration. The data ranges from 490120 (3.03%) and 7845887 (131.2%) for the passengers moved for 2001 and 2011 respectively.

In 2002, the total flow was 448948 (2.77%) which was lower than the preceding year 490120 (3.03%), largely responsible for this was the onslaught of global terrorism, especially against air transportation. The September 11, 2001, attack on the World Trade Centre portends a grave consequence for the global aviation industry. The effects were felt globally on the passengers' flows across the airports and cities all over the world. The passenger flow from Nigeria to other West African countries was not exempted in this regards. This might be responsible for the decline in the passenger flow from the preceding year as well as the further decline in the succeeding year. The highest passenger flow recorded was 3392776 (20.95%) and 7845887 (131.2%) for the year 2010 and 2011 respectively.

Another important variation noticeable from the dataset is a sharp decrease from the 500254 (3.09%) in 2005 to 265445 (1.65%) in 2006. During this period in the annals of the Nigerian aviation history, there was an incessant air mishap which resulted in the huge loss of the properties and lives. Sequel to this, there was general apathy among the air travellers in all segments of the Nigerian air travel markets-domestic, regional and international.

Table 4.3: Passengers Movement during the Post-Liberalisation Era

Post-liberalisation Passenger Flow							
Year	**Arrival in Lagos**	**% Growth**	**Departure from Lagos**	**% Growth**	**Total**	**% Growth**	**% Volume Share**
2001	231944	-	258176	-	490120	-	3.03
2002	208989	-10.9	239959	-7.6	448948	-8.4	2.77
2003	191585	-9.1	218182	-9.9	409767	-8.7	2.53
2004	190678	-0.5	232555	6.2	423233	3.3	2.61
2005	222049	14.1	278196	16.4	500245	18.2	3.09
2006	122578	-81.1	142867	-94.7	265445	-46.9	1.65
2007	178927	31.5	209945	31.9	388872	46.4	2.40
2008	356760	49.8	368766	43.1	725526	86.6	4.48
2009	611577	41.7	692893	46.8	1304470	79.8	8.05
2010	1667590	63.3	1725186	59.8	3392776	160.0	20.95
2011	3903438	57.2	3942449	56.2	7845887	131.2	48.45
Total	7886115		8309174		16195289		

Sources: Computed from Nigeria Civil Aviation Authority (2001-2011); Federal Airport Authority Nigeria (2001-2011)

Of all modal transport, the air transport mode seems the most vulnerable to little disruptions in terms of accidents; terrorism usually causes an unprecedented decline in the passenger flow. Therefore, there is need to put in place strict regulations that would guarantee safety of lives and properties and ensure a continuous and steady flow of activities

Figure 4.4 shows the trends in passenger growth over the period of the post-liberalisation from 2001 to 2000.The percentage growth in passenger movement during the post-liberalisation was negative for 2002, 2003, to 2006. The negative percentage passenger growth range for the period was between -8.4%, -8.7% and -46.9%. However, in the post-liberalisation era for the same period, the other growth percentage was positive. The range was between 3.3% and 131.2%. The lowest growth was recorded in 2004 and the highest was in 2010.

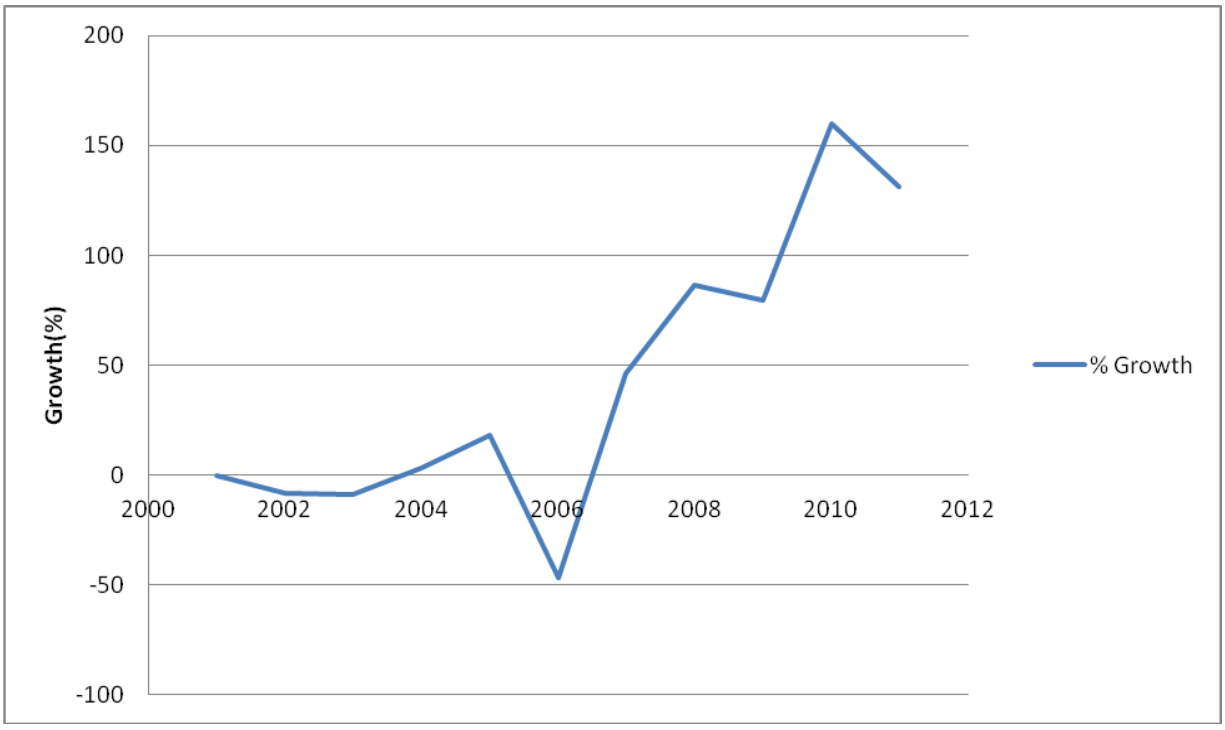

Fig 4.4: Passenger Movement in Post-Liberalisation Era, 2001-2011

Source: Nigerian Civil Aviation Authority (2001-2011)

4.3 Variations between the Volumes of Passenger Movement between Nigeria and other West African Countries before and after Liberalisation

The hypothesis which states that there is no significant difference between the volume of passenger movement before and after liberalisation was tested using the paired t-test. The volume of passenger moved in pre- and post-liberalisation constitutes the variable of interest. The period of the pre-liberalisation era was 1988 and 2000 and the post-liberalisation era was between 2001 and 2011. The nature of this data is that the sizes for the pre and post are not equal. More importantly, one of the assumptions of a dependent paired sample t-test is that the groups must have equal samples sizes. As a result of the data used for this analysis covers between (1988-1996) for the pre-liberalisation era and (2001-2009) for the post-liberalisation era.

Table 4.2 and Table 4.3 show the full list of the total volume for the pre-liberalisation and post-liberalisation eras respectively. This represents the aggregated data for traffic volume from Nigeria to countries in both the pre-liberalisation and post-liberalisation eras. The table also reflected the arrival and departure figure for the respective years in both the pre-liberalisation and the post-liberalisation eras.

Table 4.4 shows the t-test statistics analysis of comparing the mean of the passenger traffic flow in the Pre-liberalisation era as compared to the mean in the post-liberalisation era. The test statistics revealed that the mean of the observation was -321985.44444, and the standard deviation was 318966.21288. The standard error of the mean was 106322.07096 and the t value of the paired sample t statistic is 3.028. The probability of the overall model is significant at 0.016 which is less than the value of 0.05.

Therefore we reject the null hypothesis which says there is no significant difference in the volume of passenger movement in the pre and post-liberalisation. So we accept the alternative hypothesis and conclude that there is a significant difference in the volume of passenger movement from Nigeria to West African countries in the pre-liberalisation and the post-liberalisation eras in the analysis. Fig 4.5 shows the comparative volume of flow of passengers flown from Nigeria to West African in the pre-liberalisation and post-liberalisation eras.

Table 4.4: Paired Sample T-test on Volume of Passenger Movement in Pre and Post-liberalisation

Paired Differences between Pre- and Post Volume of Passenger Movement		
No.	T-Test Pararmeters	Results
1	Mean	-321985.444444
2	Std Deviation	318966.21288
3	Std Error Mean	106322.07096
4	Confidence Interval Lower	-567164.5797
5	Confidence Interval upper	-76806.30915
6	t	3.028
7	df	8
8	Sig.(2-tailed)	.016

Source: Author's Analysis (2015)

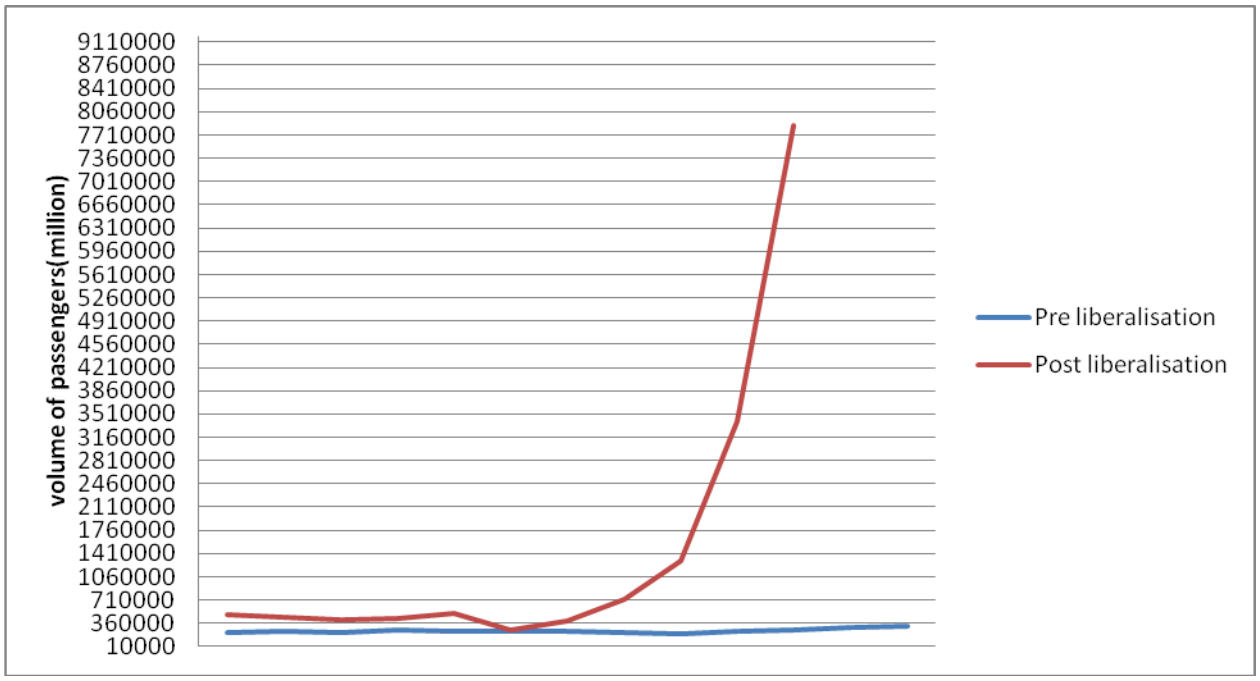

Fig. 4.5 Comparative Volume of Passenger Movement in Pre and Post-liberalisation

Source: Federal Airport Authority Nigeria (1988-2000) and Nigeria Civil Aviation Authority (2001-2011)

4.4 Temporal Pattern of Aircraft Flow

This section examines the volume and the temporal pattern of aircraft flow in the pre- and post-liberalisation. The changes in the volume and temporal pattern of flights from Nigeria to other regional cities in the pre and post liberalisation are discussed. The relationship between the passenger and aircraft flow in both periods are discussed.

4.4.1 Volume and Temporal Pattern of Aircraft flow from Nigeria to Regional Countries in the Pre-liberalisation era

The volume and the temporal flow of aircraft movement from Nigeria to West African countries are very important indicator of the impact of liberalisation. The data for this analysis is the aggregated data from Nigeria to West African countries. However, the volume was disaggregated into arrival and departure data for each of the year. The analysis is based on the total flow of arrival and departure data. The volume and temporal pattern of aircraft movement is for thirteen years. This data range is from 1988 to 2000 for the pre-liberalisation era.

Table 4.5 shows the aircraft flow during the pre-liberalisation era. The total volume of aircraft movement is 52,416 for the whole of the pre-liberalisation era. In 1988 the volume was 3947 which were 7.53% of the total figure of the pre-liberalisation era. The lowest volume of aircraft movement was 3529 (6.73%) in 1996 and the highest volume of aircraft movement was 4630 (8.83%) for the year 2000. During this period, the dominant airline on the Nigeria – West African route was the Nigeria Airways. However, the airline suffered great capacity losses due to mismanagement and huge debt. For instance, it was established that the debt of Nigeria airways rose to 16million in 1994 and estimated to be in the range of 11 billion naira by 1996.

Table 4.5 reveals the volume of aircraft movement from Nigeria to other West African countries. There was a great fluctuation of rising and falling in volumes of aircraft movement. Part of the reason for this was that some of the destination within the sub-continent was ravaged with wars; as a result, the growth of aircraft movement during this period was greatly stymied. This was easily noticeable from the aircraft movement rising from the beginning of the period and declining towards the middle and approaching the end of the period.

Table 4.5: Aircraft flow during the Pre-Liberalisation Era

Pre-liberalisation Aircraft Flow							
Year	**Arrival**	**% Growth**	**Departure**	**% Growth**	**Total**	**% Growth**	**% Volume Share**
1988	2014		1933		3947		7.53
1989	2060	2.2	1857	-4.1	3917	-0.7	7.47
1990	2076	0.7	2072	10.4	4148	8.5	7.91
1991	2057	-0.9	2036	-1.8	4093	-3.6	7.81
1992	2123	3.1	2130	4.4	4253	3.9	8.11
1993	1885	-12.6	2175	2.1	4060	-4.5	7.75
1994	2040	7.6	2108	-3.2	4148	2.2	7.91
1995	1880	-8.5	1883	-11.9	3763	-9.3	7.18
1996	1753	-7.2	1776	-6.0	3529	-6.2	6.73
1997	1727	-1.5	1868	4.9	3595	1.9	6.86
1998	1958	11.8	2028	7.9	3986	10.9	7.60
1999	2198	10.9	2149	5.6	4347	9.1	8.29
2000	2348	6.4	2282	6.2	4630	6.9	8.83
Total	26119		26297		52416	100	

Sources: Computed from Federal Airport Authority Nigeria (1988-2000); Nigerian Airways (1988-1994)

Figure 4.6 shows the trends in aircraft movement growth over the pre-liberalisation era from 1988 to 2000. The percentage growth in aircraft movement during the pre-liberalisation era was negative for 1989, 1991, 1993, 1995, 1993 and 1996. The negative percentage passenger growth range for the period was between -0.7% and -9.3%. However, in the pre-liberalisation era for the same period, the other growth percentage was positive. The range was between 1.9% and 10.9%. The lowest growth was recorded in 1997 and the highest was in 1998.

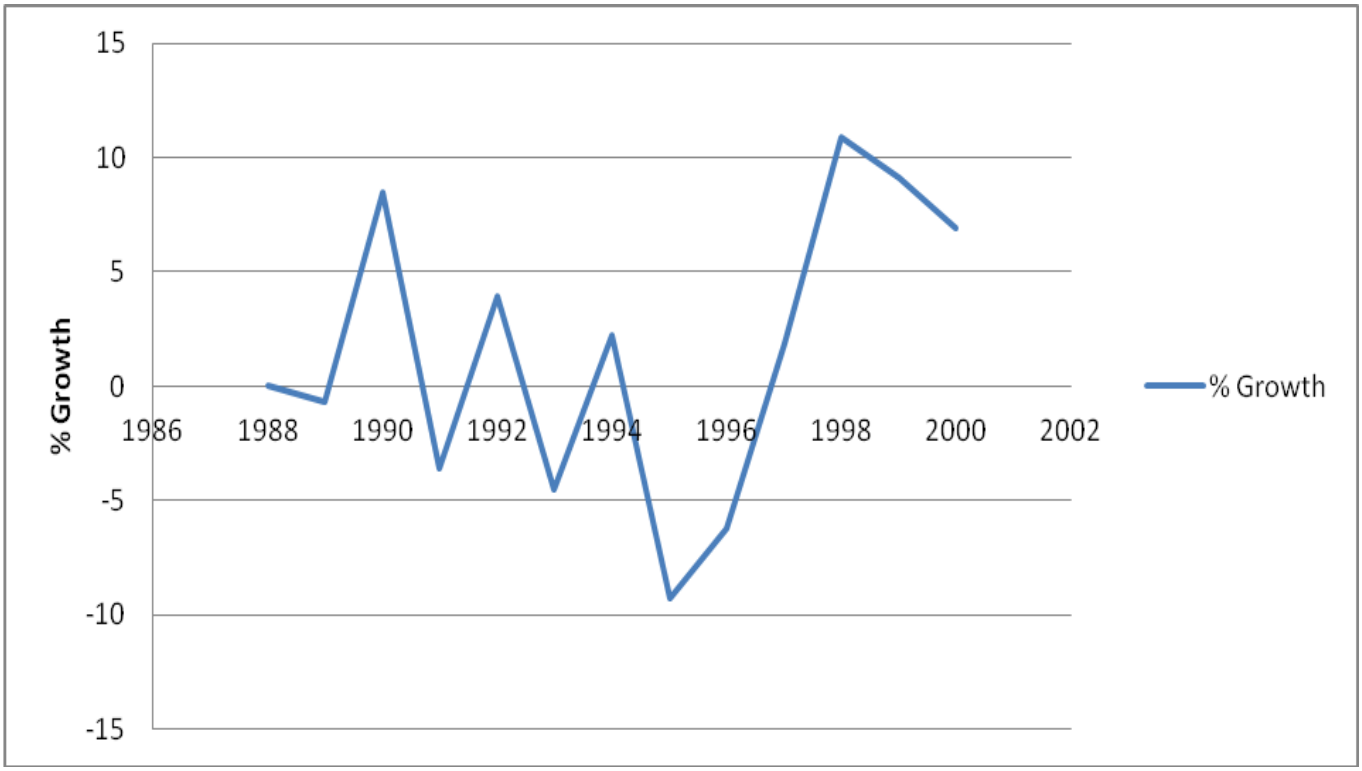

Fig 4.6: Growth in Aircraft Movement Pre-Liberalisation Era 1988-2000.
Source: Federal Airport Authority Nigeria (1988-2000)

4.4.2 Patterns of Aircraft Flow from Nigeria to other West African Countries in Post-Liberalisation era

The volume and the temporal pattern of aircraft flow from Nigeria to other countries in West African are discussed using two types of the data set. These are the aggregated data of cumulative flows of arrival and departure of the passenger from Nigeria cities to West African countries. The second data type is the disaggregated data showing the city pair flows in arrival and departure from Nigeria to other West African countries. Table 4.6 shows that the total volume of movement is 244541 for the whole period of post-liberalisation. The number ranges from 7092 (2.90%) and 105016 (42.94%) for the 2001 and 2011 aircraft flow respectively.

In 2002 the total flow was 6955 (2.84%) which was lower than the preceding year 7092 (2.90%), similarly as it affects passenger movement, the onslaughts of global terrorism, especially against air transportation, reduce aircraft movement during the period. The September 11, 2001, attack on the World Trade Centre also lent a grave consequence for the global aviation industry. The aircraft flow from Nigeria to Other West African countries was not exempted in this regards. This might be responsible for the decline in the aircraft flow from the preceding year as well as the further decline in the succeeding year. The highest aircraft flow recorded was 55122 (22.54%) and 105016 (42.94%) for the year 2010 and 2011 respectively.

Besides variation noticeable from the dataset is the sharp decrease from the 8297 (3.39%) in 2005 to 5022 (2.05%) in 2006. This period was turbulent for the Nigerian aviation history; there was a frequent occurrence of an accident which resulted in the huge loss of the properties and lives. Consequently, there was general tendency to shun among the air travellers in all segments of the Nigerian air travel markets-domestic, regional and international.

Table 4.6: Aircraft flow during the Post-Liberalisation Era

Post Liberalisation Aircraft Flow							
Year	**Arrival**	**% Growth**	**Departure**	**% Growth**	**Total**	**% Growth**	**% Volume Share**
2001	3372		3720		7092		2.90
2002	3377	0.1	3578	-3.9	6955	-1.9	2.84
2003	3309	-2.1	3704	3.4	7013	0.8	2.87
2004	3599	8.1	3729	0.7	7328	4.5	3.00
2005	3932	8.5	4365	14.6	8297	13.1	3.39
2006	2486	-58.1	2536	-72.1	5022	-39.5	2.05
2007	3364	26.1	4440	42.9	7804	55.4	3.19
2008	5806	42.1	7015	36.7	12821	64.3	5.24
2009	10354	43.9	11717	40.1	22071	72.1	9.03
2010	26866	61.5	28256	58.5	55122	149.7	22.54
2011	52558	48.9	52458	46.1	105016	90.5	42.94
Total	119023		125518		244541		

Sources: Computed from Nigeria Civil Aviation Authority (2001-2011); Federal Airport Authority Nigeria (2001-2011)

Figure 4.7 shows the trends in aircraft movement growth over the period of the post-liberalisation from 2001 to 2011. The percentage growth in aircraft movement during the post-liberalisation was negative for 2002, 2003 and 2006.The negative percentage passenger growth range for the period was between -8.4% and -46.9%. However, in the post-liberalisation regime for the same period, the other growth percentage was positive. The range was between 3.3% and 160.0%. The lowest growth was recorded in 2004 and the highest was in 2010.

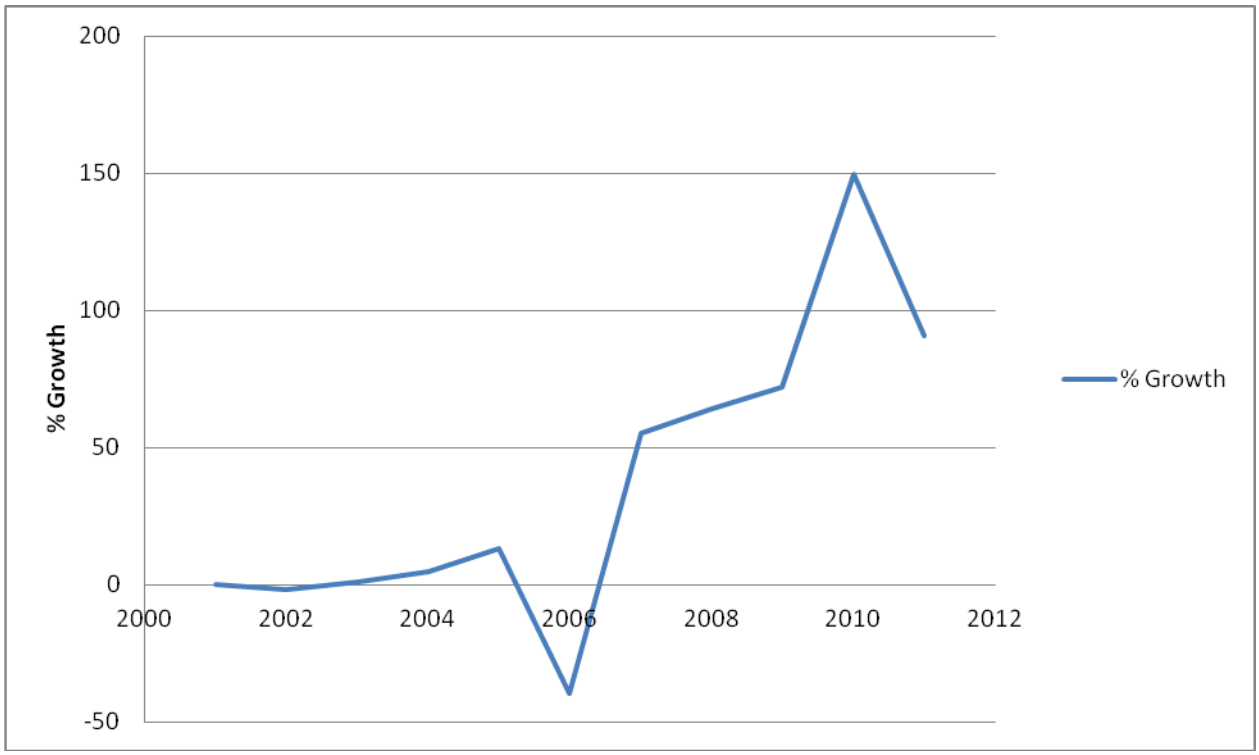

Fig 4.7: Growth in Aircraft Movement Post-Liberalisation 2000-2011
Source: Nigeria Civil Aviation Authority (2000-2011)

4.4.3 Variations between the Volumes of Aircraft Movement between Nigeria and West African Countries

The hypothesis in the study which states that there is a significant difference between the volume of aircraft movement before and after liberalisation was tested. In testing this hypothesis, a paired sample t-test was conducted on the total volume of aircraft movement figure from the pre- and post-liberalisation. The pre-liberalisation era was between 1988 and 2000 and the post-liberalisation era was between 2001 and 2011. The nature of this data is that the sizes for the pre and post are not equal. However, one of the assumptions of a dependent paired sample t-test is that the groups must have equal samples sizes. As a result of the data used for this analysis covers between (1988-1996) for the pre-liberalisation era and (2001-2009) for the post-liberalisation era.

Table 4.5 and Table 4.6 show the full list of the total volume for the pre-liberalisation and post-liberalisation eras respectively. This represents the aggregated data for traffic volume from Nigeria to West African countries in both the pre-liberalisation and post-liberalisation era. Also, It reflected the arrival and departure data for the respective years in both the pre-liberalisation and the post-liberalisation period.

Table 4.7 shows the results of the paired sample t-test statistics analysis. It compares the mean of the passenger traffic flow in the pre-liberalisation era with the post-liberalisation era .The test statistics reveals that the mean of the observation was -5382.55556, and the standard deviation was 5396.36975 .The standard error of the mean was 1798.78992 and the t value of the paired sample t statistic is 2.992. The probability of the overall model is significant at 0.017 which is less than the value of 0.05.

Therefore we reject the null hypothesis which says there is no significant difference in the volume of aircraft movement in the pre and post-liberalisation. So we accept the alternative hypothesis and conclude that there is a significant difference in the volume of aircraft movement from Nigeria to West African countries in the pre-liberalisation and the post-liberalisation eras in the analysis. Also the fig. 4.8 shows the comparative volume of flow of aircraft flow from Nigeria to West African in the pre-liberalisation and post-liberalisation eras.

Table 4.7: Paired Sample T-test on Volume of Aircraft Movement in Pre and Post-liberalisation

Paired Differences between Pre- and Post Volume of Aircraft movement		
No.	T-Test Parameters	Results
1	Mean	5382.55556
2	Std Deviation	-5396.36975
3	Std Error Mean	1798.78992
4	Confidence Interval Lower	-9530.57255
5	Confidence Interval Upper	-1234.53857
6	T	2.992
7	Df	8
8	Sig.(2-tailed)	0.17

Source: Author's Analysis (2015)

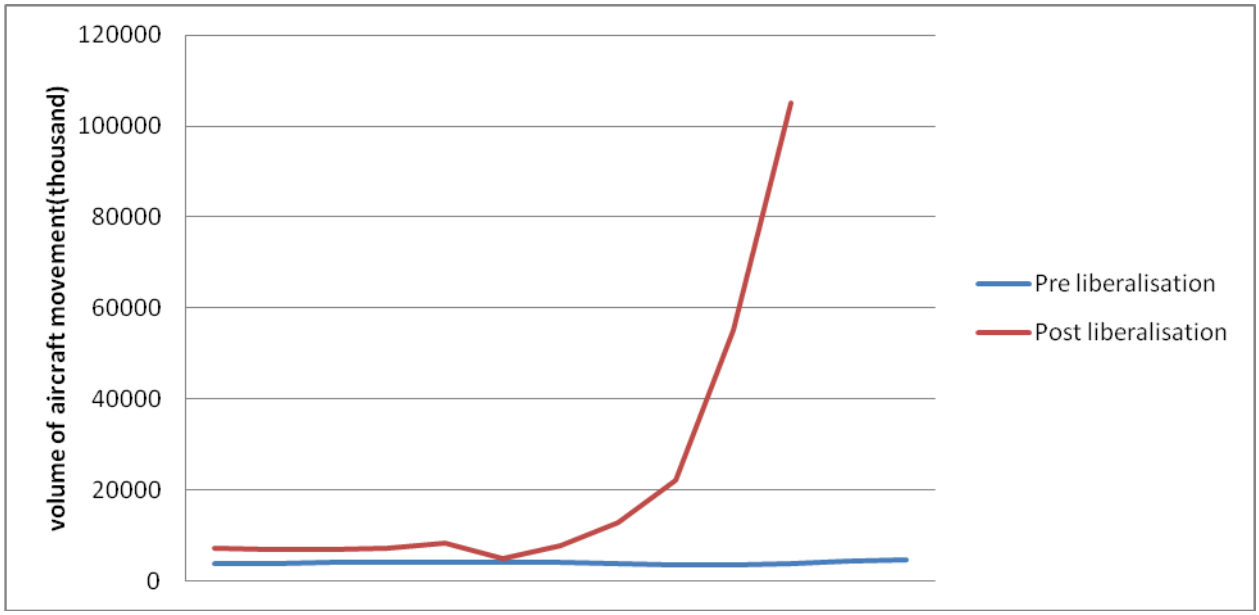

Fig 4.8: Comparative Volume of Aircraft Movement in Pre and Post-liberalisation
Source: Federal Airport Authority Nigeria (1988-2000) and Nigeria Civil Authority Aviation (2001-2011)

4.4.4 Relationship between the Volume of Aircraft Movement and Passenger Movement between Nigeria and West African Countries in Pre and Post- liberalisation Eras

The relationship between the volume of aircraft movement and passenger movement in the pre- and post-liberalisation is discussed. The airline's operation runs on schedule and mostly based on city pair schedule. Therefore, irrespective of the number of passenger and cargo bookings on such flight, the flight would be dispatched in accordance with the established timetable. Implicit in this, not all flight dispatched are filled with adequate revenue passenger capacity. So if the average load factor is too low it would affect the yields.

Therefore, it is very critical to ascertain if there is a relationship between the volume of aircraft movement and passenger movement from Nigeria to other West African countries in the pre and post-liberalisation had been significant. Table 4.8 shows the correlation between the passenger movement and the aircraft movement in both the pre- and post-liberalisation. It reveals the correlation significant levels for all the correlated variables.

Table 4.8 shows the passenger traffic in the pre-liberalisation era between Nigeria and other West African countries and airline movement in the pre-liberalisation era between Nigeria and West African. It was significant at 0.028 at 0.05level. Also, the passenger traffic in the post-liberalisation between Nigeria and West African and the aircraft movement in the post-liberalisation between Nigeria and West African were significant at 0.000 and also less than 0.05 significant level.

Also, the correlation between the passenger traffic in the pre liberalisation between Nigeria and West African and aircraft movement in the post-liberalisation between Nigeria and West African were significant at 0.004 which is also less than 0.05 significant level. Lastly, the passenger traffic in the pre-liberalisation era between Nigeria and West African and the passenger traffic in the post-liberalisation era between Nigeria and West African were significant at 0.001, less than 0.05 significant levels.

Table 4.8: Correlation between Passenger Movement and Aircraft Movement in Pre and Post-liberalisation

Correlations[c]

		Passenger traffic in the pre btw Nigeria and West Africa	Airline movement in the pre lib. btw Nigeria and W.Africa	Passenger traffic in the post btw Nigeria and West Africa	Airline Movement in the post lib. btw Nigeria and W.Africa
Passenger traffic in the pre btw Nigeria and West Africa	Pearson Correlation	1	.629*	.835**	.757**
	Sig. (2-tailed)		.028	.001	.004
Airline movement in the pre lib. btw Nigeria and W.Africa	Pearson Correlation	.629*	1	.276	.139
	Sig. (2-tailed)	.028		.384	.668
Passenger traffic in the post btw Nigeria and West Africa	Pearson Correlation	.835**	.276	1	.970**
	Sig. (2-tailed)	.001	.384		.000
Airline Movement in the post lib. btw Nigeria and W.Africa	Pearson Correlation	.757**	.139	.970**	1
	Sig. (2-tailed)	.004	.668	.000	

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

c. Listwise N=12

Table 4.8 shows the summary of the relationship between the passenger traffic and the aircraft traffic in both the pre and the post-liberalisation. It reveals that there is a significant relationship between the passenger movement and the aircraft movement in both the pre-liberalisation and the post-liberalisation eras.

4.5 Spatial and Temporal Pattern of Passenger and Aircraft Flow from Nigeria

This section examines the city pair volume and spatial pattern intensity of flows of aircraft and passenger movement from Lagos and Abuja to Other West African countries. The analysis on the intensity of spatial flow is discussed using map flow. The data are disaggregated into city pair flow from Nigeria to other West African from 2001 to 2011.

4.5.1 City pair Aircraft and Passenger flow from Lagos and Abuja 2001and 2002

From 2001, the available data shows the disaggregated city pair flow from Nigeria to other West African countries. The data covers the only two points in the country where scheduled air traffic services emanate from Nigeria to West African. They are the Lagos and Abuja international airport respectively.

Table 4.9 shows the traffic between Lagos and other countries in West African, the table included data on the city pair, the flight frequency showing the arrival as well as the departure and the city pair share for the aircraft movement and the passenger movement for the year 2001. For the aircraft flow, Lagos-Accra (42.94%), for the passenger, for the same city pair (39.86%). This is the highest for the whole year for city pair flow. This is followed by Lagos-Abidjan, aircraft (18.77%), passenger (23.90%), Lagos–Cotonou, aircraft (17.20%), passenger (14.19%).The city pairs with the lowest for the year are Lagos-Ouagadougou, aircraft (0.04%), passenger (0.01%), Lagos-Banjul, aircraft (0.07%), passenger (0.040%), and Lagos-Monrovia, aircraft (0.19%), passenger (0.06%). Implicit in this analysis is that higher aircraft frequency may not necessarily translate into higher passenger frequency.

Table 4.10 shows the analysis of the city pair traffic flows from Abuja to other countries in West African for the year 2001.The city pairs with the highest flow from Abuja are Abuja-Abidjan, aircraft (18.06%), passenger (14.38%), Abuja-Accra, aircraft (17.80%), passenger (24.86%), and Abuja-Bamako, aircraft (16.75%), passenger (16.51%). And the city pairs with lowest for the year from Abuja are Abuja-Banjul, aircraft (0.79%), passenger (1.38%), Abuja-Conakry, aircraft (0.79%), passenger (0.49%) and Abuja-Monrovia, aircraft (1.83%), passenger (2.66).

Figure 4.9 to Figure 4.11 show the spatial pattern of flight flow from Lagos to other West African countries from 2001 to 2003. During this period, the distribution of aircraft flow shows a high concentration of flight flow from Lagos to other West African countries from Lagos-Accra,

Lagos-Abidjan, Lagos- Cotonou and Lagos-Lome respectively. Whereas, the distribution of flight flows from Lagos- Ouagadougou, Lagos-Conakry, and Lagos-Bamako are quite low. The distribution reveals that some city pair decreased in flight flow in year 2002, when compared, with the preceding year. These are Lagos-Accra (2753) and Lagos-Cotonou (808), however, Lagos-Abidjan (1332) and Lagos-Lome (1116) witnessed some increase in 2002. In 2003, the flight traffic in both Lagos-Accra and Lagos-Abidjan increased slightly.

The spatial pattern of passenger flow from Lagos to other West African countries from 2001 to 2003 is shown below. Figure 4.12 to Figure 4.14 show an increase in the passenger flow pattern from Lagos to Accra, for the period. The total volume increased from 193501 in 2001, 209349 in 2002 to 214038 in 2003. However, some city pair, like Lagos-Lome and Lagos-Abidjan decreases in the total volume of flow for the period. Notably, a sharp decrease in the flow from Lagos-Cotonou was noticed from 2001 to 2003.The flow from Lagos to Cotonou decreases from 68862 in 2001 to 14003 in 2002 and 12766 in 2003. Generally, the flow pattern for the passenger and the flight shows an appreciable increase on some city pair for both passenger and flight and slight decrease on some city pair for both passenger and flight flow for the period of 2001 to 2003.

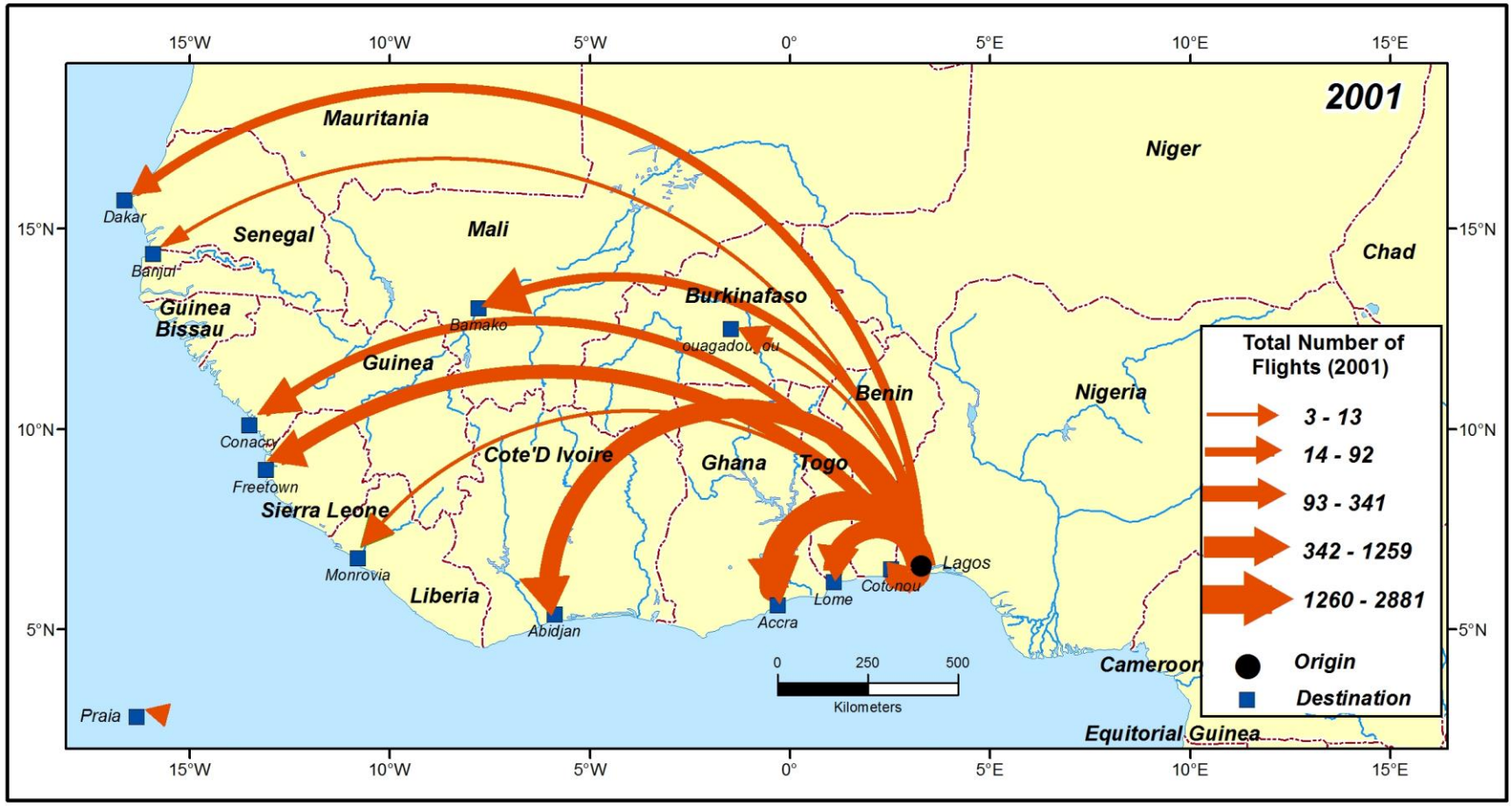

Fig. 4.9: Spatial Pattern of Flight Flow from Lagos, 2001.
Source: Author's Analysis, 2015

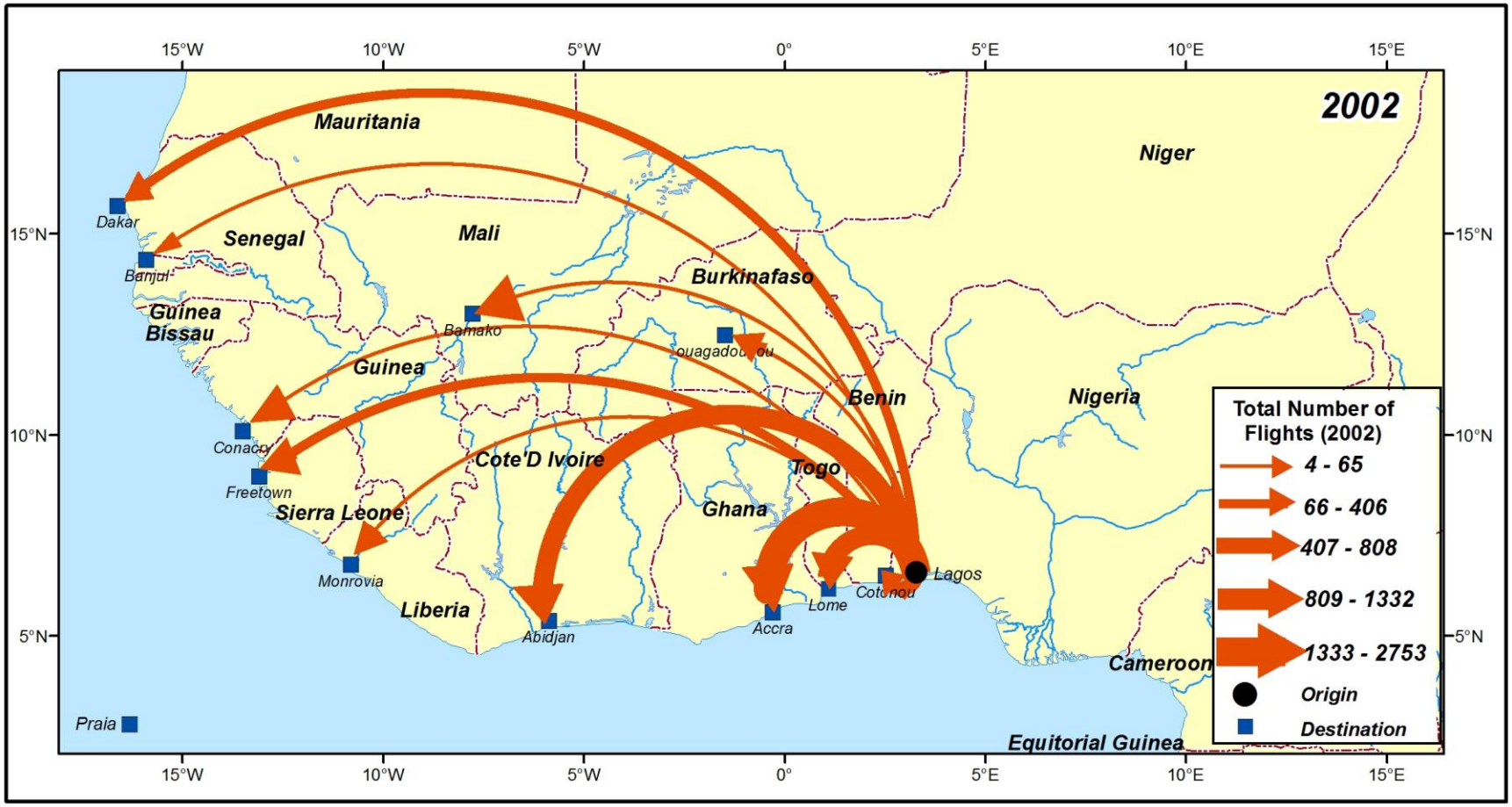

Fig. 4.10: Spatial Pattern of Flight Flow from Lagos, 2002.
Source: Author's Analysis, 2015

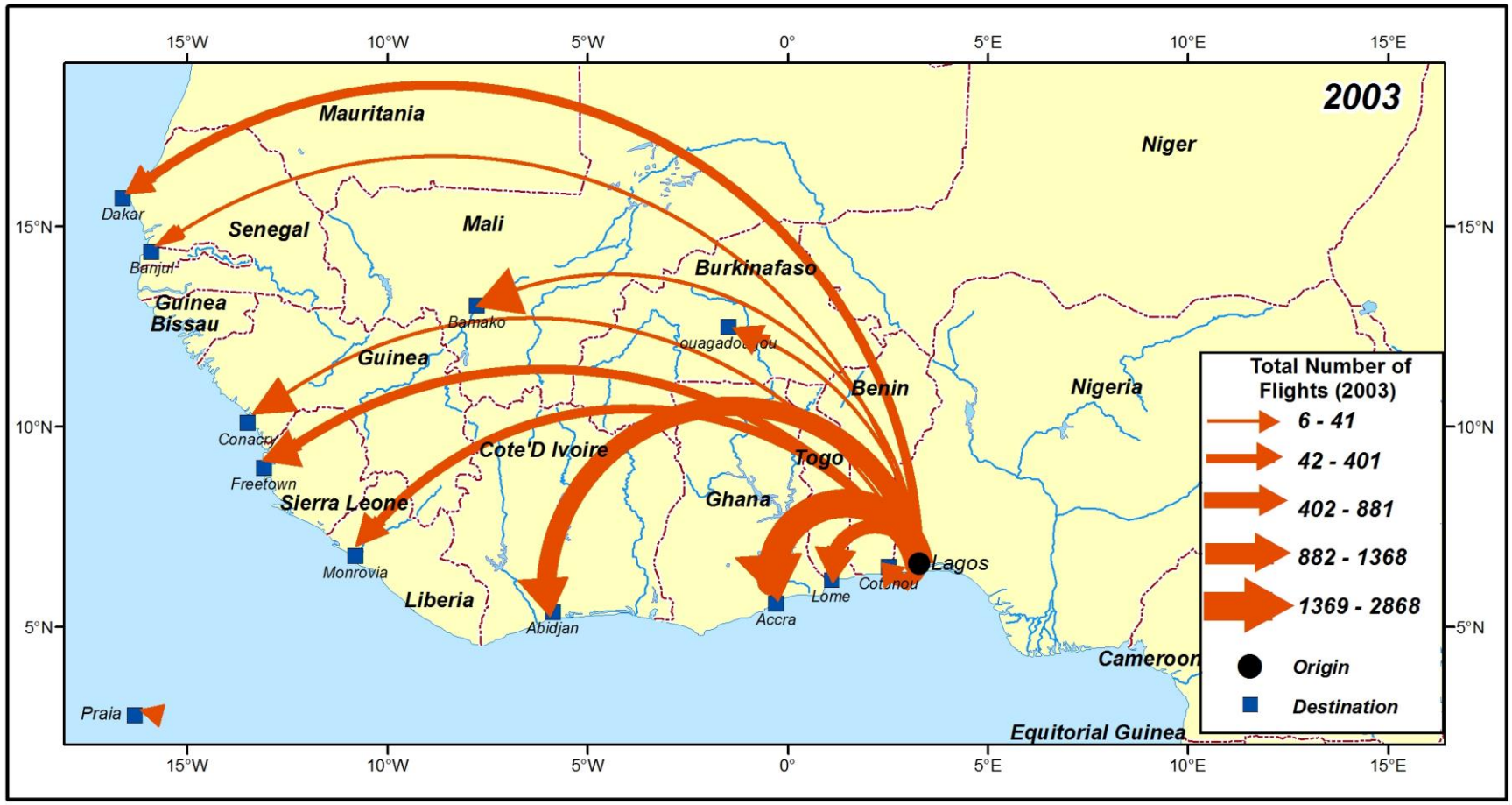

Fig. 4.11: Spatial Pattern of Flight Flow from Lagos, 2003.
Source: Author's Analysis, 2015

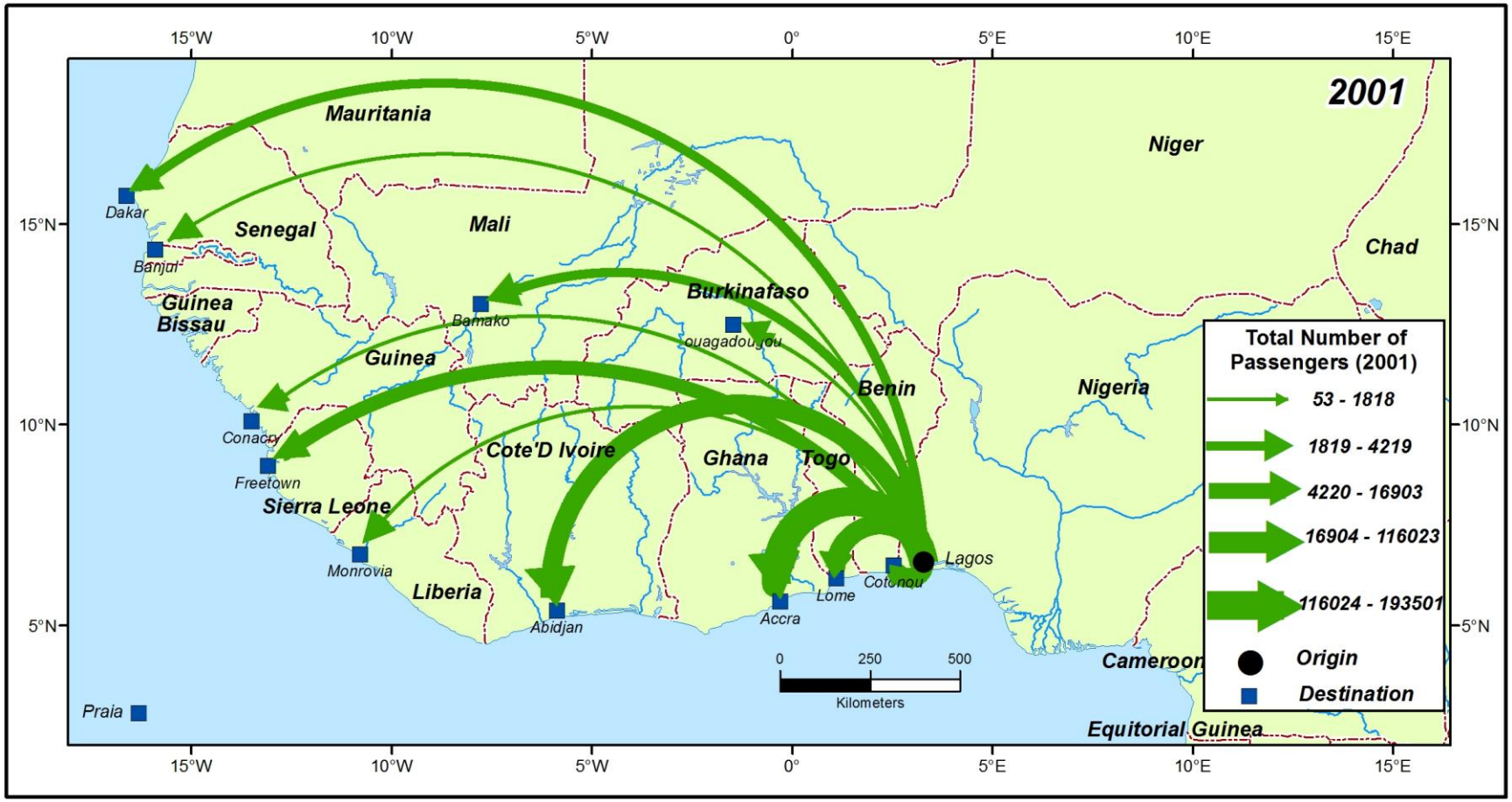

Fig. 4.12: Spatial Pattern of Passenger Flow from Lagos, 2001

Source: Author's Analysis, 2015

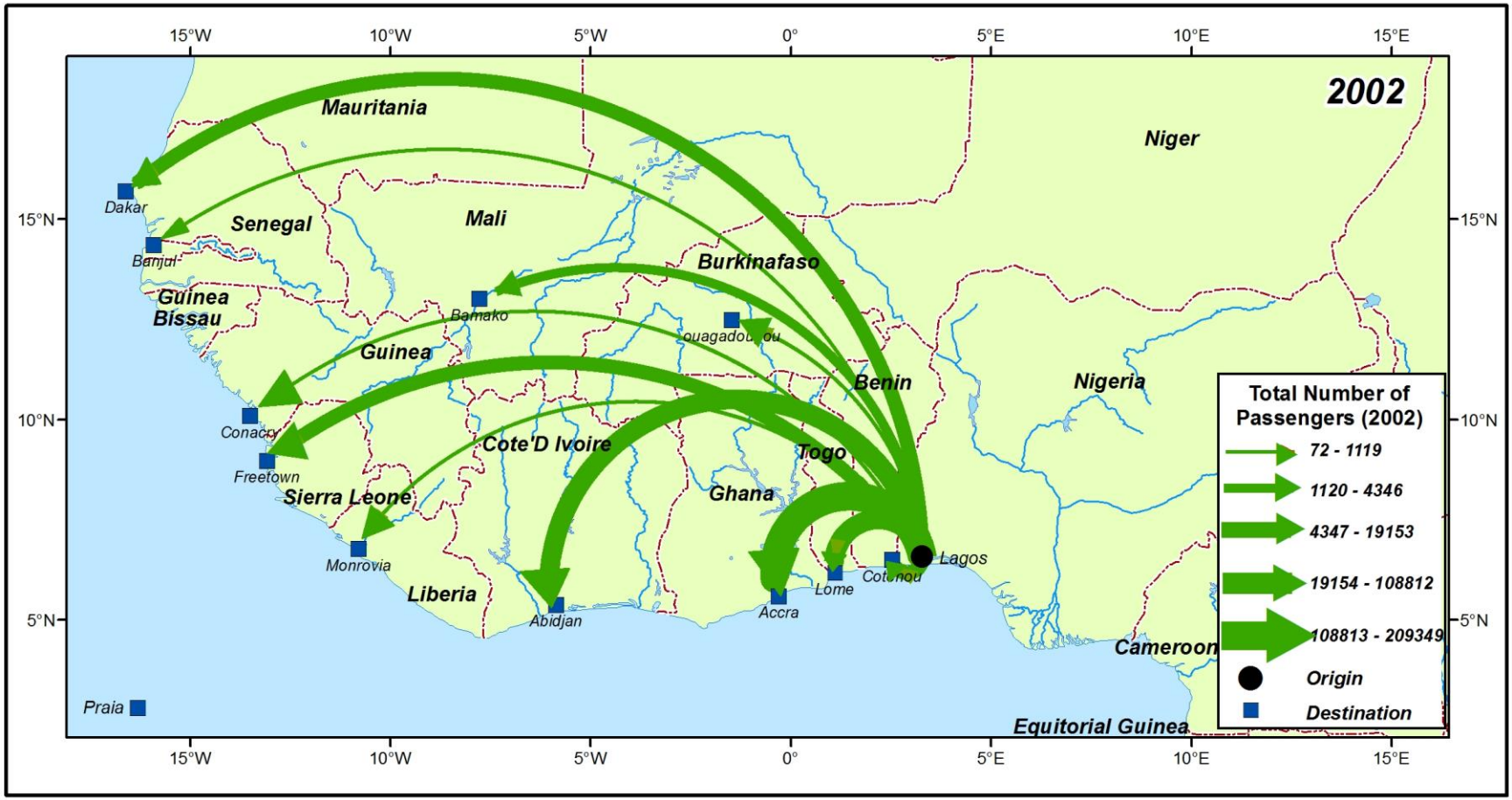

Fig. 4.13: Spatial Pattern of Passenger Flow from Lagos, 2002
Source: Author's Analysis, 2015

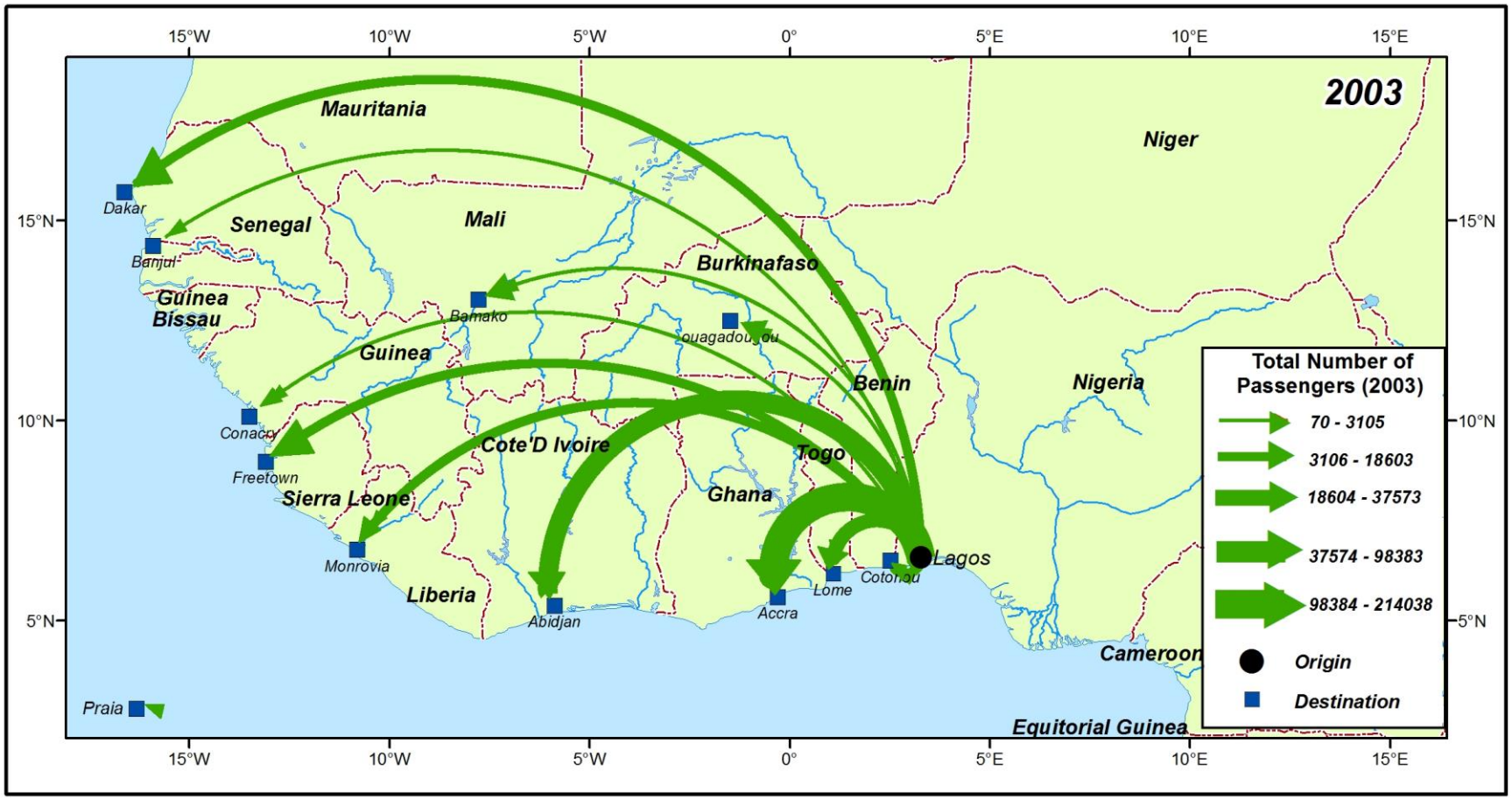

Fig. 4.14: Spatial Pattern of Passenger Flow from Lagos, 2003
Source: Author's Analysis, 2015

Table 4.9 Traffic between Lagos and other West African Countries 2001

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Lagos – Freetown	177	164	341	5.08	8179	8724	16903	3.48
Lagos – Monrovia	11	3	13	0.19	256	24	280	0.06
Lagos – Dakar	21	39	60	0.89	1876	2343	4219	0.87
Lagos –Accra	1303	1578	2881	42.94	86862	106639	193501	39.86
Lagos – Conakry	42	50	92	1.37	1919	1818	3737	0.77
Lagos – Bamako	23	57	80	1.19	657	2722	3379	0.69
Lagos – Banjul	5	0	5	0.07	195	0	195	0.040
Lagos – Cotonou	525	629	1154	17.20	31853	37009	68862	14.19
Lagos – Lome	390	431	821	12.24	39634	38627	78261	16.12
Lagos – Abidjan	667	592	1259	18.77	58195	57828	116023	23.90
Lagos – Ouagadougou	3	0	3	0.04	53	0	53	0.01
		Total	6709	100		Total	485413	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2001

Table 4.10 Traffic between Abuja and other West African Countries in 2001

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Abuja – Freetown	8	11	19	4.97	107	145	252	5.35
Abuja – Monrovia	4	3	7	1.83	55	70	125	2.66
Abuja – Dakar	11	7	18	4.71	167	113	280	5.95
Abuja –Accra	33	35	68	17.80	346	825	1171	24.86
Abuja – Conakry	2	1	3	0.79	13	10	23	0.49
Abuja – Bamako	32	32	64	16.75	333	444	777	16.51
Abuja – Banjul	2	1	3	0.79	53	12	65	1.38
Abuja – Lome	23	18	41	10.73	208	239	447	9.50
Abuja – Cotonou	28	21	49	12.83	326	172	498	10.58
Abuja Ouagadougou	20	21	41	10.73	200	192	392	8.33
Abuja – Abidjan	42	27	69	18.06	457	220	677	14.38
		Total	382	100		Total	4707	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2001

Table 4.9 and 4.10 show the figure for the aircraft and passenger flow were higher in Lagos than Abuja, because Abuja had just been inaugurated to carry traffic from Nigeria to other West African countries. The data from Abuja also suggests a socio-cultural affinity between passengers from Abuja and some northern West African countries.

4.5.2 City pair Aircraft and Passenger Flow from Lagos and Abuja 2002

This section presents the disaggregated city pair flow from Nigeria to other West African countries for 2002.It shows the scheduled air traffic flow from Nigeria to other West African countries. The influence of liberalisation on these flows is discussed.

Table 4.11 shows the traffic between Lagos and other West African countries. It reveals the data flow on the city pair, the flight frequency showing the arrival as well as the departure, the city pair share for the aircraft movement and the passenger movement for year 2002. For the aircraft flow, Lagos–Accra had (41.15%), for the passenger for the same city pair (47.05%).This is the highest for the whole year for city pair flow. This is followed by Lagos-Abidjan, aircraft (19.91%), passenger (24.45%) and, Lagos–Lome, aircraft (16.68%), passenger (16.77%). The city pairs with the lowest for the year are Lagos-Ouagadougou, aircraft (0.28%), passenger (0.02%), Lagos-Banjul, aircraft (0.06%), passenger (0.02%), and Lagos-Monrovia, aircraft (0.12%), passenger (0.09%).

Table 4.12 shows the analysis of the city pair traffic flow from Abuja to other countries in West African for the year 2002.The city pairs with the highest flow from Abuja are Abuja-Abidjan, aircraft (15.47%), passenger (9.33%), Abuja-Accra, aircraft (26.79%), passenger (48.42%) ,and Abuja-Cotonou, aircraft (14.33%), passenger (6.79%). The city pairs with lowest for the year are Abuja-Banjul, aircraft (1.13%), passenger (2.48%), Abuja-Conakry, aircraft (1.13%), passenger (1.18%) and Abuja-Monrovia, aircraft (1.89%), passenger (0.95%).

Table 4.11: Traffic between Lagos and other West African Countries 2002

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Lagos – Freetown	198	208	406	6.07	9772	9381	19153	4.30
Lagos – Monrovia	7	1	8	0.12	362	32	394	0.09
Lagos – Dakar	82	81	163	2.44	6259	6712	12971	2.92
Lagos –Accra	1220	1533	2753	41.15	90751	118598	209349	47.05
Lagos – Conakry	10	6	16	0.24	808	311	1119	0.25
Lagos – Bamako	17	48	65	0.97	927	3419	4346	0.98
Lagos – Banjul	0	4	4	0.06	0	97	97	0.02
Lagos – Cotonou	379	429	808	12.08	5581	8422	14003	3.15
Lagos – Lome	592	524	1116	16.68	39067	35571	74638	16.77
Lagos – Abidjan	735	597	1332	19.91	54052	54760	108812	24.45
Lagos – Ouagadougou	9	10	19	0.28	33	39	72	0.02
		Total	6690	100		Total	444954	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2002

Table 4.12: Traffic between Abuja and other West African Countries 2002

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Abuja – Freetown	6	9	15	5.66	54	104	158	0.95
Abuja – Monrovia	1	4	5	1.89	9	29	38	0.95
Abuja – Dakar	7	9	16	6.15	156	189	345	8.64
Abuja –Accra	31	40	71	26.79	375	1559	1934	48.42
Abuja – Conakry	2	1	3	1.13	32	15	47	1.18
Abuja – Bamako	11	13	24	9.06	223	130	353	8.84
Abuja – Banjul	2	1	3	1.13	48	51	99	2.48
Abuja – Cotonou	22	16	38	14.33	109	162	271	6.79
Abuja – Lome	13	16	29	10.94	105	120	225	5.63
Abuja – Abidjan	22	19	41	15.47	194	179	373	9.33
Abuja – Ouagadougou	11	9	20	7.55	72	79	151	3.78
		Total	265	100		Total	3994	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2002

Table 4.11 and Table 4.12 show the increase in aircraft and passenger movement as compared to 2001. The increase is noticeable in the following city pair: Lagos-Lome, Lagos–Cotonou, Lagos-Ouagadougou, Lagos–Freetown, Abuja-Accra and Abuja-Cotonou. However, there were some city pair with decreasing number of the flow of aircraft and passenger; the decline might be due to the effect of terrorist attack on World Trade Center building in the United States. This incident created a lull in global air transport patronage as many travellers exhibited some apathy towards air travels.

Figure 4.15 to Figure 4.17 show the spatial pattern of flight flow from Abuja to other West African countries from 2001 to 2003. During this period, the distribution of aircraft flow shows a high concentration of flight flow from Abuja to other West African countries from Abuja-Accra, Abuja-Abidjan, Abuja- Cotonou, Abuja-Bamako and Abuja-Lome respectively. Whereas, the distribution of flight flows from Abuja-Banjul, Abuja-Conakry, and Abuja-Monrovia are quite low. The distribution reveals that some city pair decreased in flight flow in year 2002, when compared, with the preceding year. These are Abuja-Abidjan (41) and Abuja-Cotonou (38), however, Abuja-Accra (71) witnessed some increase in 2002. In 2003, the flight traffic in both Abuja-Accra and Abuja-Abidjan increased slightly.

The spatial pattern of passenger flow from Abuja to other West African countries from 2001 to 2003 is shown below. Figure 4.18 to Figure 4.20 show an increase in the passenger flow pattern from Abuja to Accra, for the period. The total volume increased from 1171 in 2001, 1934 in 2002 to 2445 in 2003. However, some city pair, like Abuja-Bamako and Abuja-Ouagadougou decrease in the total volume of flow for the period. Also, a decrease in the flow from Abuja-Monrovia was noticed from 2001 to 2003.The flow from Abuja to Monrovia decreases from 252 in 2001 to 38 in 2002 and 40 in 2003. All in all, the flow pattern for the passenger and the flight shows an appreciable increase on some city pair for both passenger and flight and slight decrease on some city pair for both passenger and flight flow for the period of 2001 to 2003.

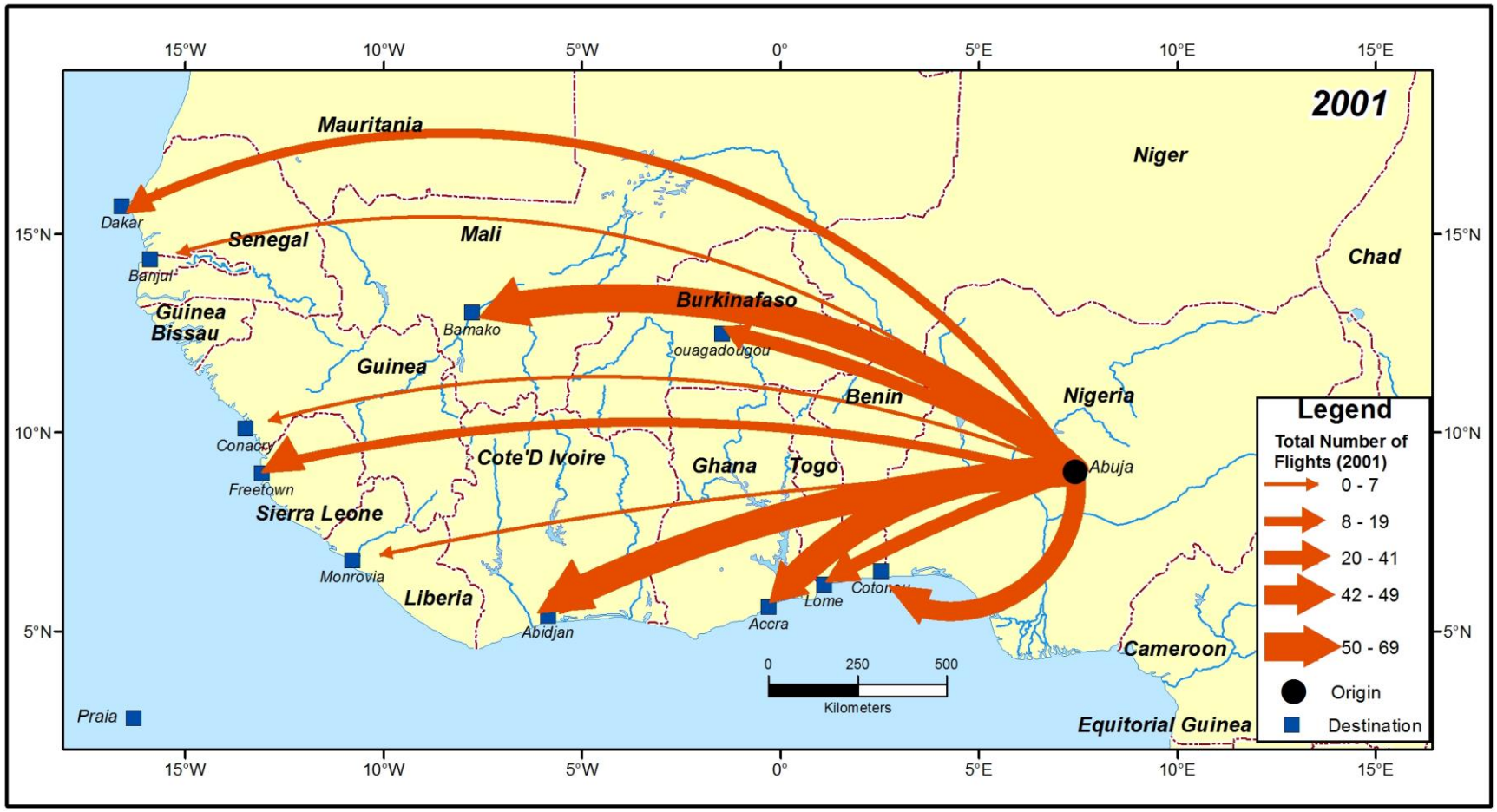

Fig. 4.15: Spatial Pattern of Flight Flow from Abuja, 2001.
Source: Author's Analysis, 2015

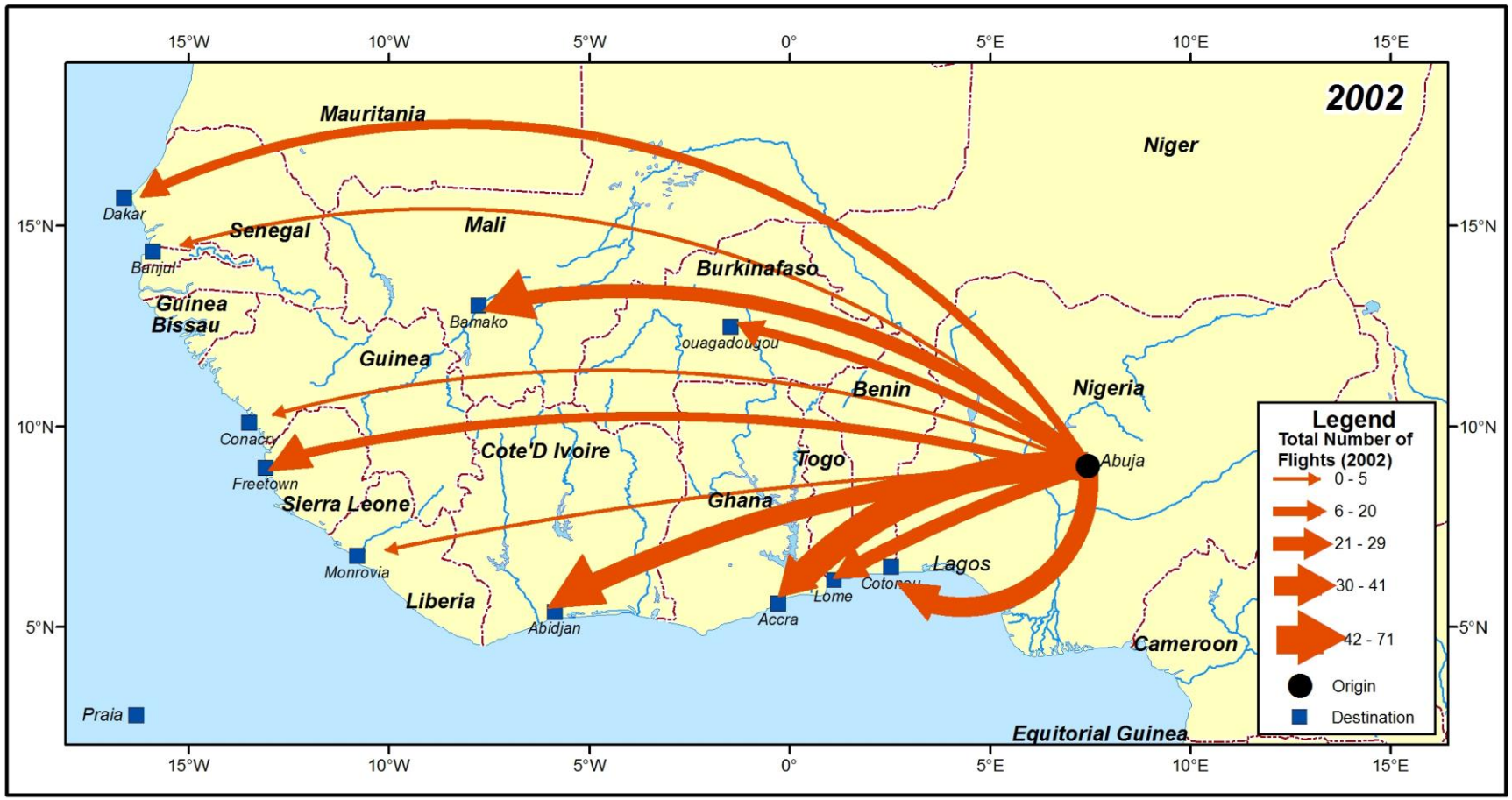

Fig. 4.16: Spatial Pattern of Flight Flow from Abuja, 2002.
Source: Author's Analysis, 2015

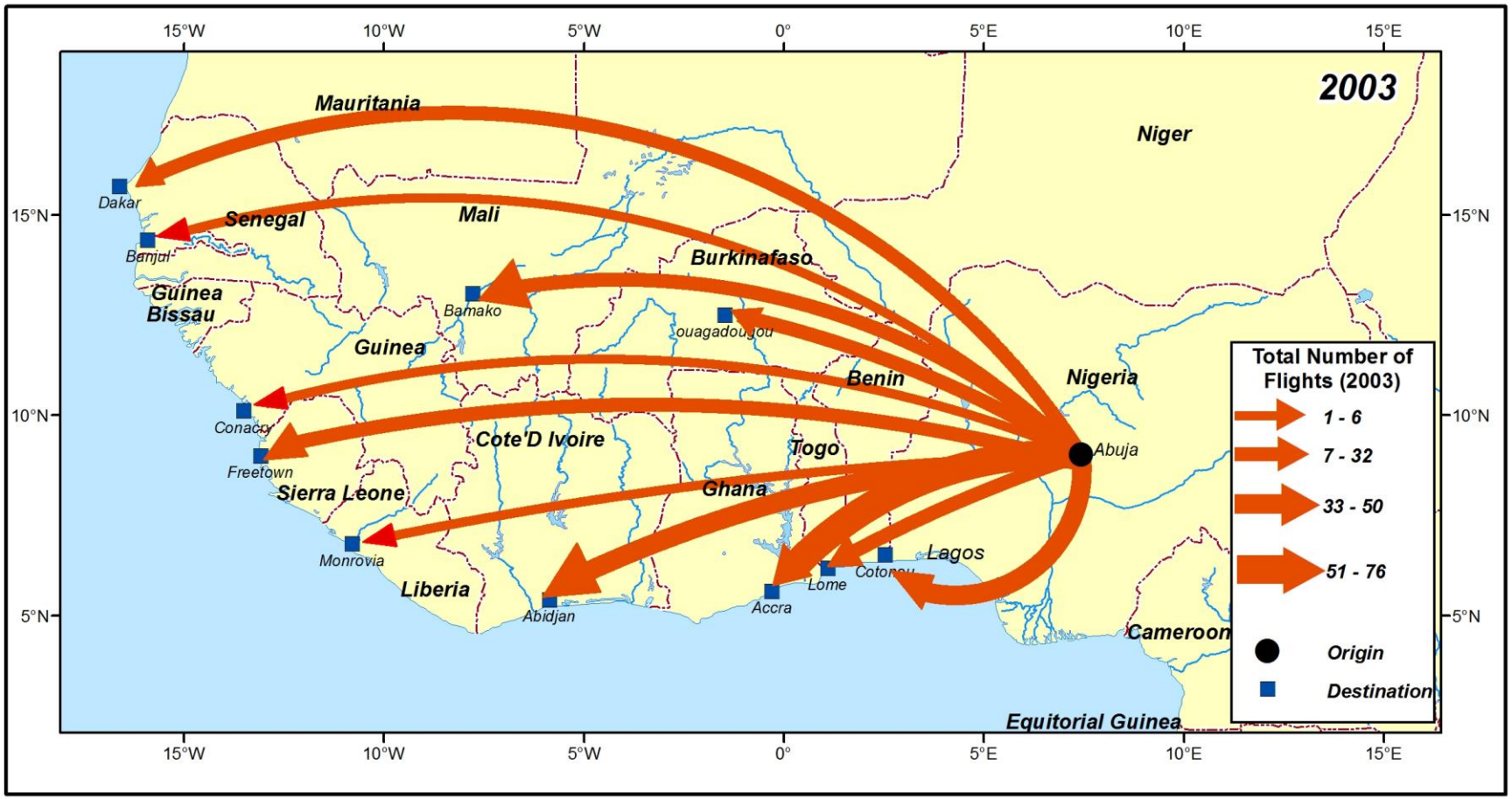

Fig. 4.17: Spatial Pattern of Flight Flow from Abuja, 2003.
Source: Author's Analysis, 2015

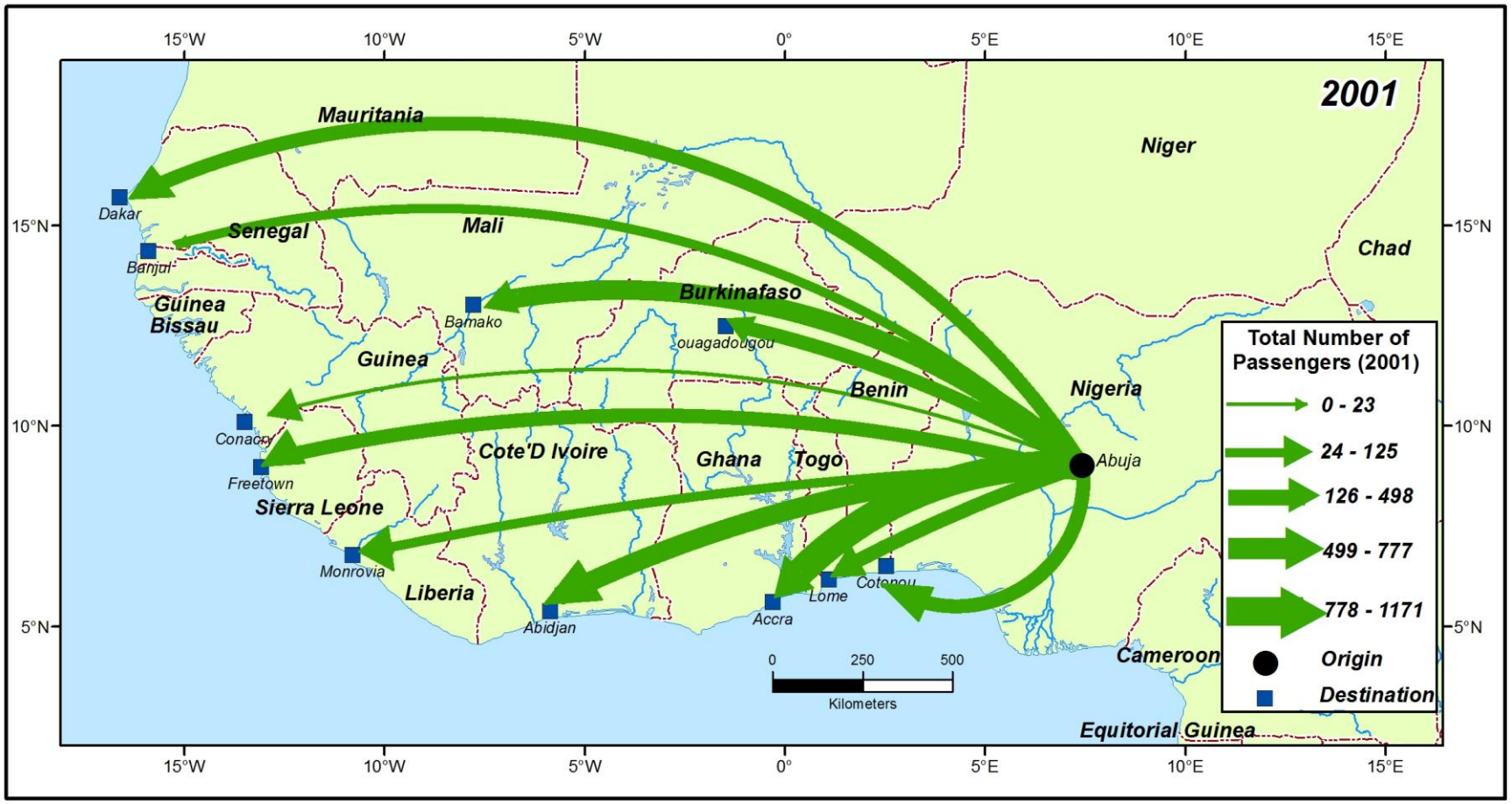

Fig. 4.18: Spatial Pattern of Passenger Flow from Abuja, 2001.
Source: Author's Analysis, 2015

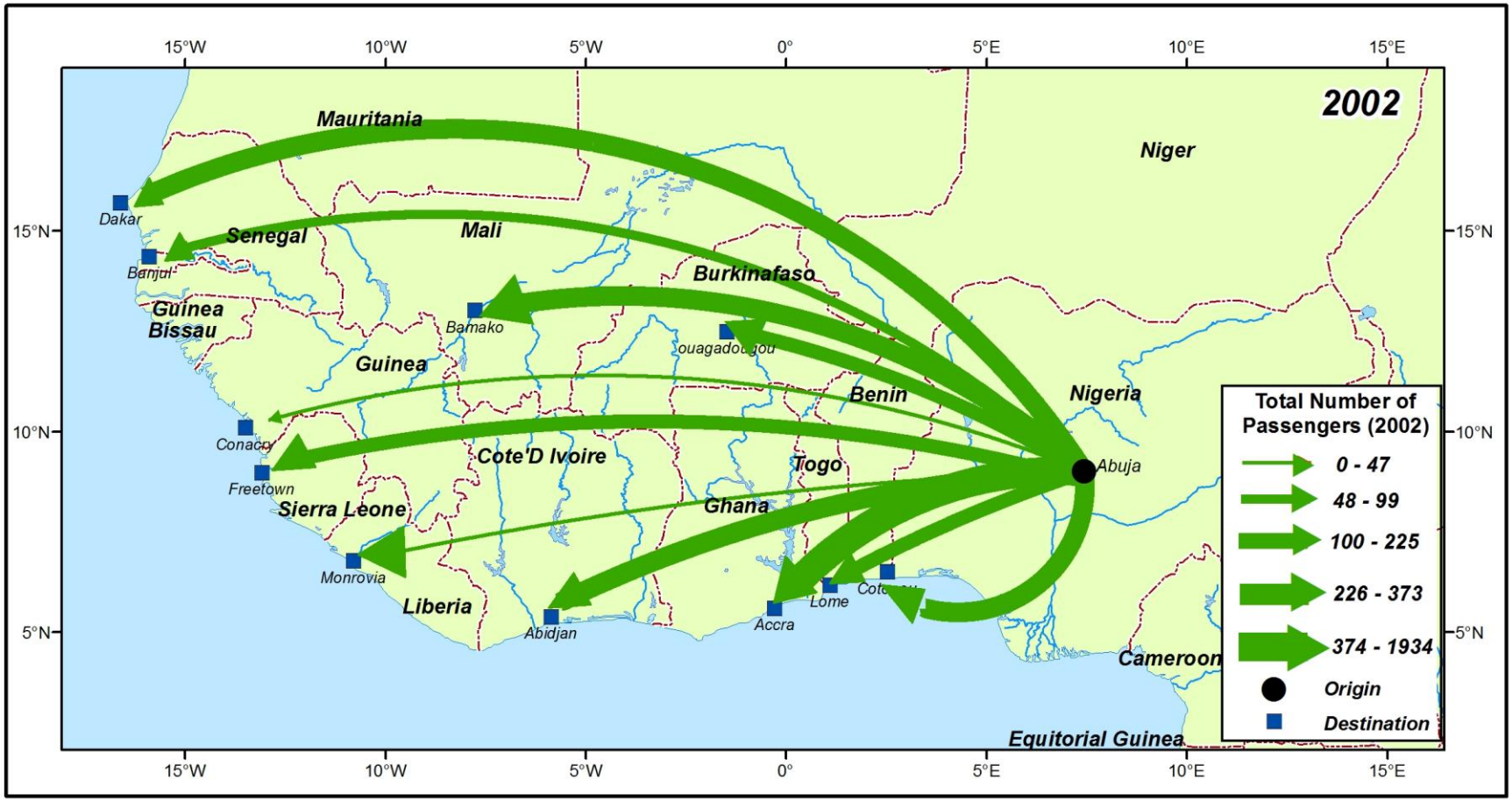

Fig. 4.19: Spatial Pattern of Passenger Flow from Abuja, 2002.
Source: Author's Analysis, 2015

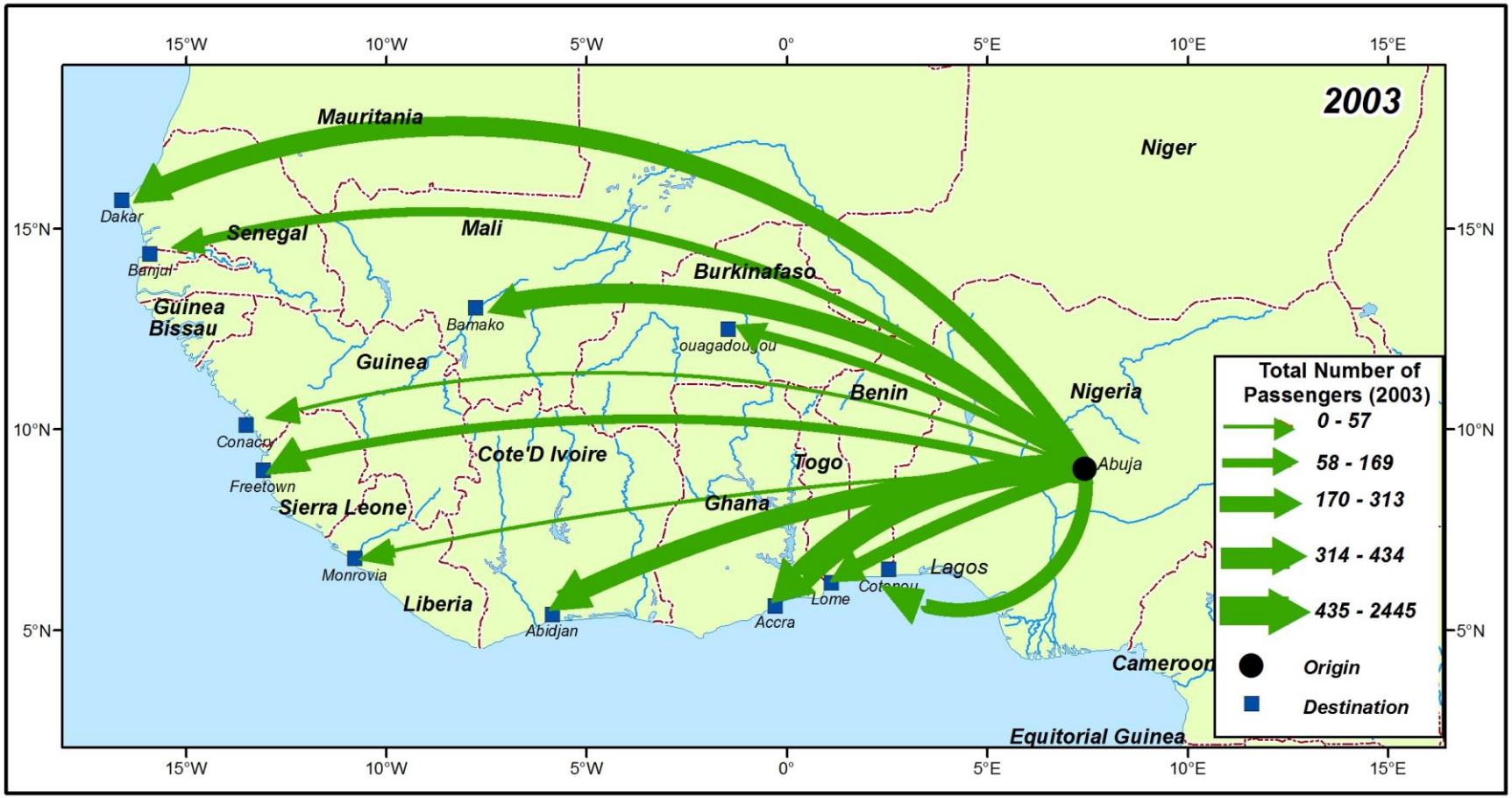

Fig. 4.20: Spatial Pattern of Passenger Flow from Abuja, 2003.
Source: Author's Analysis, 2015

4.5.3 City pair Aircraft and Passenger flow from Lagos and Abuja 2003 and 2004

This section presents the city pair aircraft and passenger flow from Lagos and Abuja to other West African countries for 2003 and 2004. It discusses the city pair distribution of flow from Lagos and Abuja respectively. It examines the impact of liberalisation on these flows.

Table 4.13 shows the traffic between Lagos and other West African countries. It depicts data on the city pair, the flight frequency showing the arrival as well as the departure, the city pair share for the aircraft movement and the passenger movement for the year 2003. For the aircraft flow, Lagos –Accra (42.70%), for the passenger for the same city pair (52.84%).This is the highest for the whole year for city pair flow. This is followed by Lagos-Abidjan, aircraft, (20.36%), passenger (24.29%) and, Lagos–Lome, aircraft, (13.12%), passenger(9.28%).The city pairs with the lowest for the year are Lagos-Ouagadougou, aircraft (0.22%), passenger (0.02%), Lagos-Banjul, aircraft(0.09%), passenger (0.03%), and Lagos-Conakry, aircraft (0.09%), passenger (0.10%).

Table 4.14 shows the analysis of The city pairs traffic flows from Abuja to other countries in West African for the year 2003.The city pair with the highest flow from Abuja are Abuja-Abidjan, aircraft (16.84%), passenger (9.19%), Abuja-Accra, aircraft (25.59%), passenger(51.77%) ,and Abuja-Cotonou, aircraft (14.48%),passenger (6.63%). And the city pairs with lowest for the year are Abuja-Banjul, aircraft (1.68%), passenger (2.12%), Abuja-Conakry, aircraft (1.35%), passenger (1.21%) and Abuja-Monrovia, aircraft (2.02%),passenger (0.85%).

Table 4.13: Traffic between Lagos and other West African Countries 2003

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Lagos – Freetown	196	205	401	5.97	8863	9740	18603	4.59
Lagos – Monrovia	97	110	207	3.08	4092	5214	9306	2.30
Lagos – Dakar	63	84	147	2.19	3396	7306	10702	2.64
Lagos – Conakry	3	3	6	0.09	195	191	386	0.10
Lagos – Bamako	3	38	41	0.61	220	2885	3105	0.77
Lagos – Banjul	1	5	6	0.09	2	110	112	0.03
Lagos – Cotonou	406	370	776	11.55	7203	5563	12766	3.15
Lagos – Lome	485	396	881	13.12	23051	14522	37573	9.28
Lagos – Abidjan	702	666	1368	20.36	54358	44025	98383	24.29
Lagos – Ouagadougou	6	9	15	0.22	28	42	70	0.02
Lagos – Accra	1198	1670	2868	42.70	88548	125490	214038	52.84
		Total	6716	100		Total	405044	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2003

Table 4.14: Traffic between Abuja and other West African Countries2003

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Abuja – Freetown	7	8	15	5.05	59	110	169	3.58
Abuja – Monrovia	2	4	6	2.02	12	28	40	0.85
Abuja – Dakar	9	8	17	5.72	177	191	368	7.79
Abuja – Conakry	2	2	4	1.35	40	17	57	1.21
Abuja – Accra	35	41	76	25.59	525	1920	2445	51.77
Abuja – Banjul	3	2	5	1.68	47	53	100	2.12
Abuja – Bamako	13	13	26	8.75	260	140	400	8.47
Abuja – Cotonou	25	18	43	14.48	125	188	313	6.63
Abuja – Lome	15	17	32	10.77	109	132	241	5.10
Abuja – Abidjan	25	25	50	16.84	201	233	434	9.19
Abuja – Ouagadougou	13	10	23	7.74	74	82	156	3.30
		Total	297	100		Total	4723	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2003

Table 4.13 and 4.14 show there is a variation in the city pair share percentage as compared with the aircraft city pair percentage and passenger city pair percentage share. The aircraft city pair percentage may either directly or inversely corresponds to the passenger city pair share percentage. That is, the increase or decrease passenger flow does not automatically translate to same corresponding increase or decrease in the passenger flow. Compared with the previous year 2002, the Lagos-Accra, Lagos-Dakar, Lagos-Monrovia, Lagos-Conakry, Lagos-Banjul, Abuja-Accra, Abuja-Abidjan and Abuja-Lome were higher than the year 2002.Though the total flow for the aircraft and the passenger for this period would have been more if not for the numerous challenges affecting the Nigeria airways which were the dominant airline on this route. Consequently, the airline became defunct in the year 2003.

4.5.4 City pair Aircraft and Passenger flow from Lagos and Abuja 2004

The city pairs aircraft and passenger flow from Lagos and Abuja to other West African countries for the year 2004 are examined. It considers the effects of liberalisation on the flow of both aircraft and passenger from Nigerian cities to other West African countries.

Table 4.15 shows the traffic between Lagos and other West African countries, the table portrayed data on the city pair, the flight frequency showing the arrival as well as the departure and the city pair share for the aircraft movement and the passenger movement for the year 2004. For the aircraft flow, Lagos-Accra (48.20%), for the passenger for the same city pair (60.35%). This is the highest for the whole year for city pair flow. This is followed by Lagos-Abidjan, aircraft (20.73%), passenger (23.58%) and Lagos–Lome, aircraft (7.84%), passenger (4.76%).The city pairs with the lowest for the year are Lagos-Ouagadougou, aircraft (0.22%), passenger (0.03%), Lagos-Banjul, aircraft (0.17%), passenger (0.09%), and Lagos-Conakry, aircraft (0.24%), passenger (0.13%).

Table 4.16 shows the analysis of the city pair traffic flows from Abuja to other West African countries for the year 2004.The city pairs with the highest flow from Abuja are Abuja-Accra, aircraft (26.54%), passenger (38.16%), Abuja-Abidjan, aircraft (20.91%), passenger (4.02%), and Abuja-Cotonou , aircraft (6.97%), passenger (6.60%). The city pair with lowest for the year are Abuja-Banjul, aircraft (2.41%), passenger (0.20%), Abuja-Conakry, aircraft (1.07%), passenger (1.58%) and Abuja-Monrovia, aircraft (6.17%), passenger (7.26%).

Table 4.15: Traffic between Lagos and other West African Countries 2004

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Lagos – Freetown	213	230	443	6.37	12235	10696	22931	5.46
Lagos – Monrovia	54	31	85	1.22	1631	3161	4792	1.14
Lagos – Dakar	30	35	65	0.93	1519	1497	3016	0.72
Lagos – Accra	1597	1755	3352	48.20	107426	146176	253602	60.35
Lagos – Conakry	8	9	17	0.24	240	289	529	0.13
Lagos – Bamako	69	75	144	2.07	2529	5615	8144	1.94
Lagos – Banjul	7	5	12	0.17	183	186	369	0.09
Lagos – Cotonou	413	416	829	11.92	4183	3385	7568	1.80
Lagos – Lome	312	233	545	7.84	10162	9849	20011	4.76
Lagos – Abidjan	730	712	1442	20.73	49127	49970	99097	23.58
Lagos – Ouagadougou	9	6	15	0.22	85	29	114	0.03
Lagos – Praia	4	2	6	0.09	16	12	28	0.01
		Total	6955	100		Total	420201	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2004

Table 4.16: Traffic between Abuja and other West African Countries 2004

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Abuja – Freetown	9	8	17	4.56	105	36	141	4.65
Abuja – Monrovia	11	12	23	6.17	46	174	220	7.26
Abuja – Dakar	9	7	16	4.29	166	103	269	8.87
Abuja – Conakry	3	1	4	1.07	19	29	48	1.58
Abuja – Accra	48	51	99	26.54	453	704	1157	38.16
Abuja – Banjul	1	8	9	2.41	1	5	6	0.20
Abuja – Bamako	11	13	24	6.43	106	77	183	6.03
Abuja – Cotonou	11	15	26	6.97	97	103	200	6.60
Abuja – Lome	16	16	32	8.58	168	120	288	9.50
Abuja – Abidjan	13	65	78	20.91	17	105	122	4.02
Abuja – Ouagadougou	18	21	39	10.46	154	205	359	11.84
Abuja – Praia	3	3	6	1.61	10	29	39	1.29
		Total	373	100		Total	3032	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2004

Table 4.15 and Table 4.16 show an increase in the aircraft and passenger movement as compared to 2003. Notably, there was a significant increase in the Lagos-Accra, Abuja-Accra, however, the Lagos-Monrovia, Lagos-Freetown, Abuja-Monrovia and Abuja-Freetown data from the previous years has not increased because of the civil war witnessed in those countries during the period.

4.5.5 City pair Aircraft and Passenger flow from Lagos and Abuja 2005 and 2006

The section examines the city pair aircraft and passenger flow from Lagos and Abuja to other West African countries for 2005 and 2006. It considers the impacts of the liberalisation policy on the flow of both aircraft and passenger from Nigerian cities to other West African countries.

Table 4.17 shows the traffic between Lagos and other West African states. It presents data on the city pair, the flight frequency showing the arrival as well as the departure and the city pair share for the aircraft movement and the passenger movement for the year 2005. For the aircraft flow, Lagos–Accra (69.14%), for the passenger for the same city pair (68.33%).This is the highest for the whole year for city pair flow. This is followed by Lagos-Abidjan, aircraft (13.45%), passenger (17.06%) and Lagos–Freetown, aircraft (8.48%), passenger (6.40%). The city pairs with the lowest for the year are Lagos-Ouagadougou, aircraft (0.22%), passenger (0.18%), Lagos-Banjul, aircraft (0.04%), passenger (0.004%), and Lagos-Conakry, aircraft (0.32%), passenger (0.40%).

Table 4.18 shows the analysis of the city pair traffic flows from Abuja to other West African countries for the year 2005.The city pairs with the highest flow from Abuja are Abuja-Accra, aircraft (20.84%), passenger (25.92%), Abuja-Abidjan, aircraft (12.88%), passenger (7.90%), and Abuja-Lome, aircraft (12.41%), passenger (10.04%). And the city pair with lowest for the year from Abuja are Abuja-Banjul, aircraft (0.94%), passenger (0.34%), Abuja-Conakry, aircraft (0.47%), passenger (0.69%) and Abuja-Praia, aircraft (1.41%), passenger (2.29%).

Figure 4.21 to Figure 4.23 show the spatial pattern of flight flow from Lagos to other West African countries from 2004 to 2006. During this period, the distribution of aircraft flow shows a high concentration of flight flow from Lagos to other West African countries from Lagos-Accra, Lagos-Abidjan, Lagos- Cotonou and Lagos-Lome respectively. Whereas, the distribution of flight flows from Lagos- Ouagadougou, Lagos-Conakry, and Lagos-Bamako are quite low. The distribution reveals that some city pair decreased in flight flow in year 2005 and 2006, when compared, with the year 2004. These are Lagos-Abidjan (1058) and Lagos-Cotonou (64), however, Lagos-Accra (5440) increased in year 2005 but decrease further in year 2006. In 2005 and 2006, the flight flow in Lagos-Cotonou, Lagos- Lome and Lagos-Abidjan decreased slightly.

The spatial pattern of passenger flow from Lagos to other West African countries from 2004 to 2006 is shown below. Figure 4.24 to Figure 4.26 show an increase in the passenger flow pattern from Lagos to Accra, during the period. The total volume increased from 253602 in 2004 to 338162 in 2005 and decline to 187560 in 2006. However, some city pair, like Lagos-Abidjan, Lagos-Lome and Lagos to Cotonou decreases in the total pattern of passenger flow for the period. Clearly, a sharp decrease in the flow from Lagos-Cotonou was noticed from 2004 to 2006.The flow from Lagos to Cotonou decreases from 7568 in 2004 to 5604 in 2005 and 2887 in 2006. Similar patterns were also noticeable in Lagos-Abidjan which decreases from 99097 in 2004 to 84435 in 2005 and 23453 in 2006. Generally, the flow pattern for the passenger and the flight shows an erratic patterns both passenger and flight from 2004 to 2006.

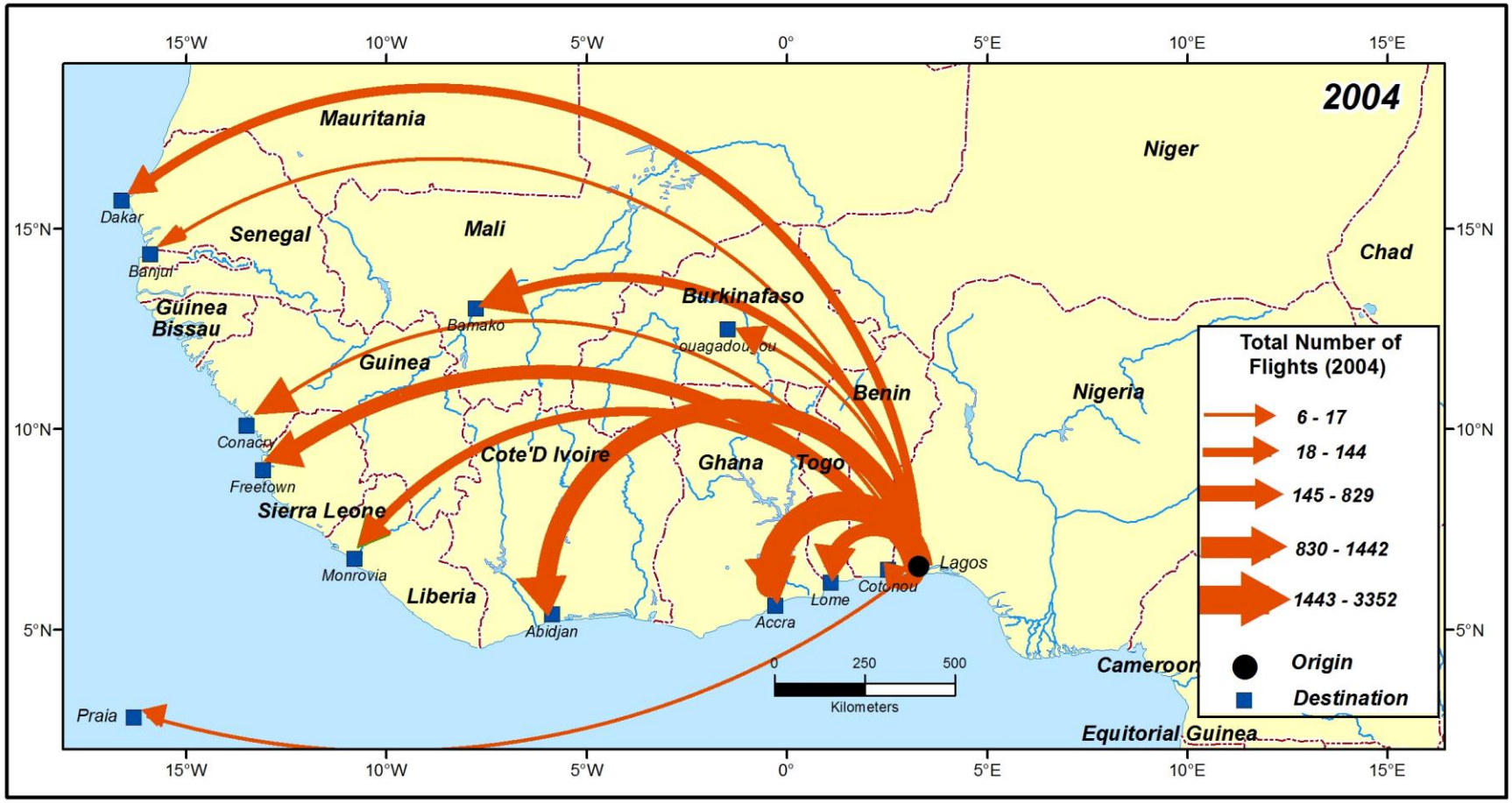

Fig. 4.21: Spatial Pattern of Flight Flow from Lagos, 2004.
Source: Author's Analysis, 2015

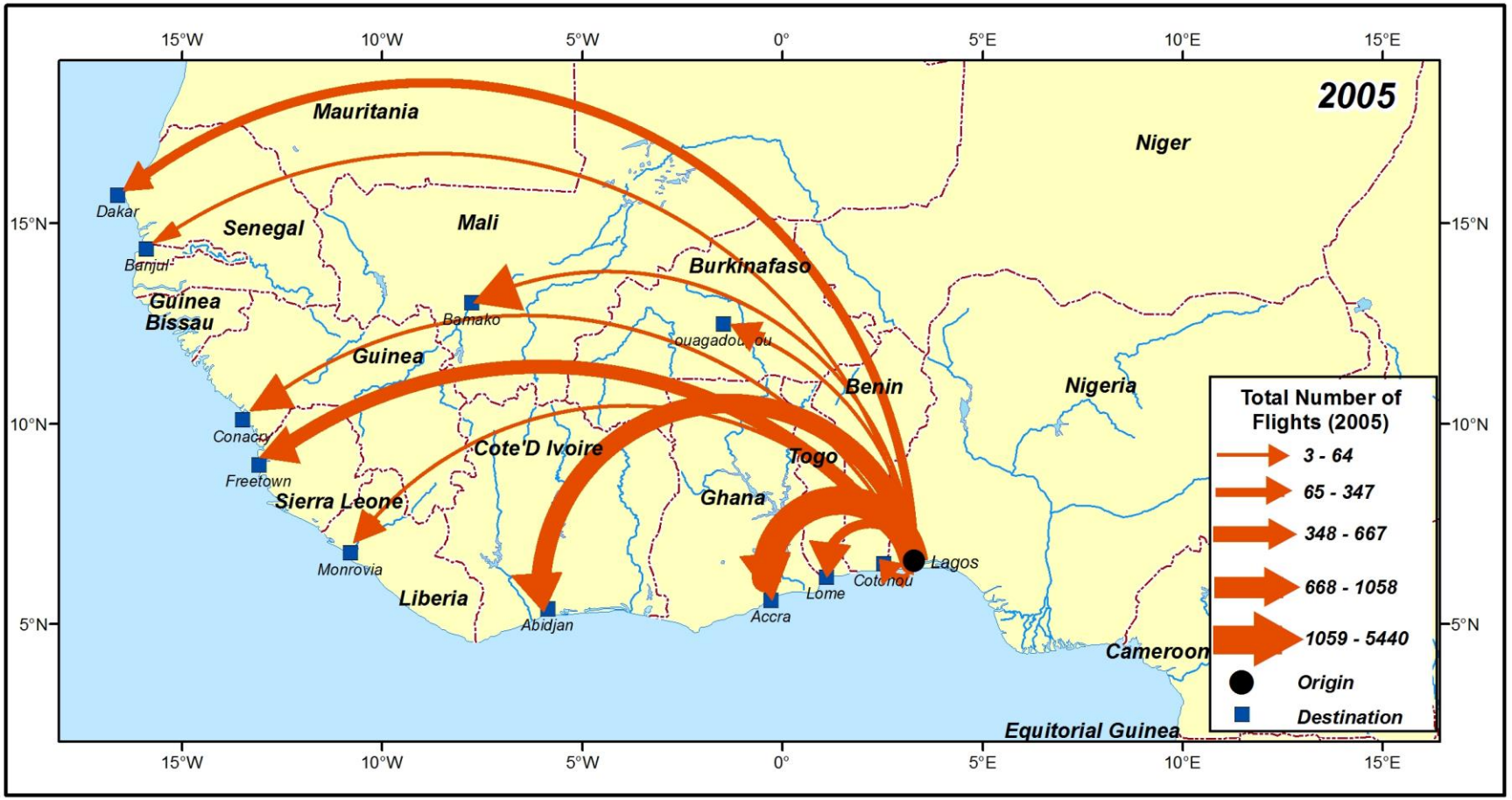

Fig. 4.22: Spatial Pattern of Flight Flow from Lagos, 2005.
Source: Author's Analysis, 2015

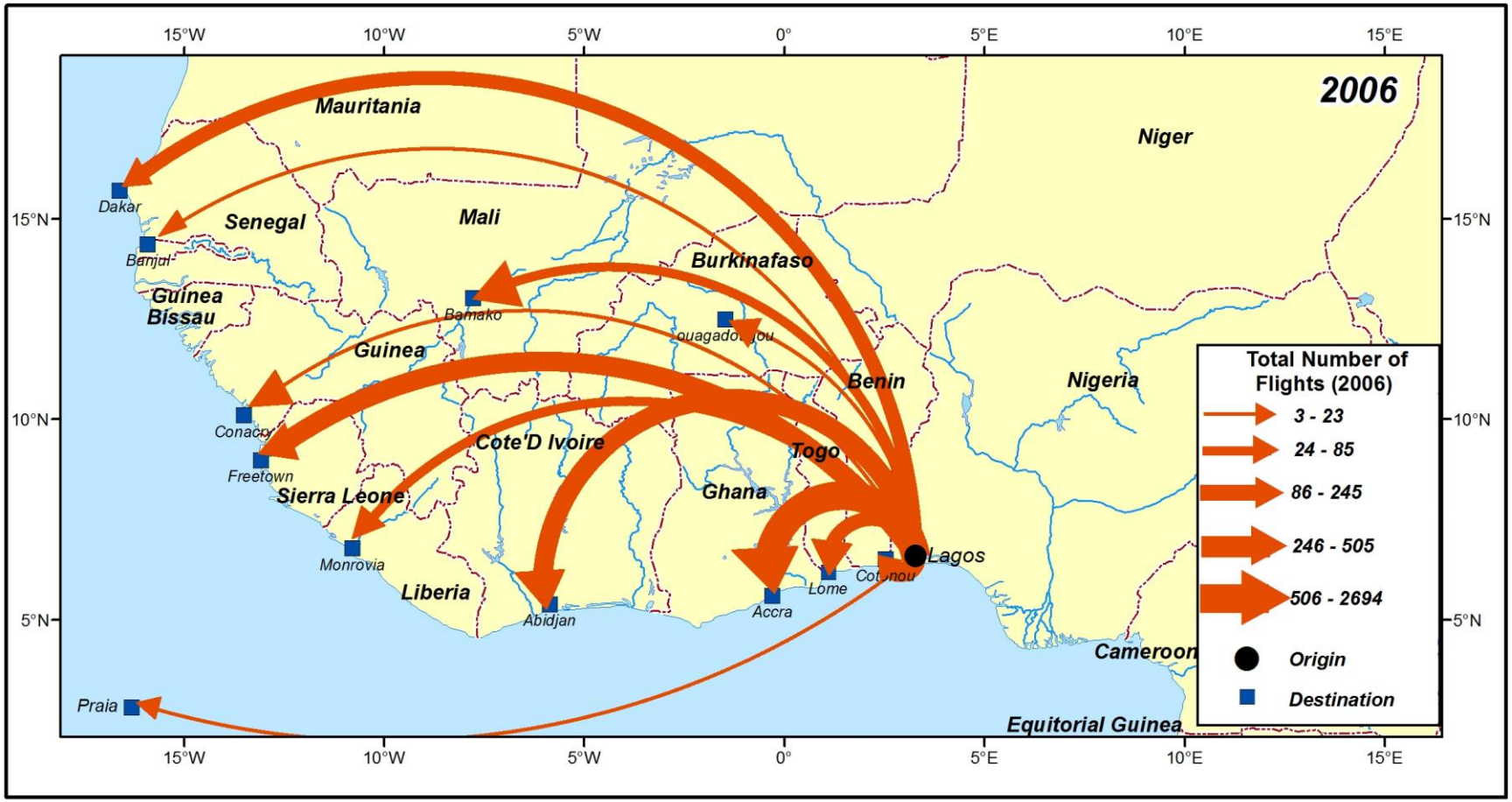

Fig. 4.23: Spatial Pattern of Flight Flow from Lagos, 2006.
Source: Author's Analysis, 2015

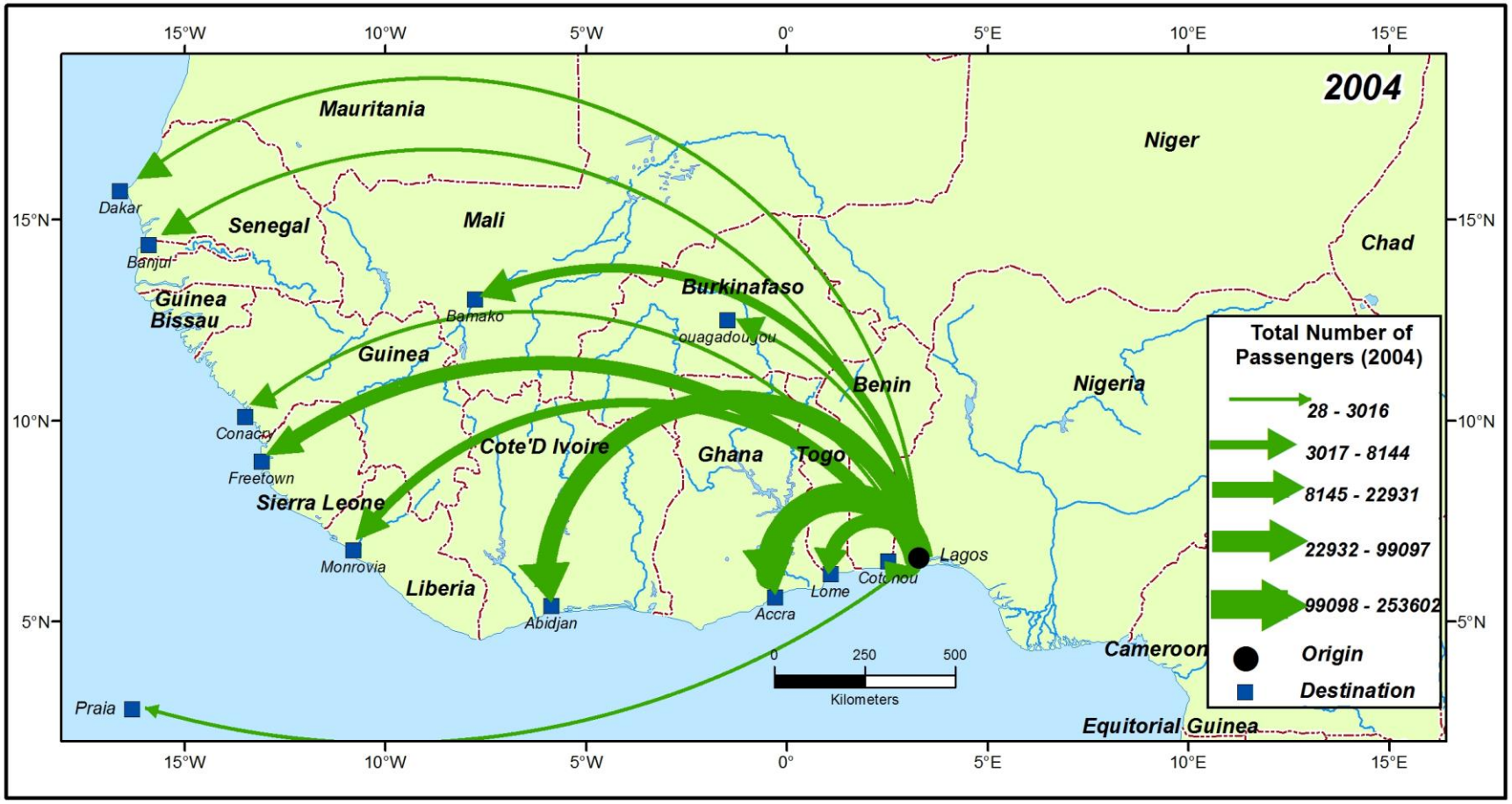

Fig. 4.24: Spatial Pattern of Passenger Flow from Lagos, 2004.
Source: Author's Analysis, 2015

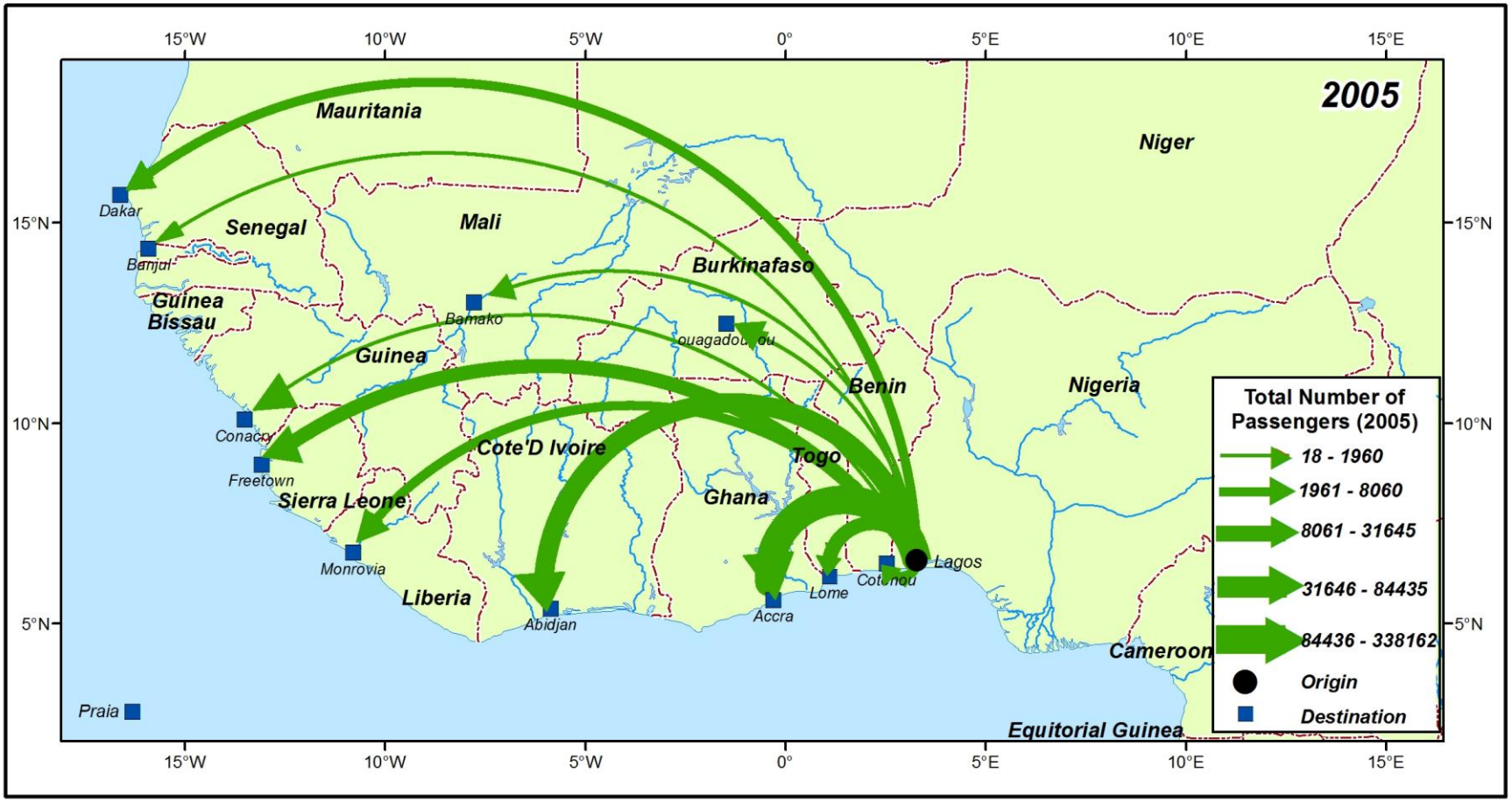

Fig. 4.25: Spatial Pattern of Passenger Flow from Lagos, 2005.
Source: Author's Analysis, 2015

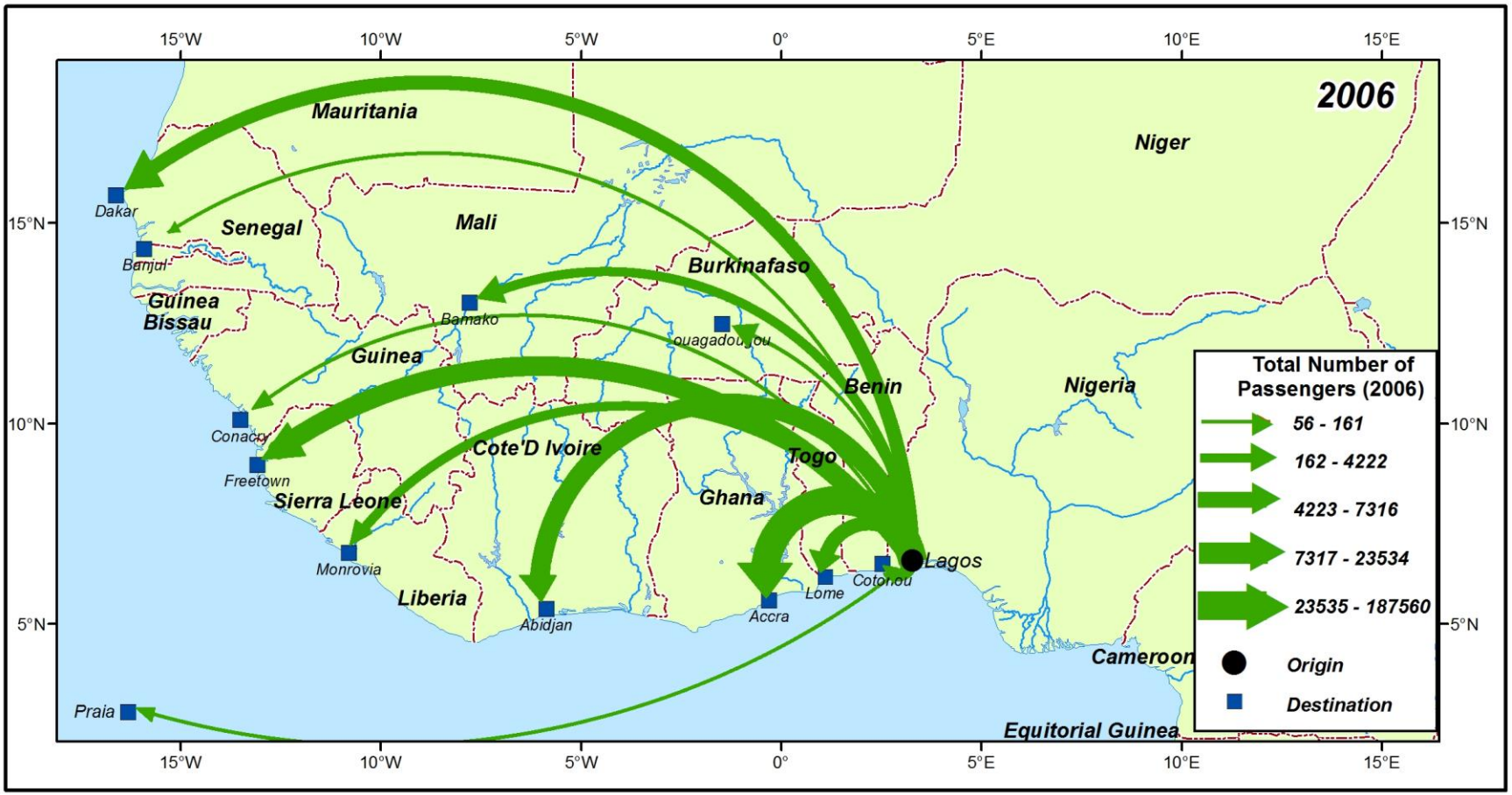

Fig. 4.26: Spatial Pattern of Passenger Flow from Lagos, 2006.
Source: Author's Analysis, 2015

Table 4.17: Traffic between Lagos and other West African Countries 2005

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Lagos – Freetown	369	298	667	8.48	16917	14728	31645	6.40
Lagos – Monrovia	17	45	62	0.79	805	3813	4618	0.93
Lagos – Dakar	5	165	170	2.16	341	7719	8060	1.63
Lagos – Accra	2588	2852	5440	69.14	146192	191970	338162	68.33
Lagos – Conakry	2	23	25	0.32	23	1937	1960	0.40
Lagos – Bamako	7	8	15	0.19	461	486	947	0.19
Lagos – Banjul	2	1	3	0.04	10	8	18	0.004
Lagos – Cotonou	28	36	64	0.81	2592	3012	5604	1.13
Lagos – Lome	178	169	347	4.41	10210	8383	18593	3.76
Lagos – Abidjan	525	533	1058	13.45	41770	42665	84435	17.06
Lagos – Ouagadougou	2	15	17	0.22	95	781	876	0.18
		Total	7868	100		Total	494918	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2005

Table 4.18: Traffic between Abuja and other West African Countries 2005

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Abuja – Freetown	8	11	19	4.45	47	78	125	2.35
Abuja – Monrovia	25	27	52	12.18	376	582	958	17.98
Abuja – Dakar	21	19	40	9.37	339	249	588	11.04
Abuja – Conakry	0	2	2	0.47	0	37	37	0.69
Abuja – Accra	40	49	89	20.84	742	639	1381	25.92
Abuja – Banjul	2	2	4	0.94	13	5	18	0.34
Abuja – Bamako	17	14	31	7.26	212	152	364	6.83
Abuja – Cotonou	15	13	28	6.56	189	141	330	6.19
Abuja – Lome	30	23	53	12.41	287	248	535	10.04
Abuja – Abidjan	28	27	55	12.88	191	230	421	7.90
Abuja – Ouagadougou	21	27	48	11.24	181	267	448	8.41
Abuja - Praia	2	4	6	1.41	56	66	122	2.29
		Total	427	100		Total	5327	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2005

Table 4.17 and Table 4.18 show there had been a decrease in the aircraft and passenger movement as compared to previous year. Part of the reason for this negative shift, there was a major incident of aircraft mishap in the Nigerian domestic market. This created a general apathy among the travellers, of which the regional route network from Nigeria was also affected greatly.

Figure 4.27 to Figure 4.29 show the spatial pattern of flight flow from Abuja to other West African countries from 2004 to 2006. During this period, the distribution of aircraft flow shows a high concentration of flight flow from Abuja to other West African countries from Abuja-Accra, Abuja-Abidjan, Abuja-Monrovia, Abuja-Dakar, Abuja-Ouagadougou and Abuja-Lome respectively. Whereas, the distribution of flight flows from Abuja-Praia, Abuja-Conakry, and Abuja-Banjul are quite low. The distribution reveals that some city pair decreased in flight flow in year 2005 and 2006, when compared, with the year 2004. These are Abuja-Accra (89) and Abuja-Abidjan (55), however, Abuja-Lome (53) increased in year 2005 but increase further in year 2006. In 2005 and 2006, the flight flow in Abuja-Monrovia, Abuja-Lome and Abuja-Cotonou increased slightly.

The spatial pattern of passenger flow from Abuja to other West African countries from 2004 to 2006 is shown below. Figure 4.30 to Figure 4.32 show an increase in the passenger flow pattern from Abuja to Monrovia, during the period. The total volume increased from 220 in 2004 to 958 in 2005 and increase to 2068 in 2006. Also, some city pair, like Abuja-Abidjan, Abuja-Lome and Abuja to Cotonou increases in the total pattern of passenger flow for the period. Clearly, a slight decrease in the flow from Abuja-Accra was noticed from 2005 to 2006.The flow from Abuja to Ouagadougou increases from 359 in 2004 to 448 in 2005 and 510 in 2006. The city pair passenger pattern for Abuja-Freetown declines from 141 in 2004 to 125 in 2005, and rose to 280 in 2006. Overall, the flow pattern for the passenger and the flight show erratic patterns for both passenger and flight from 2004 to 2006, but improves greatly from 2001 to 2003.

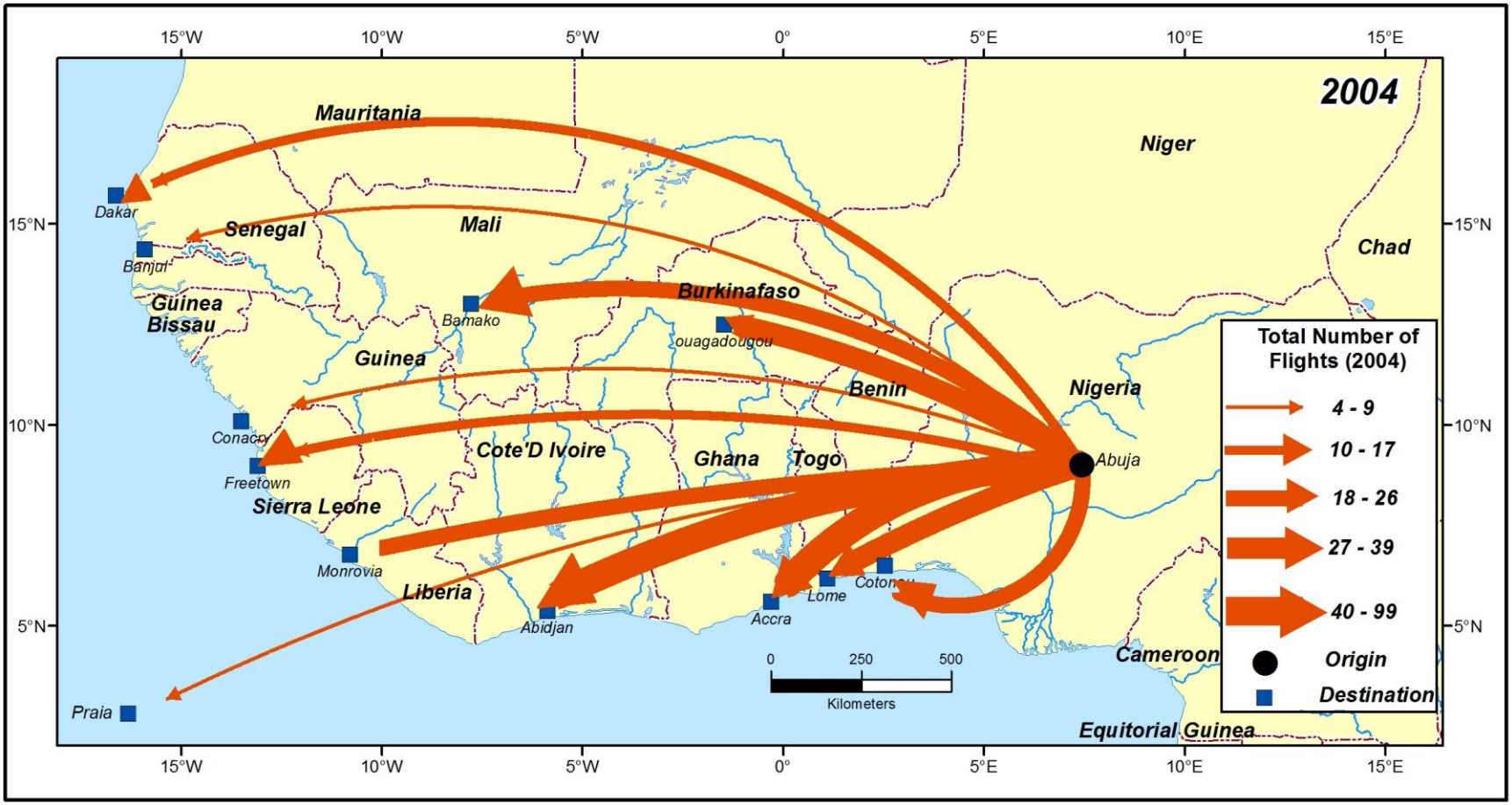

Fig.4.27: Spatial Pattern of Flight Flow from Abuja, 2004.
Source: Author'Analysis, 2015

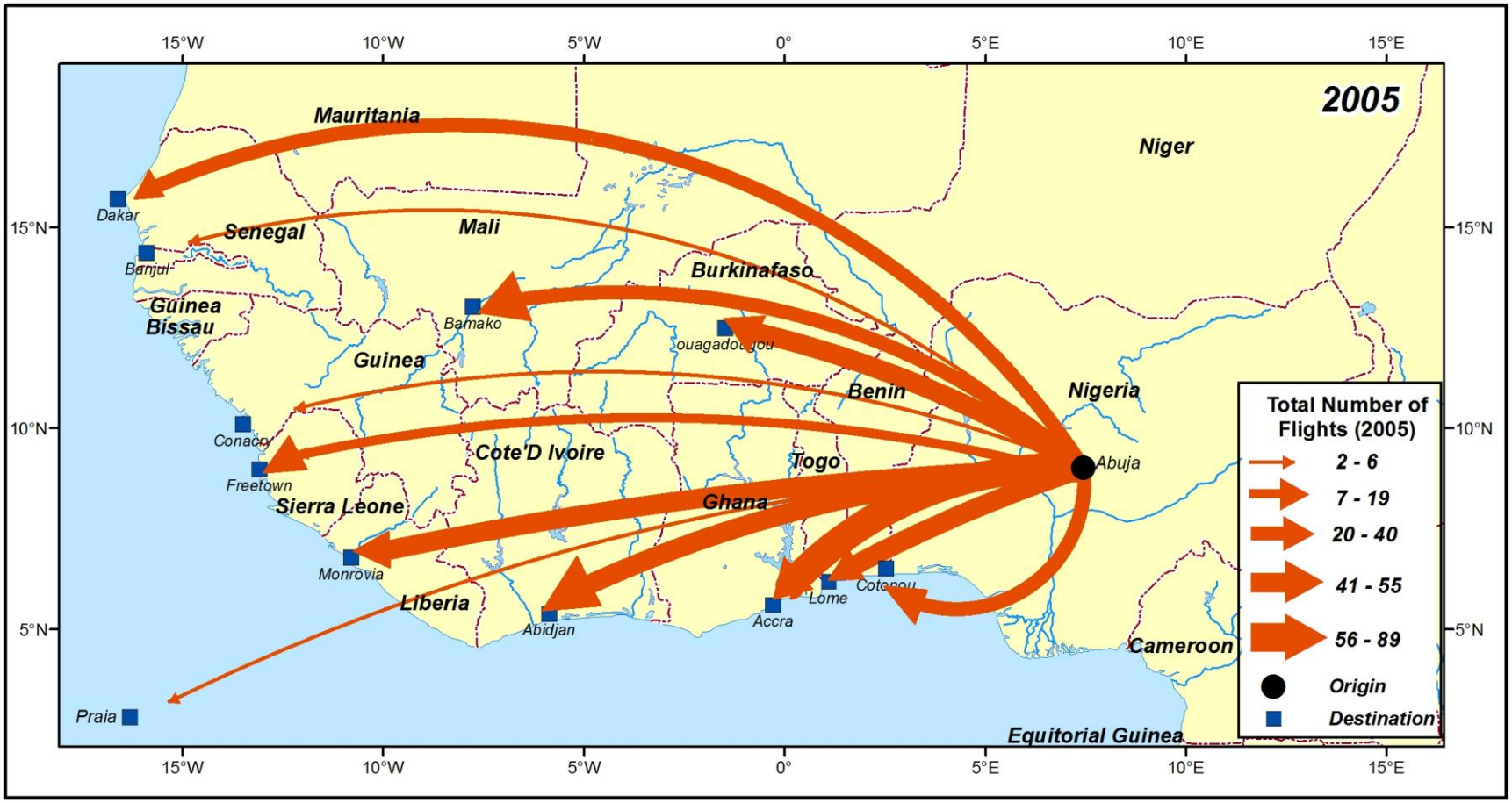

Fig.4.28: Spatial Pattern of Flight Flow from Abuja, 2005.
Source: Author'Analysis, 2015

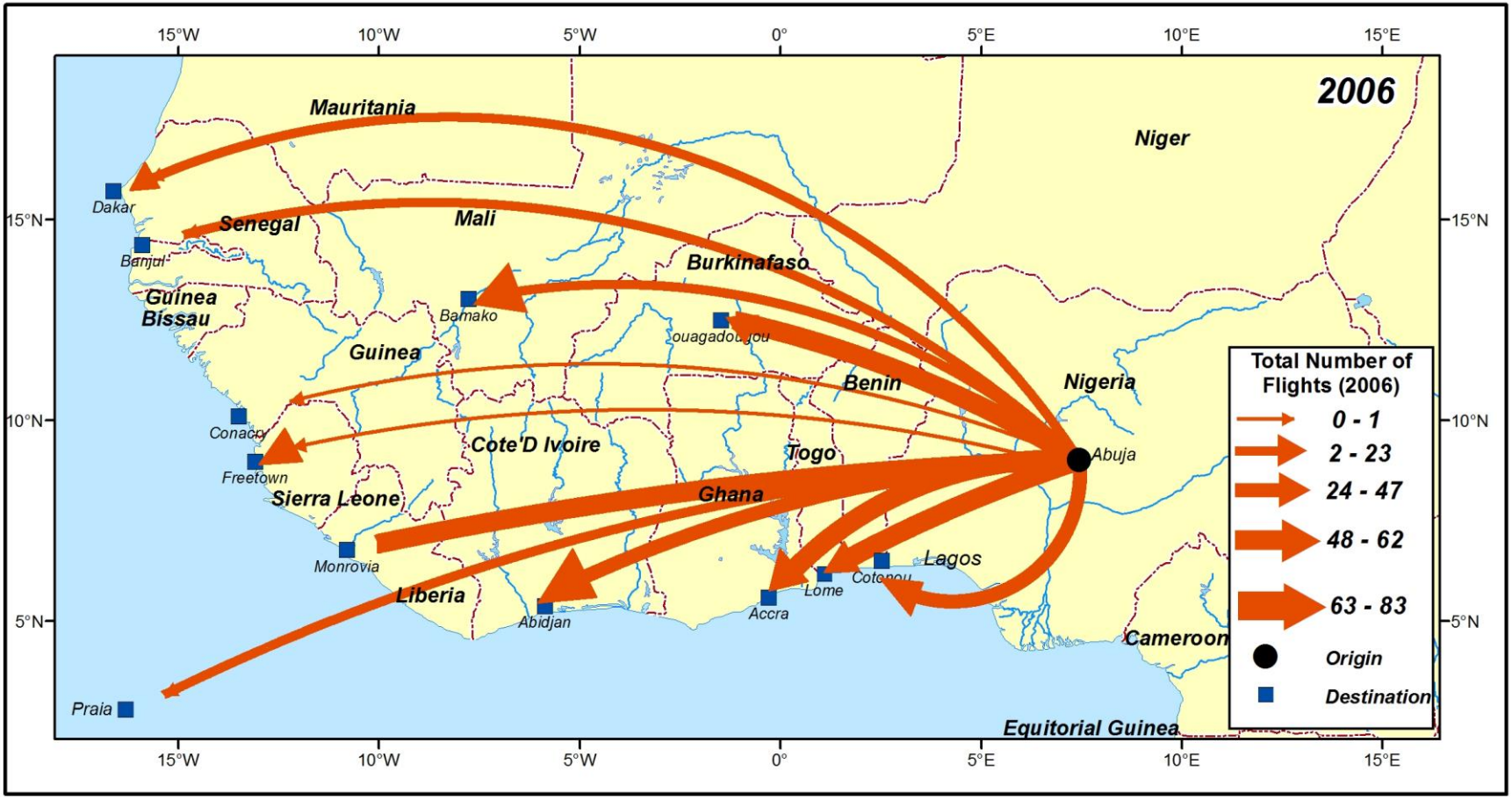

Fig.4.29: Spatial Pattern of Flight Flow from Abuja, 2006.
Source: Author'Analysis, 2015

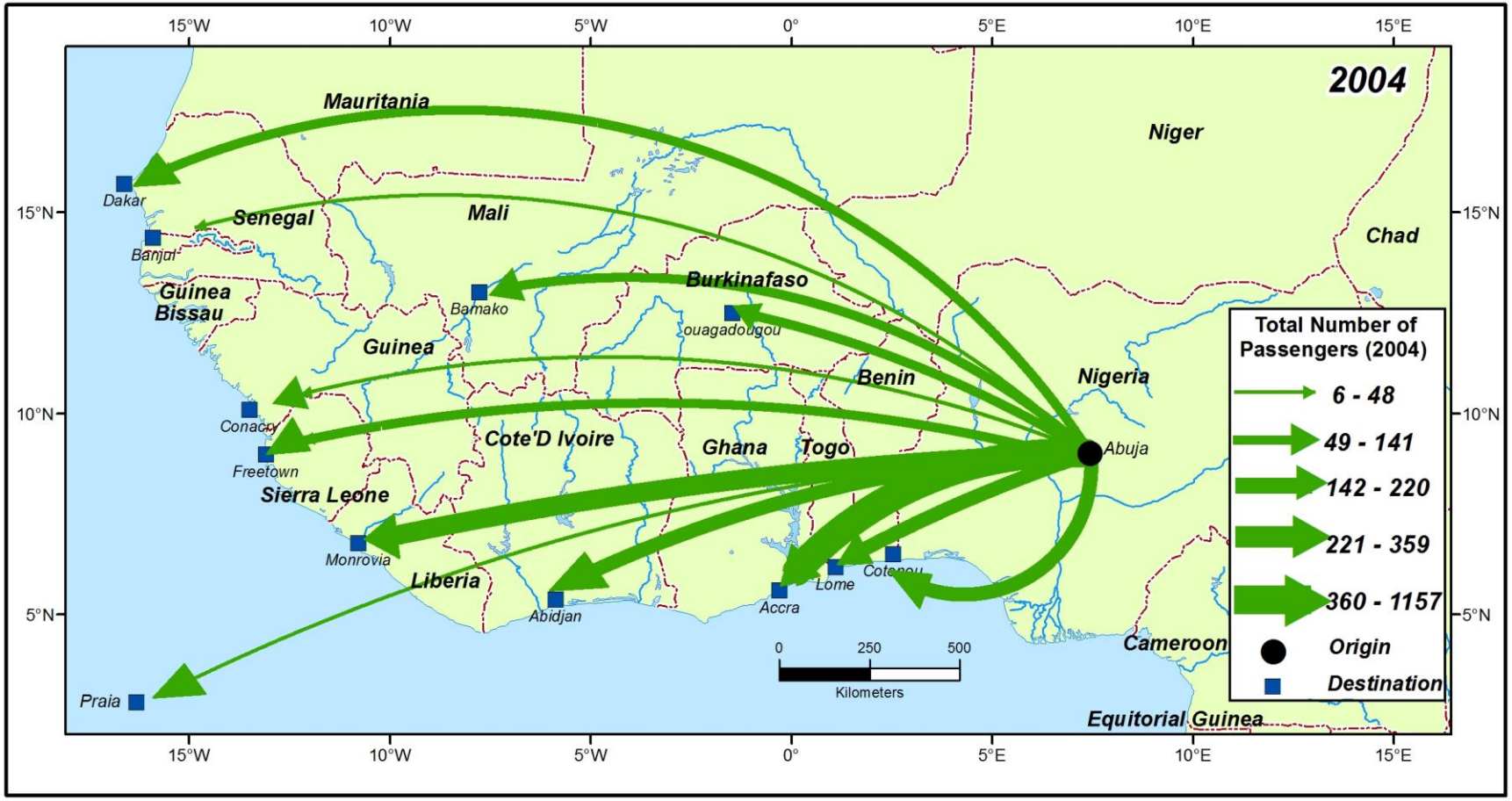

Fig.4.30: Spatial Pattern of Passenger Flow from Abuja, 2004.
Source: Author's Analysis, 2015

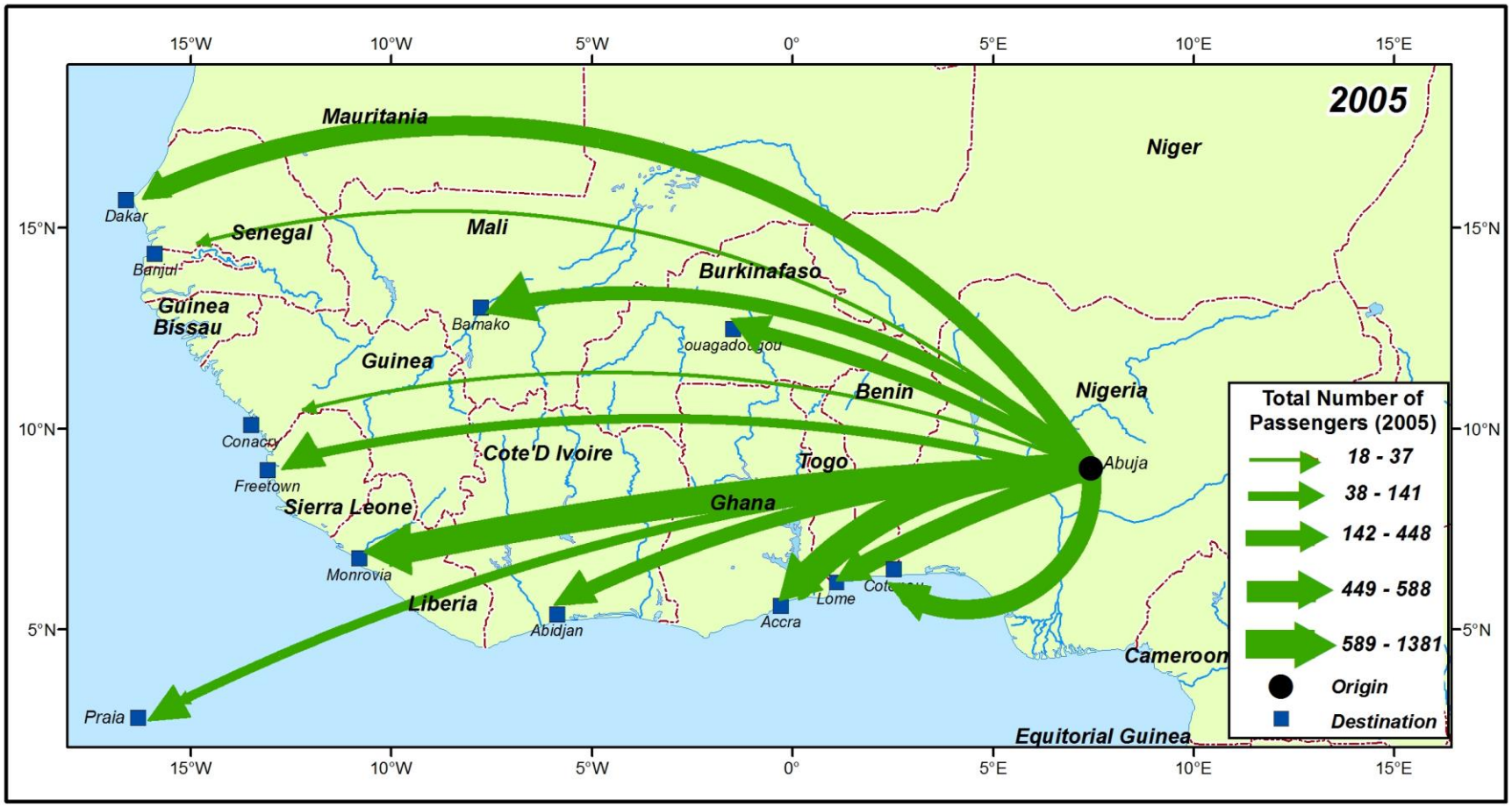

Fig.4.31: Spatial Pattern of Passenger Flow from Abuja, 2005.
Source: Author's Analysis, 2015

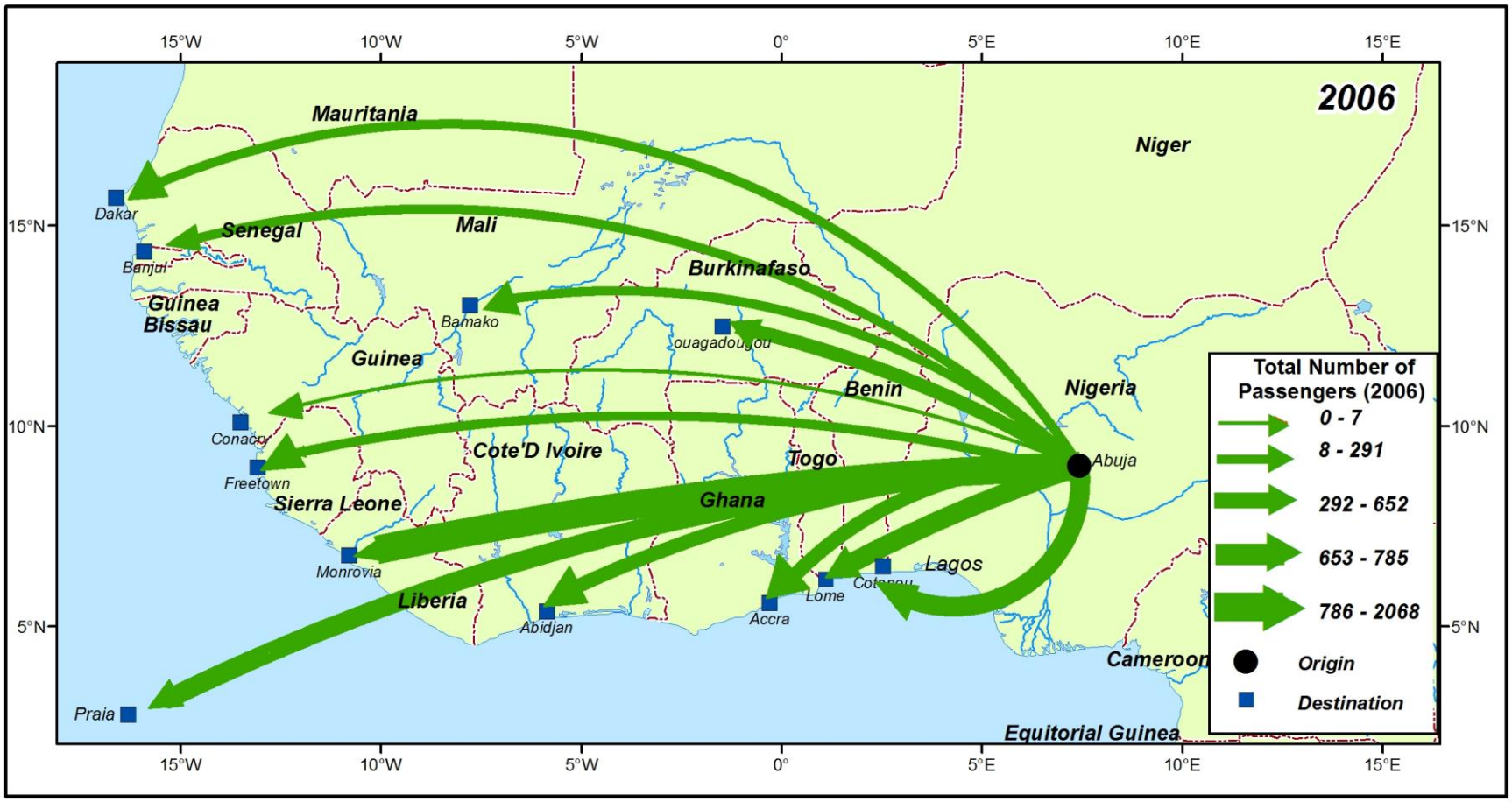

Fig.4.32: Spatial Pattern of Passenger Flow from Abuja, 2006.
Source: Author's Analysis, 2015

4.5.6 City pair Aircraft and Passenger flow from Lagos and Abuja 2006

This section considers the city pair aircraft and passenger flow from Lagos and Abuja to other West African countries. It shows the effects of liberalisation on the flow of both aircraft and passenger from Nigerian cities to other West African countries

Table 4.19 shows the traffic between Lagos and other West African countries, it shows data on the city pair, the flight frequency showing the arrival as well as the departure and the city pair share for the aircraft movement and the passenger movement for the year 2006. For the aircraft flow, Lagos –Accra (58.55%), for the passenger for the same city pair (72.64%). This is the highest for the whole year for city pair flow. This is followed by Lagos-Abidjan, aircraft (11.00%), passenger (9.08%) and Lagos–Freetown, aircraft (9.37%), passenger (9.12%).The city pairs with the lowest for the year are Lagos-Ouagadougou, aircraft (0.50%), passenger (0.06%), Lagos-Banjul, aircraft (0.09%), passenger (0.02%), and Lagos-Conakry, aircraft (0.07%), passenger (0.03%).

Table 4.20 shows the analysis of the city pair traffic flows from Abuja to other West African countries for the year 2006. The city pairs with the highest flow from Abuja are Abuja-Accra, aircraft (19.71%), passenger (8.97%), Abuja-Ouagadougou, aircraft (14.73%), passenger (7.02%), and Abuja-Monrovia, aircraft (14.49%), passenger (28.71%). And the city pair with lowest for the year from Abuja are Abuja-Conakry, aircraft (0.24%), passenger (0.10%), Abuja-Dakar, aircraft (3.09%), passenger (4.00%), and Abuja-Banjul, aircraft (4.04%), passenger(3.62%).

Table 4.19: Traffic between Lagos and other West African Countries 2006

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Lagos – Freetown	230	201	431	9.37	12720	10814	23534	9.12
Lagos – Monrovia	44	29	73	1.59	959	1912	2871	1.11
Lagos – Dakar	68	99	167	3.63	3776	3540	7316	2.83
Lagos – Accra	1242	1452	2694	58.55	84359	103201	187560	72.64
Lagos – Conakry	3	0	3	0.07	43	46	89	0.03
Lagos – Bamako	37	48	85	1.85	1573	2649	4222	1.64
Lagos – Banjul	2	2	4	0.09	47	9	56	0.02
Lagos – Cotonou	214	147	361	7.85	1233	1654	2887	1.12
Lagos – Lome	179	66	245	5.32	2771	3200	5971	2.31
Lagos – Abidjan	256	249	505	11.00	11453	12000	23453	9.08
Lagos – Ouagadougou	10	13	23	0.50	29	132	161	0.06
Lagos – Praia	4	6	10	0.22	29	40	69	0.03
		Total	4601	100		Total	258189	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2006

Table 4.20: Traffic between Abuja and other West African Countries 2006

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Abuja – Freetown	-	-	-	-	183	97	280	3.85
Abuja – Monrovia	30	31	61	14.49	869	1192	2068	28.71
Abuja – Dakar	6	7	13	3.09	109	182	291	4.00
Abuja – Conakry	1	0	1	0.24	7	0	7	0.10
Abuja – Accra	42	41	83	19.71	387	265	652	8.97
Abuja – Banjul	8	9	17	4.04	136	127	263	3.62
Abuja – Bamako	9	13	22	5.23	100	138	238	3.28
Abuja – Lome	19	35	54	12.83	359	390	749	10.31
Abuja – Abidjan	23	24	47	11.16	403	249	652	8.97
Abuja – Ouagadougou	32	30	62	14.73	308	202	510	7.02
Abuja – Praia	10	13	23	5.46	501	284	785	10.80
		Total	421	100		Total	7266	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2006

Table 4.19 and Table 4.20 show the aircraft and passenger movement for Lagos-Accra. The flow for Abuja-Accra kept on increasing as compared to previous years. Unlike the previous years, Lagos-Freetown witnessed a surge in the both aircraft and passenger movement. In contrast, there had not been any significant increase in Lagos-Ouagadougou and Lagos-Conakry. However, there was a significant surge in the Abuja-Ouagadougou as compared with the numbers from previous years. And there was no data for Abuja-Freetown for the aircraft movement for the year 2006. Interestingly, the Abuja-Monrovia recorded a significant surge as compared with the previous years.

4.5.7 City pair Aircraft and Passenger flow from Lagos and Abuja 2007 and 2008

The city pairs aircraft and passenger flow from Lagos and Abuja to other West African countries for the year 2007 are discussed in this section. In the analysis, the effects of liberalisation on the flow of both aircraft and passenger from Nigerian cities to other West African countries are as follows:

Table 4.21 shows the traffic between Lagos and other West African countries. It depicts data on the city pair, the flight frequency showing the arrival as well as the departure and the city pair share for the aircraft movement and the passenger movement for the year 2007. For the aircraft flow, Lagos-Accra had (55.51%), for the passenger for the same city pair (75.72%).This is the highest for the whole year city pair flow. This is followed by Lagos-Abidjan, aircraft (9.20%), passenger (7.59%) and Lagos–Dakar, aircraft (4.19%), passenger (5.79%).The city pairs with the lowest for the year are Lagos-Ouagadougou, aircraft (0.22%), passenger (0.30%), Lagos-Banjul, aircraft(0.25%), passenger (0.12%), and Lagos-Conakry, aircraft (0.08%), passenger (0.05%).

Table 4.22 shows the analysis of the city pair traffic flows from Abuja to other West African countries for the year 2007.The city pairs with the highest flow from Abuja are Abuja-Monrovia, aircraft (22.73%), passenger (63.82%), Abuja-Accra, aircraft (24.64%), passenger (11.80%) and Abuja-Abidjan, aircraft (8.13%), passenger (1.94%). And the city pairs with lowest for the year from Abuja are Abuja-Banjul, aircraft (0%), passenger (0%), Abuja-Conakry, aircraft (2.90%), passenger (1.28%) and Abuja-Praia, aircraft (1.44%), passenger (1.26%).

Figure 4.33 to Figure 4.35 shows the spatial pattern of flight flow from Lagos to other West African countries from 2007 to 2009. During this period, the distribution of aircraft flow shows a high concentration of flight flow from Lagos to other West African countries from Lagos-Accra, Lagos-Abidjan, Lagos- Freetown, Lagos-Dakar, Lagos-Cotonou and Lagos-Lome respectively. Whereas, the distribution of flight flows from Lagos- Ouagadougou, Lagos-Conakry, Lagos-Monrovia, Lagos-Praia and Lagos-Bamako, are quite low. The distribution reveals that some city pair increased significantly in flight flow in year 2008 and 2009, when compared, with the year 2007. These are Lagos-Accra, from 4067 in 2007 to 8232 in 2008 and 14952 in 2009, Lagos-Cotonou from 604 in 2007 to 1051 in 2008 and 2404 in 2009, and Lagos-Lome from 342 in 2007 to 754 in 2008 and 1388 in 2009. However, Lagos-Abidjan decreases slightly from 674 in 2007 to 616 in 2008 and increases to 1059 in 2009. Generally, the flight patterns reveals that there is a

dichotomy along the city pair while some city pair exhibits a high patterns of flight flows some experience low patterns of flight flows.

The spatial pattern of passenger flow from Lagos to other West African countries from 2007 to 2009 is shown below. Figure 4.36 to Figure 4.38 show an increase in the passenger flow pattern from Lagos to Accra, during the period. The total volume increases from 285315 in 2007 to 607838 in 2008 and increases to 1150910 in 2009. Also, some city pair, like Lagos-Cotonou, Lagos-Lome and Lagos to Freetown increases in the total pattern of passenger flow for the period. Clearly, a sharp decrease in the flow from Lagos-Abidjan was noticed from 2008 to 2009. The flow from Lagos to Abidjan increases from 28588 in 2007 to 28910 in 2008 and declines to 15902 in 2009. Similar patterns were also noticeable in Lagos-Dakar which decreases from 21830 in 2007 to 14381 in 2008 and increases to 28430 in 2009. However, the following city pair, Lagos-Conakry, Lagos-Praia, Lagos-Ouagadougou, Lagos-Bamako and Lagos-Banjul is low in passenger traffic during the period. Generally, the flow pattern for the passenger and the flight shows an erratic patterns both passenger and flight from 2007 to 2009.

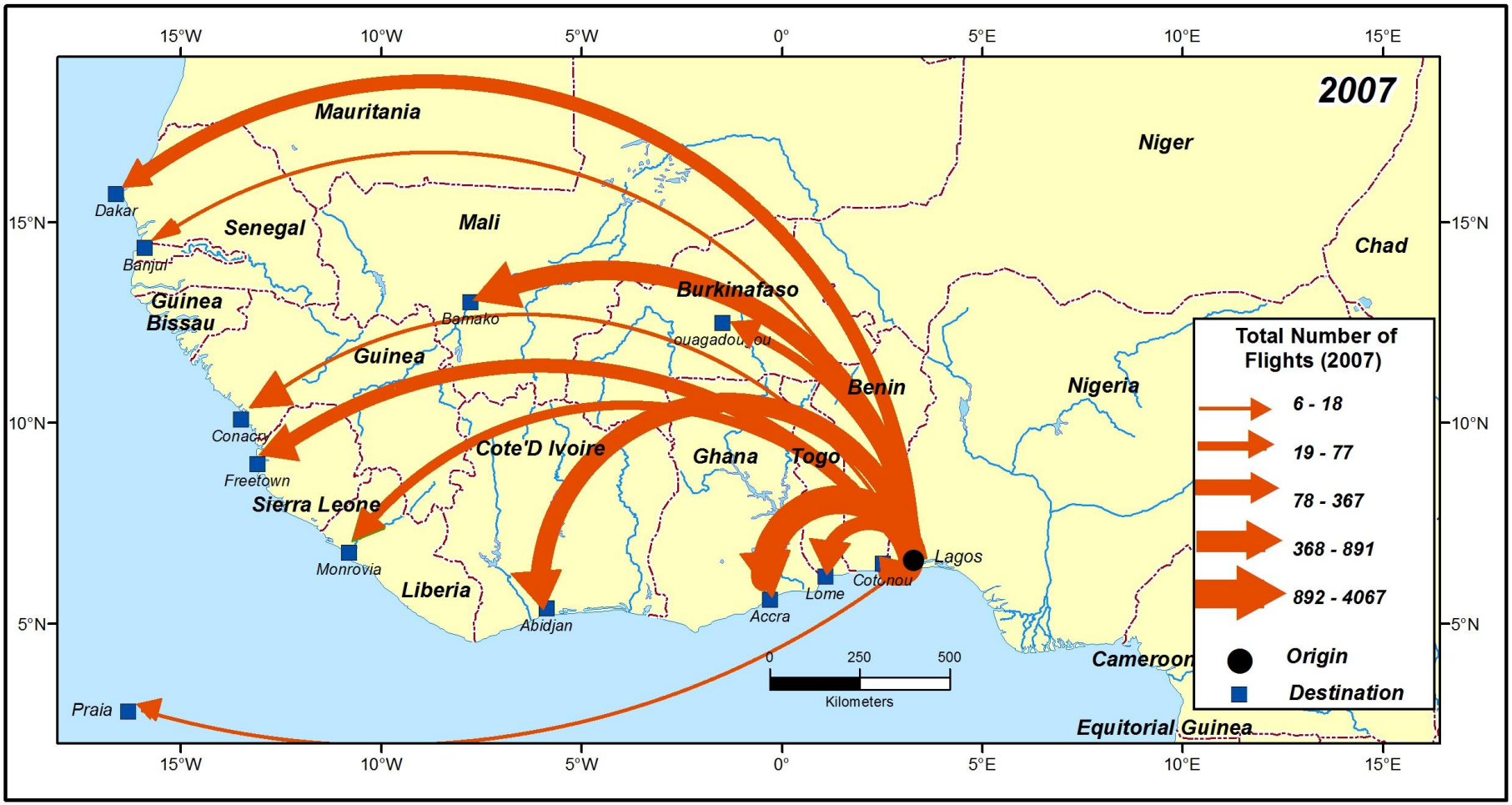

Fig. 4.33: Spatial Pattern of Flight Flow from Lagos, 2007
Source: Author'Analysis, 2015

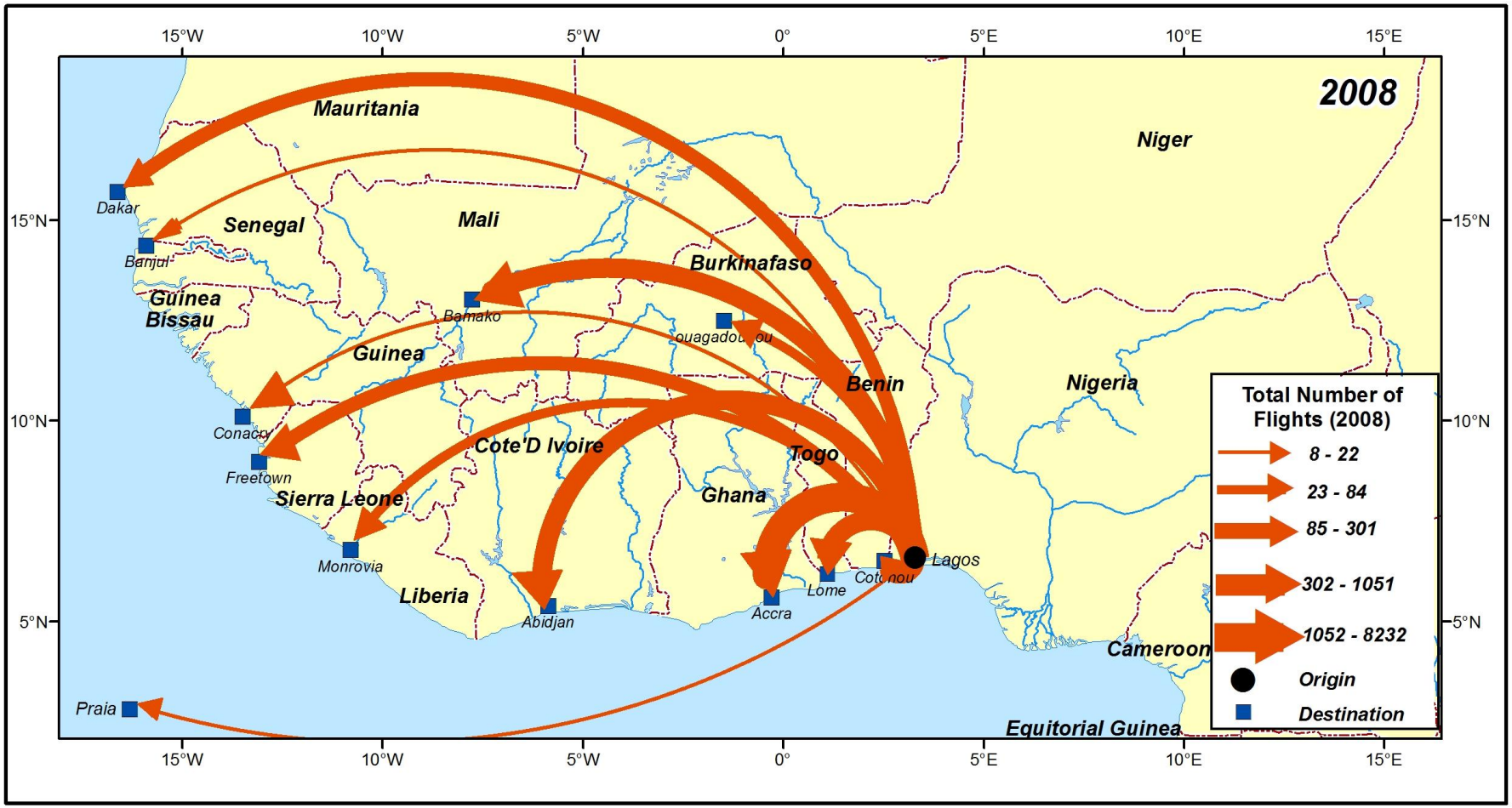

Fig. 4.34: Spatial Pattern of Flight Flow from Lagos, 2008
Source: Author'Analysis, 2015

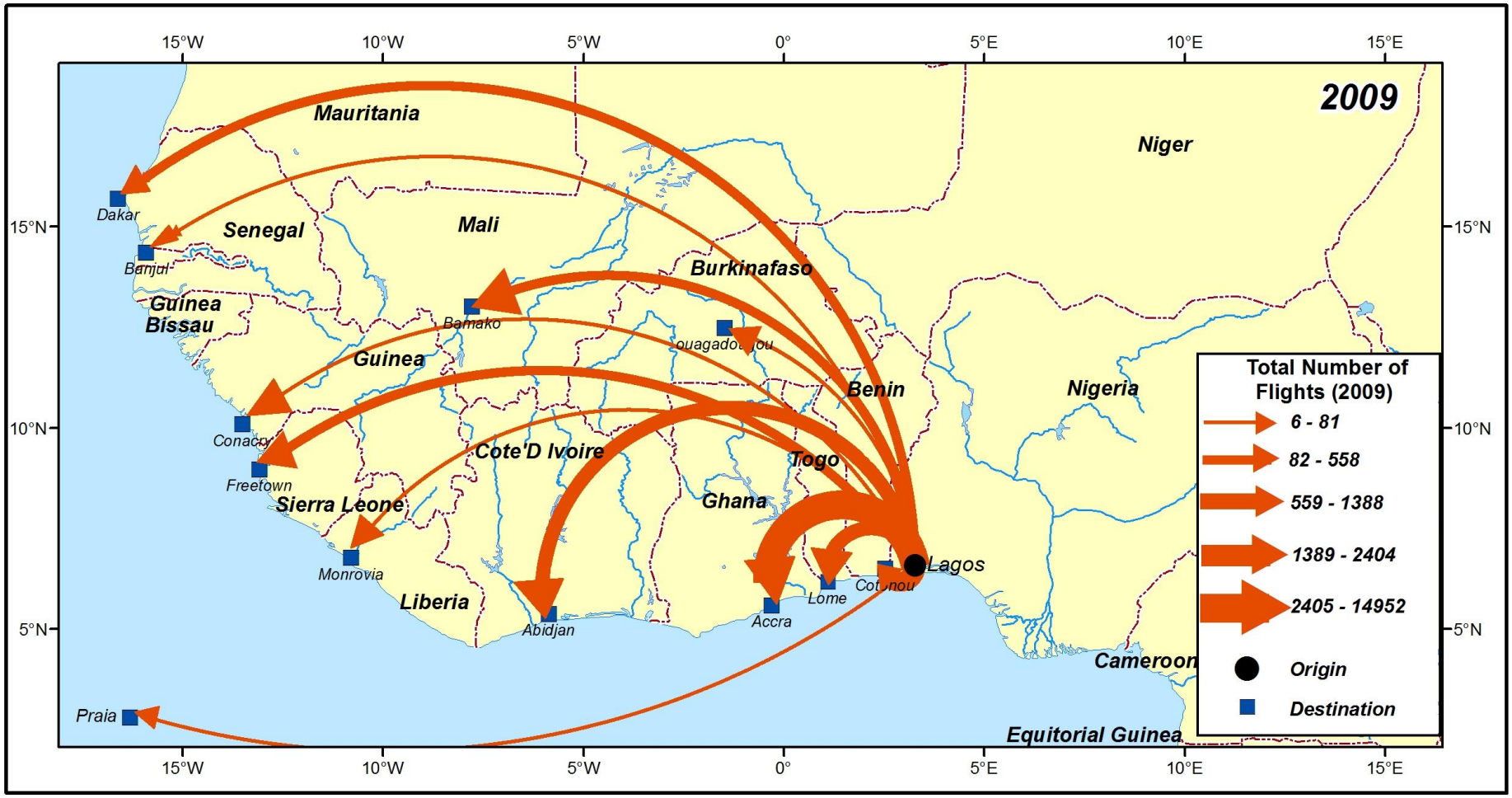

Fig. 4.35: Spatial Pattern of Flight Flow from Lagos, 2009
Source: Author'Analysis, 2015

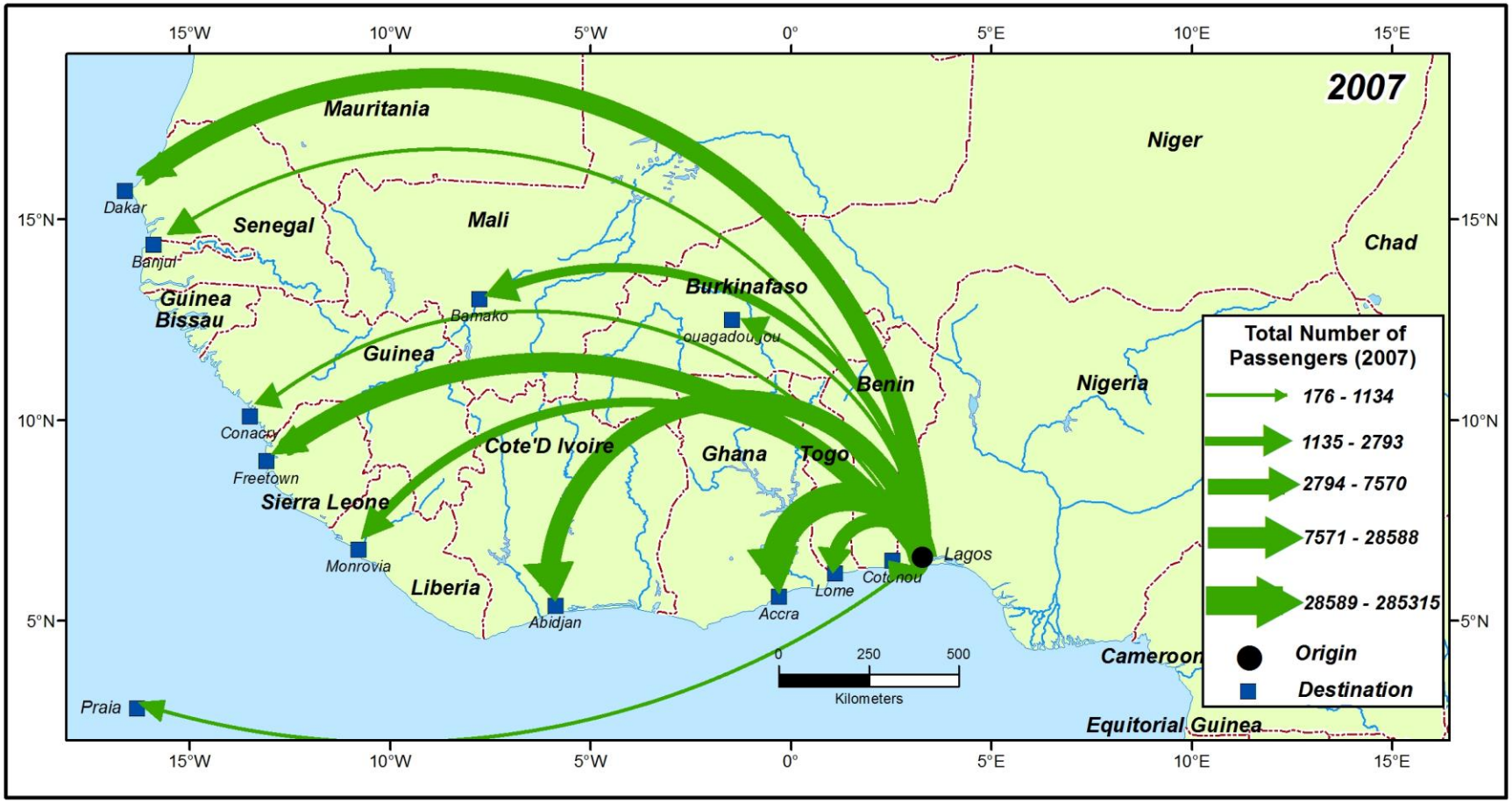

Fig. 4.36: Spatial Pattern of Passenger Flow from Lagos, 2007.
Source: Author'Analysis, 2015

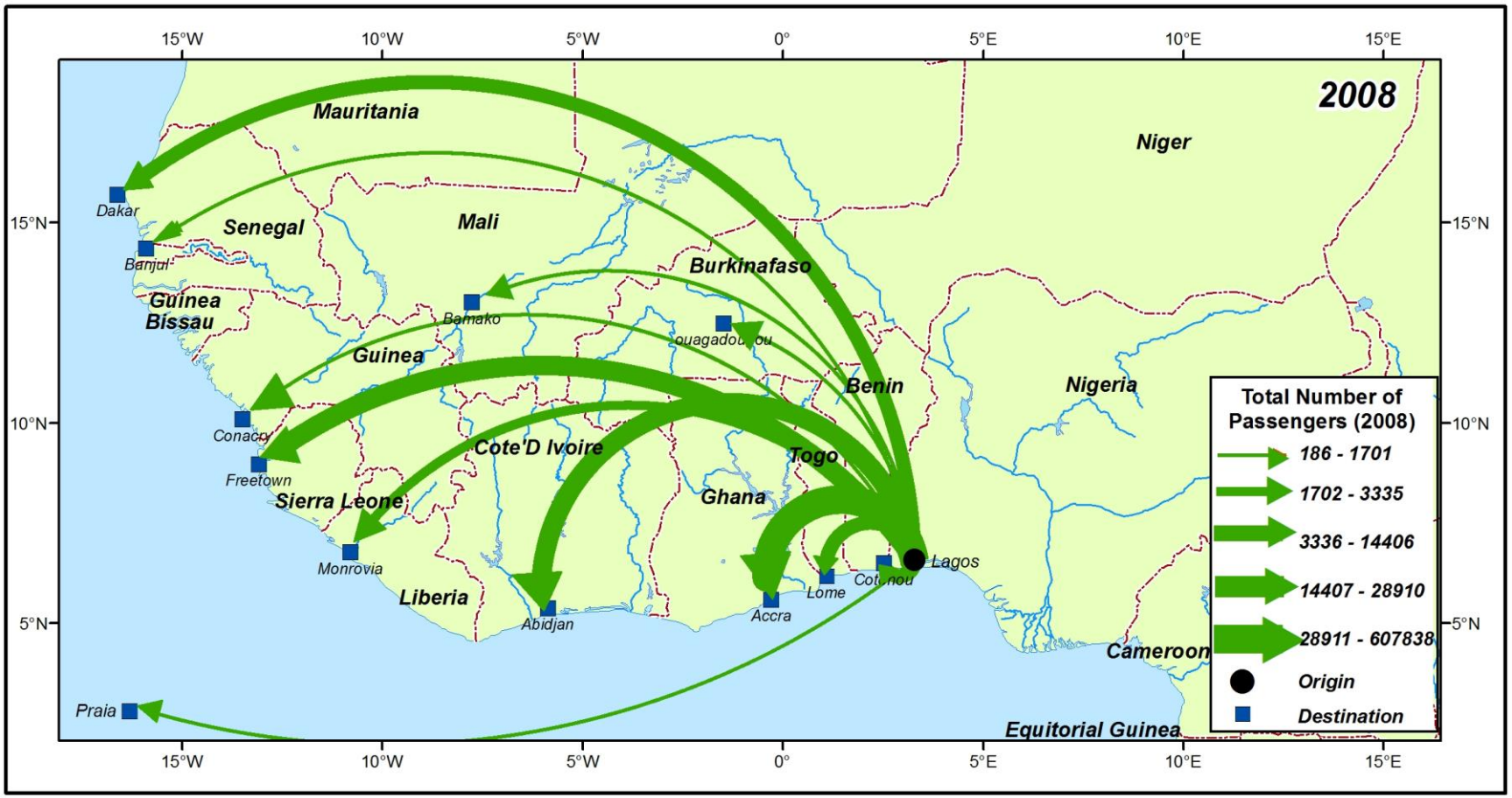

Fig. 4.37: Spatial Pattern of Passenger Flow from Lagos, 2008.
Source: Author'Analysis, 2015

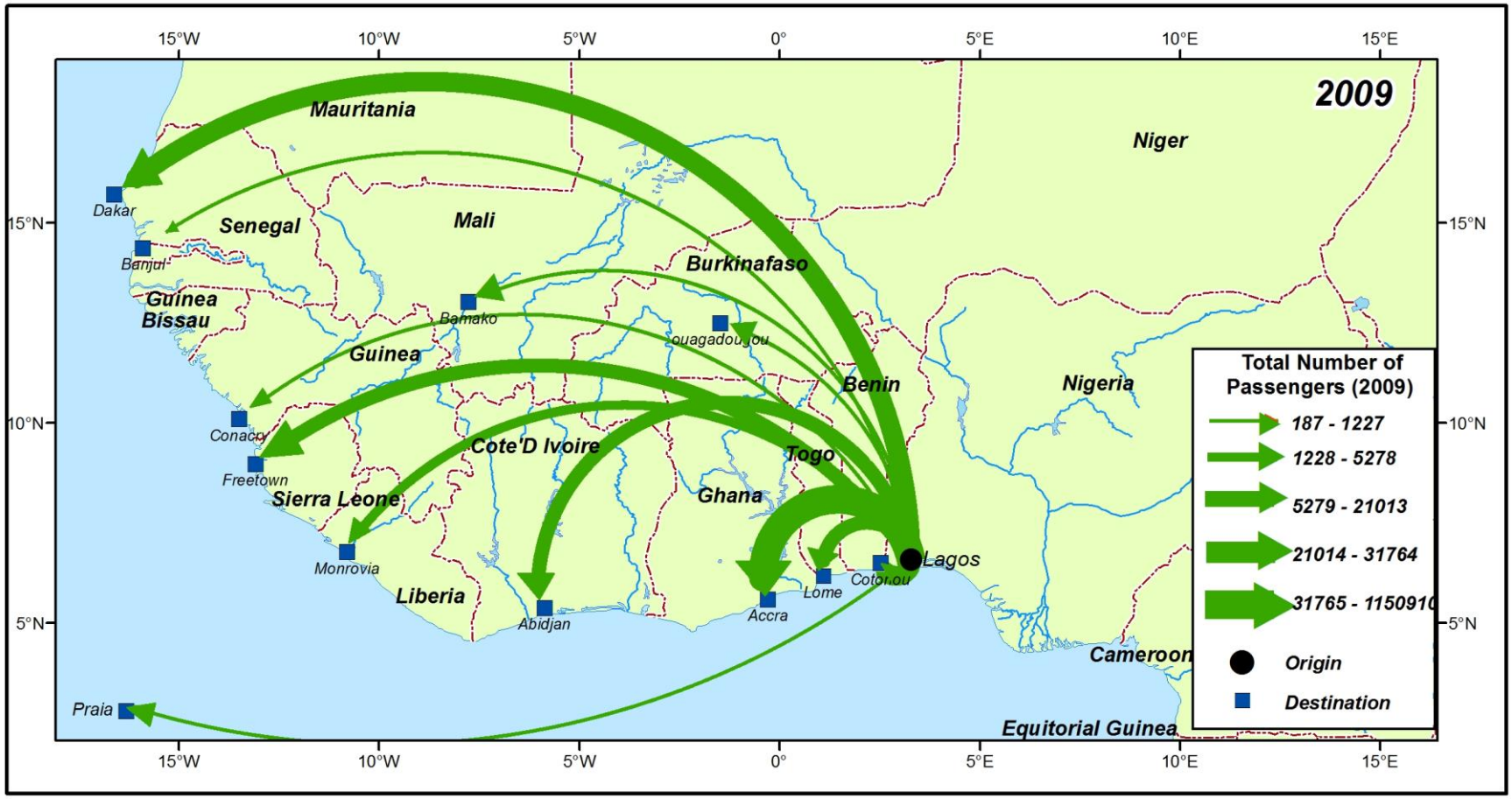

Fig. 4.38: Spatial Pattern of Passenger Flow from Lagos, 2009.
Source: Author'Analysis, 2015

Table 4.21: Traffic between Lagos and other West African Countries 2007

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Lagos – Monrovia	22	21	43	0.59	1277	1516	2793	0.74
Lagos – Dakar	163	204	367	4.19	10799	11031	21830	5.79
Lagos – Accra	1845	2222	4067	55.51	127147	158168	285315	75.72
Lagos – Conakry	3	3	6	0.08	161	15	176	0.05
Lagos – Bamako	44	847	891	12.16	259	1427	1686	0.45
Lagos – Banjul	11	7	18	0.25	309	160	469	0.12
Lagos – Cotonou	311	293	604	8.24	4499	3071	7570	2.01
Lagos – Lome	240	102	342	4.67	2456	3691	6147	1.63
Lagos – Abidjan	355	319	674	9.20	15181	13407	28588	7.59
Lagos – Ouagadougou	28	49	77	1.05	383	459	842	0.22
Lagos – Praia	7	9	16	0.22	183	951	1134	0.30
		Total	7386	100		Total	376809	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2007

Table 4.22: Traffic between Abuja and other West African Countries 2007

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Abuja – Freetown	6	6	12	2.87	109	75	184	1.53
Abuja – Monrovia	48	47	95	22.73	3907	3792	7699	63.82
Abuja – Dakar	12	13	25	5.98	375	199	574	4.76
Abuja – Conakry	5	7	12	2.90	64	91	155	1.28
Abuja – Accra	38	65	103	24.64	634	789	1423	11.80
Abuja – Banjul	0	0	0	0	0	0	0	0
Abuja – Bamako	11	9	20	4.80	68	62	130	1.08
Abuja – Cotonou	11	20	31	7.42	247	480	727	6.03
Abuja – Lome	22	24	46	11.00	231	239	470	3.90
Abuja – Abidjan	15	19	34	8.13	129	105	234	1.94
Abuja – Ouagadougou	19	15	34	8.13	190	125	315	2.61
Abuja – Praia	5	1	6	1.44	149	3	152	1.26
		Total	418	100		Total	12063	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2007

Table 4.21 and Table 4.22 show that there is an appreciable increase in the aircraft movement for the Lagos-Bamako. But this does not follow with a simultaneous increase in the passenger movement. The implication is that, though there was more flight movement but an extremely low load factor at the time. In the same year, for the city pair, Abuja-Banjul, there was no data for the aircraft movement during this period. Notably, there was an increase in the aircraft and passenger movement on the Abuja-Monrovia city pair. Part of the reason is the renewed interest of travellers to make use of Abuja airport for regional route destination other than Lagos.

4.5.8 City pair Aircraft and Passenger flow from Lagos and Abuja 2008

This section presents the aircraft and passenger flow from Lagos and Abuja to other West African countries for 2008. It presents the city pair flow from Lagos and Abuja respectively. The influence of liberalisation on traffic flow is discussed.

Table 4.23 shows the traffic between Lagos and other West African countries, it depicts data on the city pair, the flight frequency showing the arrival as well as the departure and the city pair share for the aircraft movement and the passenger movement for the year 2008. For the aircraft flow, Lagos–Accra (66.86%), for the passenger for the same city pair (86.17%).This is the highest for city pair flow for the whole year. This is followed by Lagos-Abidjan, aircraft (5.00%), passenger (4.10%) and Lagos–Cotonou, aircraft (8.54%), passenger (204%).The city pairs with the lowest for the year are Lagos-Praia, aircraft (0.16%), passenger (0.17%), Lagos-Banjul, aircraft (0.18%), passenger (0.07%), and Lagos-Conakry, aircraft (0.06%), passenger(0.03%).

Table 4.24 shows the analysis of the city pair traffic flows from Abuja to other West African countries for the year 2008.The city pairs with the highest flow from Abuja are Abuja-Monrovia, aircraft (20.04%), passenger (38.77%), Abuja-Accra, aircraft (28.08%), passenger (36.02%), and Abuja-Cotonou, aircraft (8.06%), passenger (7.10%). And the city pairs with lowest for the year from Abuja are Abuja-Banjul, aircraft (0.39%), passenger (0.04%), Abuja-Praia, aircraft (1.77%), passenger (0.94%) and Abuja-Conakry, aircraft (2.36%), passenger (0.30%).

Figure 4.39 to Figure 4.41 show the spatial pattern of flight flow from Abuja to other West African countries from 2007 to 2009. During this period, the distribution of aircraft flow shows a high concentration of flight flow from Abuja to other West African countries from Abuja-Accra, Abuja-Abidjan, Abuja-Monrovia, Abuja-Dakar, Abuja-Cotonou and Abuja-Lome respectively. Whereas, the distribution of flight flows from Abuja-Praia, Abuja-Conakry, and Abuja-Banjul are quite low. The distribution reveals that some city pair increases in flight flow in year 2008 and 2009, when compared, with the year 2007. The Abuja-Accra increases from 103 in 2007 to 143 in 2008 and 293 in 2009, Abuja-Lome, from 46 in 2007 to 57 in 2008, and 63 in 2009, Abuja-Dakar, from 25 in 2007 to 34 in 2008, and 34 in 2009, and Abuja-Abidjan, from 34 in 2007 to 40 in 2008 and 49 in 2009. Also, Abuja-Freetown increases in flight traffic flows from

2007 to 2009. Between 2007 and 2009, the flight flow from Abuja-Conakry, Abuja-Banjul and Abuja-Praia are quite low.

The spatial pattern of passenger flow from Abuja to other West African countries from 2007 to 2009, as shown in Figure 4.42 to Figure 4.44 show an increase in the passenger flow pattern from Abuja to Accra, Abuja-Lome, Abuja-Dakar, Abuja-Abidjan, Abuja-Cotonou and Abuja-Freetown during the period. The total volume for Abuja-Accra increased from 1423 in 2007 to 7256 in 2008 and increase to 14440 in 2009. Vividly, a slight decrease in the flow from Abuja-Dakar was noticed from 2007 to 2008 and increase to 603 in 2009. The flow from Abuja to Monrovia increases from 2793 in 2007 to 7809 in 2008 and reduces to 5391 in 2009. The city pair passenger pattern for Abuja-Freetown increases from 184 in 2007 to 200 in 2008, and rose to 480 in 2009. Overall, the flow pattern for the passenger and the flight show erratic patterns both for passenger and flight pattern from 2007 to 2009, but improves greatly from 2001 to 2006. Since 2001 there had been an improvement in the both the passenger and flight traffic patterns. However, the most significant till date is the passenger and flight pattern for 2008 and 2009 which significantly shows high intensity when compared with the data for the 2001. So since the implementation of the liberalisation policy from 2001, there had been a gradual and consistent improvement in the both passenger and flight traffic pattern.

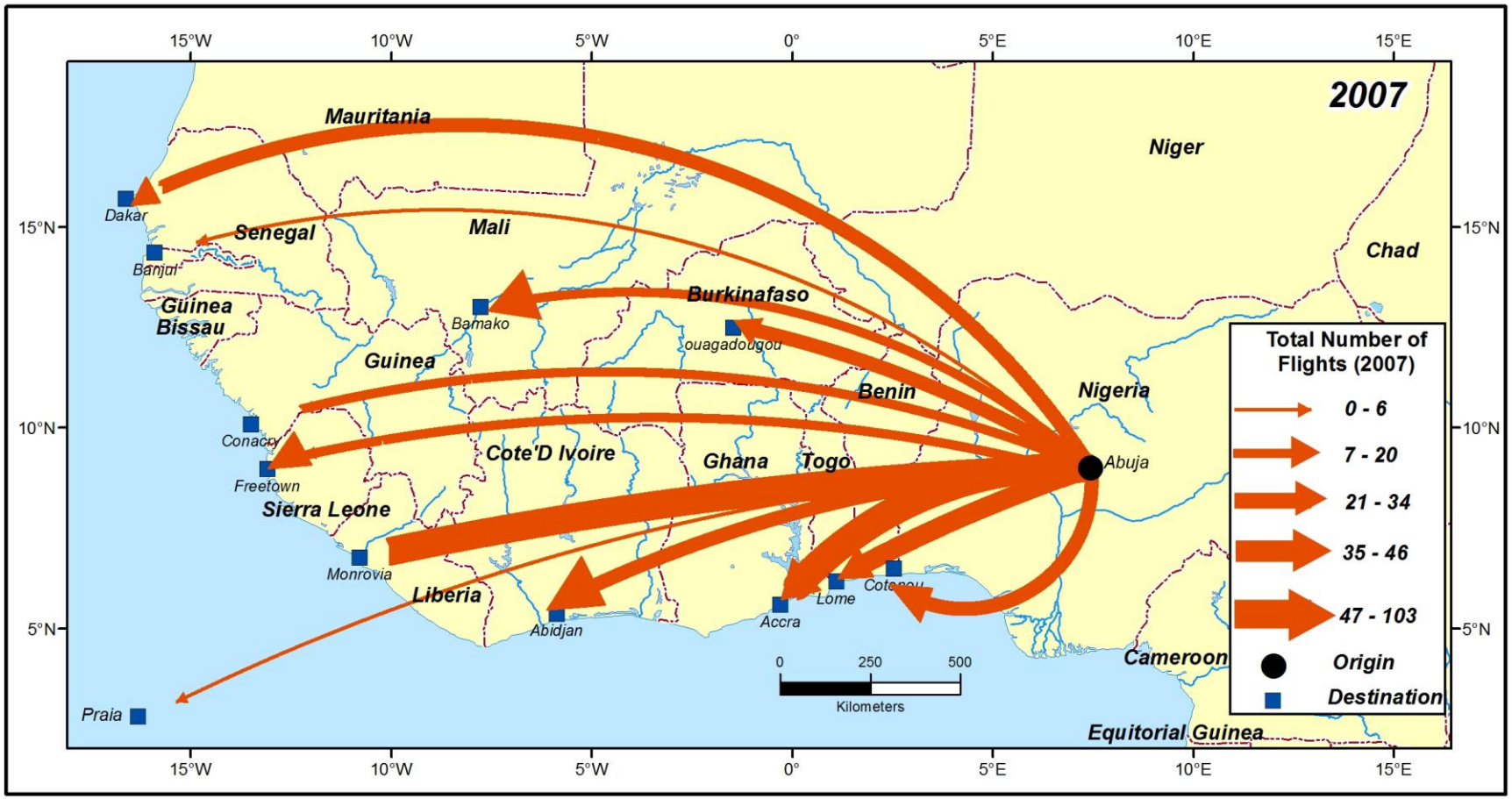

Fig. 4.39: Spatial Pattern of Air Traffic Flow from Abuja, 2007.
Source: Author's Analysis, 2015

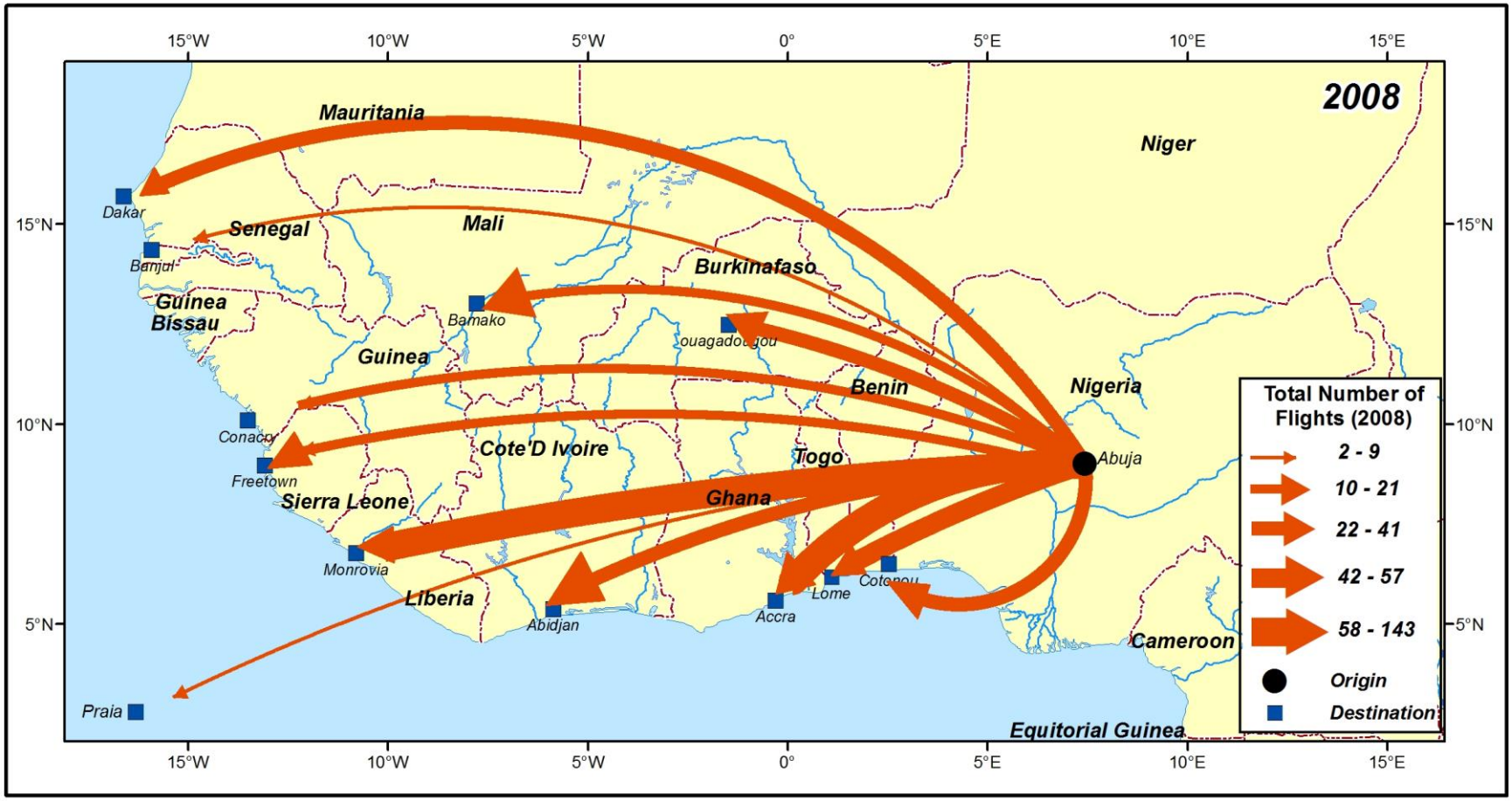

Fig. 4.40: Spatial Pattern of Air Traffic Flow from Abuja, 2008.
Source: Author's Analysis, 2015

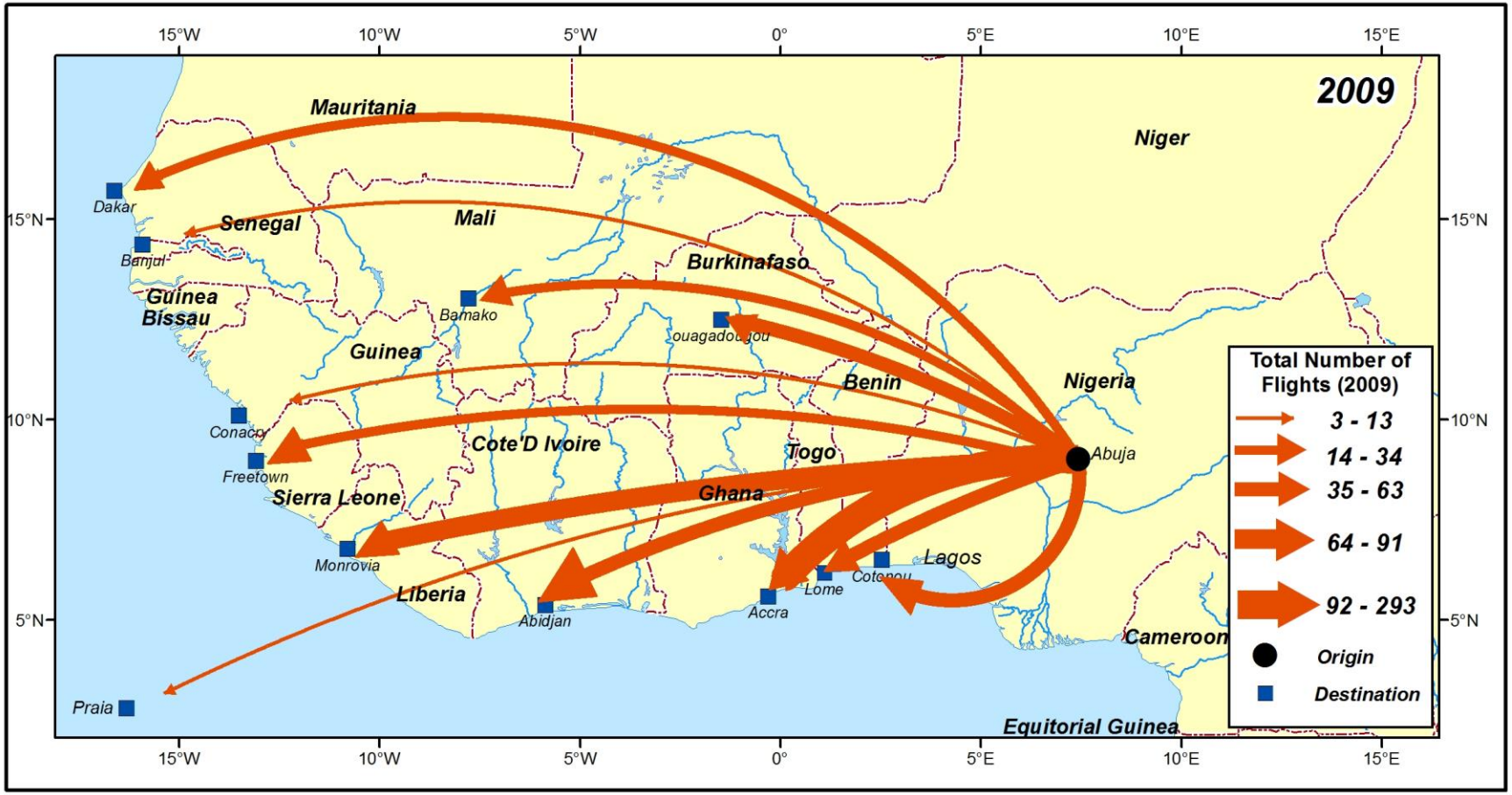

Fig. 4.41: Spatial Pattern of Air Traffic Flow from Abuja, 2009.
Source: Author's Analysis, 2015

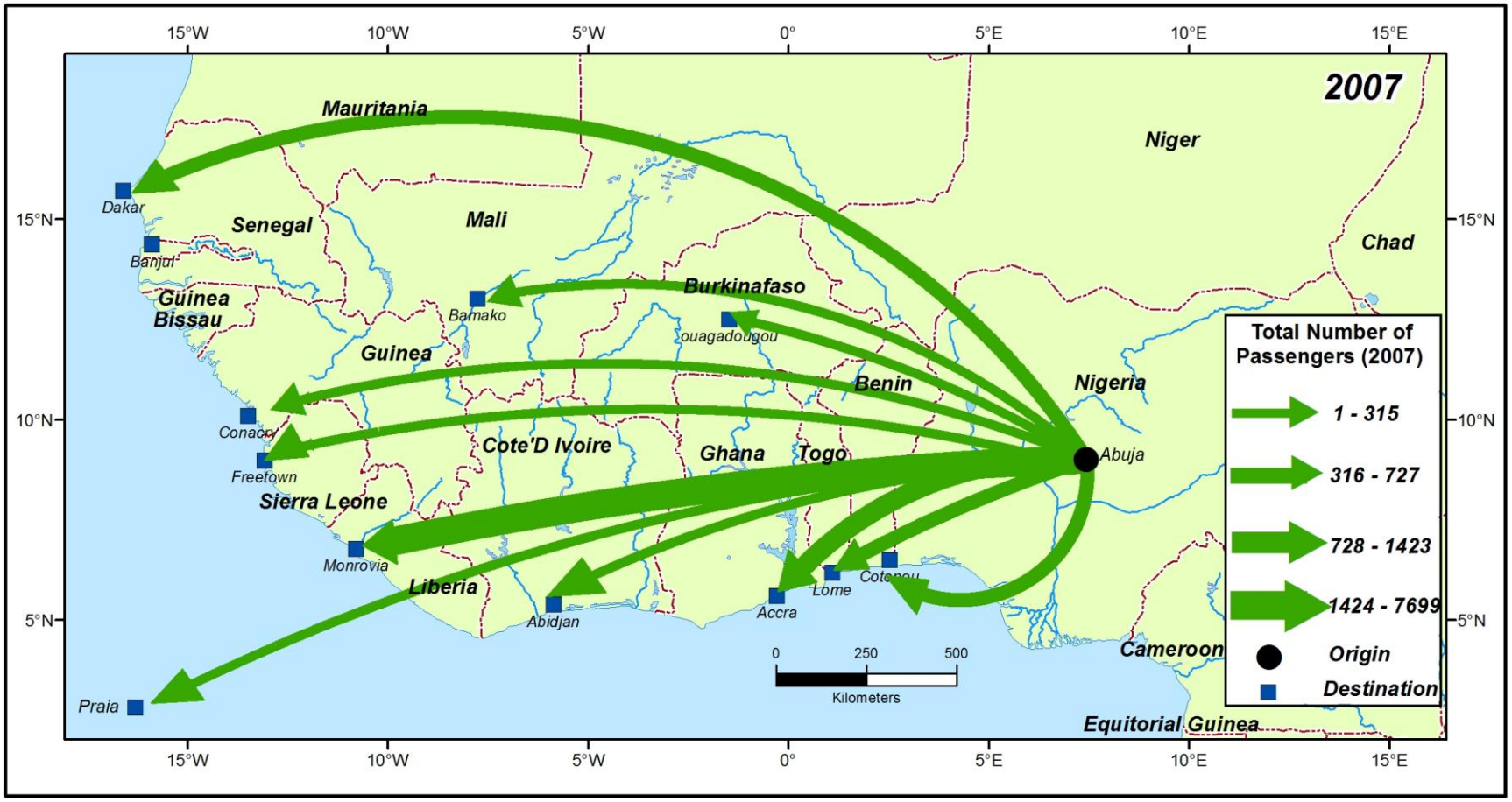

Fig. 4.42: Spatial Pattern of Passenger Flow from Abuja, 2007.
Source: Author's Analysis, 2015

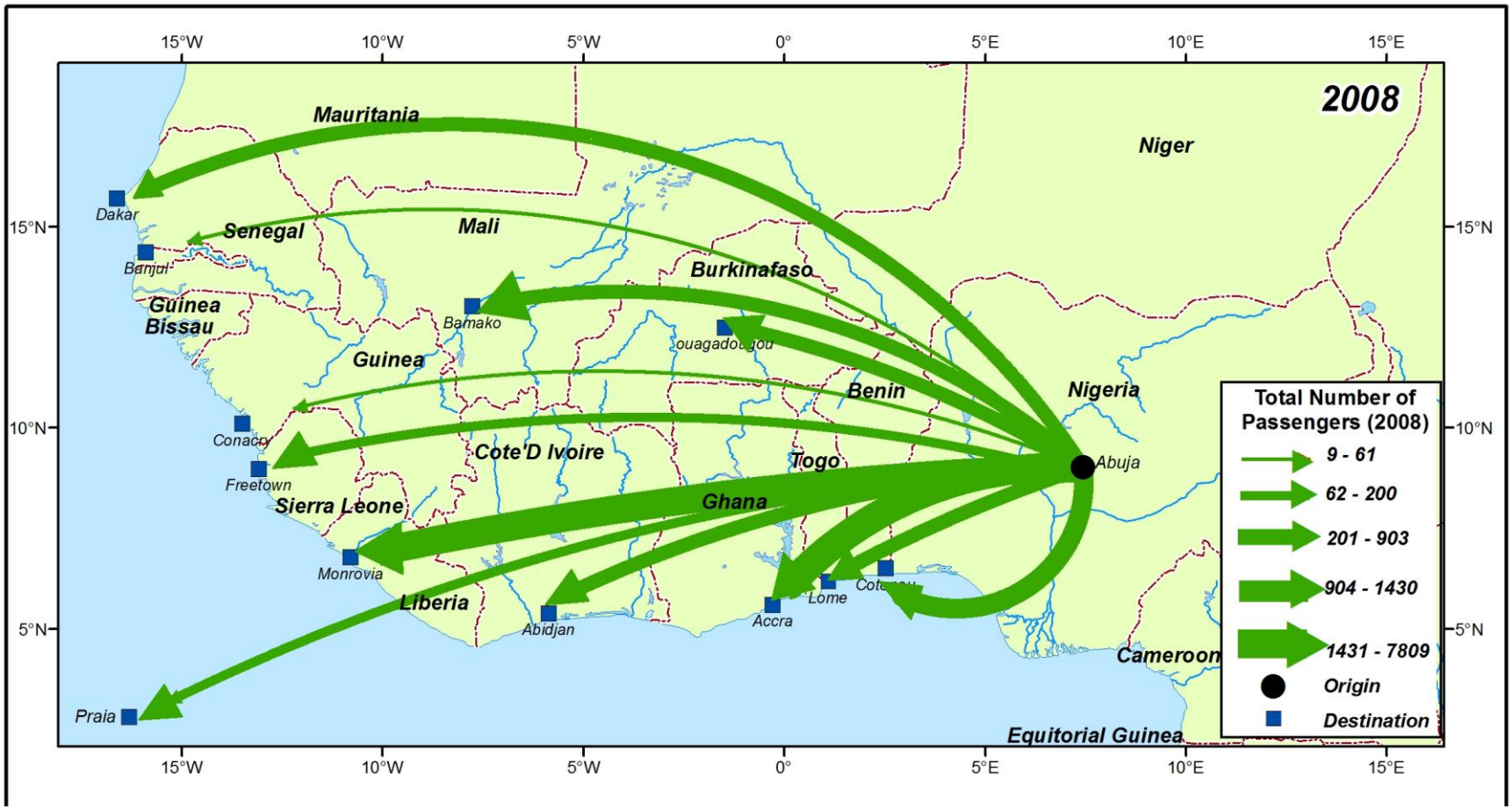

Fig. 4.43: Spatial Pattern of Passenger Flow from Abuja, 2008.
Source: Author's Analysis, 2015

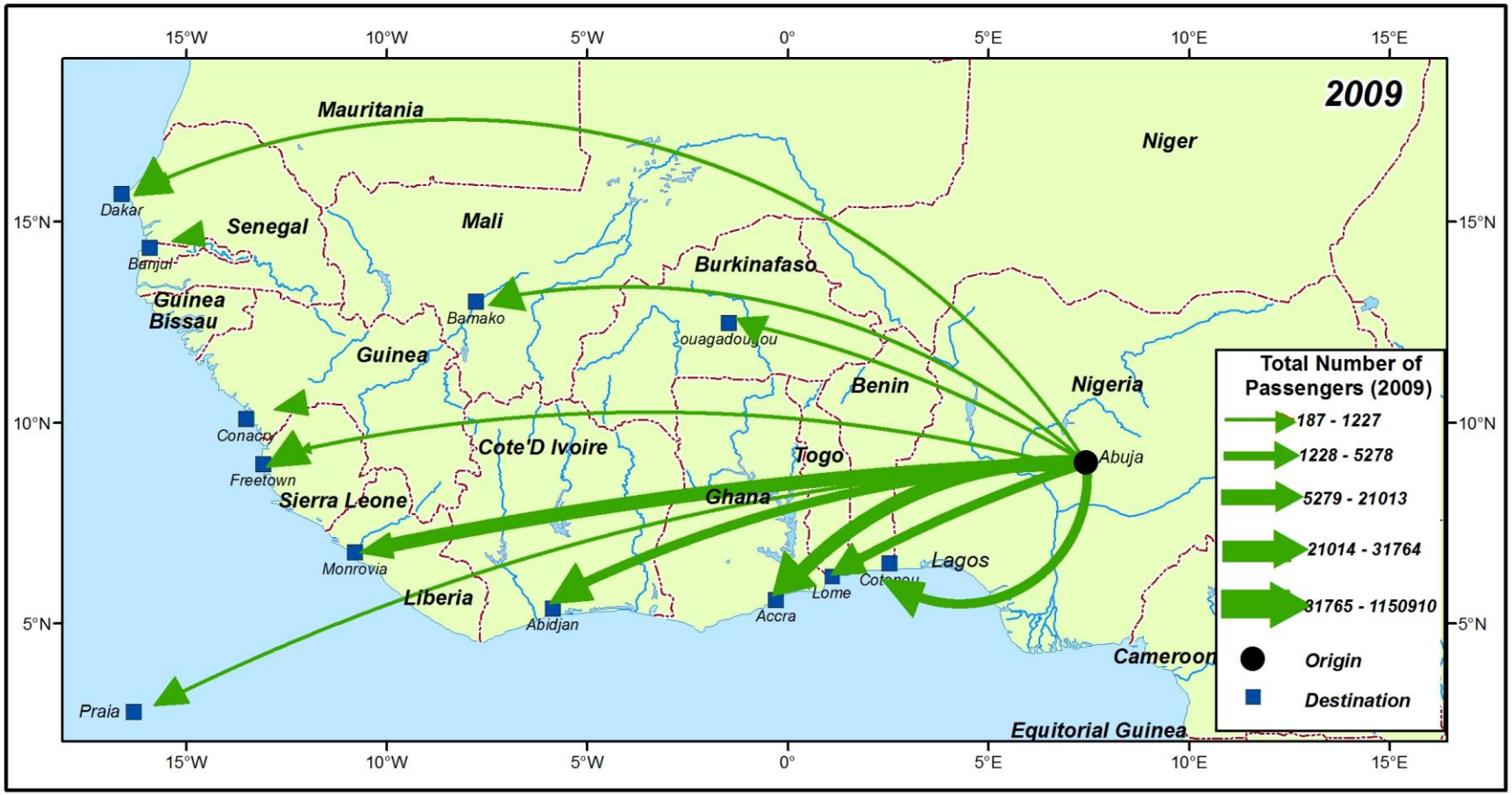

Fig. 4.44: Spatial Pattern of Passenger Flow from Abuja, 2009.
Source: Author's Analysis, 2015

Table 4.23: Traffic between Lagos and other West African Countries 2008

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Lagos – Freetown	156	145	301	2.44	10580	10280	20860	2.96
Lagos – Monrovia	29	31	60	0.49	1650	1685	3335	0.47
Lagos – Dakar	150	118	268	2.18	8071	6310	14381	2.04
Lagos – Accra	3950	4282	8232	66.86	297240	310598	607838	86.17
Lagos – Conakry	4	4	8	0.06	167	19	186	0.03
Lagos – Banjul	13	9	22	0.18	320	169	489	0.07
Lagos – Cotonou	520	531	1051	8.54	7485	6921	14406	2.04
Lagos – Lome	358	396	754	6.12	5324	5924	11248	1.60
Lagos – Abidjan	318	298	616	5.00	14950	13960	28910	4.10
Lagos – Ouagadougou	29	55	84	0.68	389	467	856	0.12
Lagos – Praia	9	11	20	0.16	192	982	1174	0.17
		Total	12312	100		Total	705384	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2008

Table 4.24: Traffic between Abuja and other West African Countries 2008

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Abuja – Freetown	7	9	16	3.14	123	77	200	0.99
Abuja – Monrovia	53	49	102	20.04	3984	3825	7809	38.77
Abuja – Dakar	19	15	34	6.68	356	167	523	2.60
Abuja – Conakry	4	8	12	2.36	30	31	61	0.30
Abuja – Accra	42	101	143	28.09	3506	3750	7256	36.02
Abuja – Banjul	1	1	2	0.39	5	4	9	0.04
Abuja – Bamako	13	8	21	4.13	238	222	460	2.28
Abuja – Cotonou	15	26	41	8.06	645	785	1430	7.10
Abuja – Lome	27	30	57	11.20	431	472	903	4.48
Abuja – Abidjan	17	23	40	7.86	384	401	785	3.90
Abuja – Ouagadougou	19	13	32	6.29	251	264	515	2.55
Abuja – Praia	7	2	9	1.77	176	15	191	0.94
		Total	509	100		Total	20142	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2008

From the Table 4.23 and 4.24, notably for the traffic between Lagos and the other West African countries, Lagos–Accra has the highest city pair share. Also, the Lagos-Freetown also recorded a slight increase in the passenger movement compared with the previous year. In spite of global economic recession of 2008 of which air transport had a fair share in passenger movement, the regional route from Nigeria to other West African countries were not totally affected by this global economic collapse. For the Abuja to West African Countries, Abuja-Monrovia witnessed a slight increase from passenger movement when compared with the previous year.

4.5.9 City pair Aircraft and Passenger flow from Lagos and Abuja 2009, 2010 and 2011

The section presents the city pair share for aircraft and passenger flow from Lagos and Abuja to West African countries. The analysis shows the flow of both aircraft and passenger from Nigerian cities to other West African countries

Table 4.25 shows the traffic between Lagos and other West African countries, the table depicted data on the city pair, the flight frequency showing the arrival as well as the departure and the city pair share for the aircraft movement and the passenger movement for the year 2009. For the aircraft flow, Lagos–Accra (69.97%), for the passenger for the same city pair (90.10%).This is the highest for the whole year for city pair flow. This is followed by Lagos-Cotonou, aircraft (11.25%), passenger (2.49%) and Lagos–Dakar, aircraft (2.24%), passenger (2.23%).The city pairs with the lowest for the year are Lagos-Conakry, aircraft (0.03%), passenger (0.01%), Lagos-Banjul, aircraft (0.11%), passenger (0.04%), and Lagos-Ouagadougou, aircraft (0.37%), passenger (0.06%).

Table 4.26 shows the analysis of the city pair traffic flows from Abuja to other West African countries for the year 2009.The city pairs with the highest flow from Abuja are Abuja-Accra, aircraft (41.68%), passenger (53.23%), Abuja-Monrovia, aircraft (10.08%), passenger (19.87%), and Abuja-Cotonou, aircraft (8.11%), passenger(7.05%). And the city pairs with lowest for the year from Abuja are Abuja-Banjul, aircraft (0.43%), passenger (0.06%), Abuja-Conakry, aircraft (1.56%), passenger (0.21%) and Abuja-Praia, aircraft (1.85%), passenger (0.73%).

Table 4.25: Traffic between Lagos and other West African Countries 2009

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Lagos – Freetown	162	156	318	1.49	10094	10919	21013	1.65
Lagos – Monrovia	36	39	75	0.35	2510	2768	5278	0.41
Lagos – Dakar	192	286	478	2.24	10202	18228	28430	2.23
Lagos – Accra	7242	7710	14952	69.97	540760	610150	1150910	90.10
Lagos – Conakry	4	2	6	0.03	166	21	187	0.01
Lagos – Bamako	38	520	558	2.61	242	980	1222	0.10
Lagos – Banjul	14	10	24	0.11	325	172	497	0.04
Lagos – Cotonou	1102	1302	2404	11.25	15640	16124	31764	2.49
Lagos – Lome	680	708	1388	6.50	9980	10108	20088	1.57
Lagos – Abidjan	511	548	1059	5.00	7640	8262	15902	1.24
Lagos – Ouagadougou	32	49	81	0.37	401	425	826	0.06
Lagos – Praia	11	14	25	0.12	245	982	1227	0.10
		Total	21368	100		Total	1277344	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2009

Table 4.26: Traffic between Abuja and other West African Countries 2009

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Abuja – Freetown	10	13	23	3.27	215	265	480	1.78
Abuja – Monrovia	43	48	91	10.08	2443	2948	5391	19.87
Abuja – Dakar	15	19	34	4.83	305	298	603	2.22
Abuja – Conakry	4	7	11	1.56	29	28	57	0.21
Abuja – Accra	131	162	293	41.68	7230	7210	14440	53.23
Abuja – Banjul	1	2	3	0.43	8	9	17	0.06
Abuja – Bamako	12	9	21	2.99	245	210	455	1.68
Abuja – Cotonou	25	32	57	8.11	945	968	1913	7.05
Abuja – Lome	29	34	63	8.96	786	796	1582	5.83
Abuja – Abidjan	28	21	49	6.97	685	701	1386	5.11
Abuja – Ouagadougou	24	21	45	6.40	301	303	604	2.23
Abuja – Praia	8	5	13	1.85	180	18	198	0.73
		Total	703	100		Total	27126	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2009

Table 4.25 and 4.26 reveal an interesting shift, especially for the Abuja traffic. The Abuja-Accra aircraft and passenger movement surpassed the earlier dominance of the Abuja-Monrovia as the prevailing city pair share. Also, the Abuja-Lome city pair also made an appreciable increase in both the aircraft and passenger movement.

4.5.10 City pair Aircraft and Passenger flow from Lagos and Abuja 2010

This section presents city pair aircraft and passenger flow from Lagos and Abuja to other West African countries. The effects of liberalisation on these flows are discussed.

Table 4.27 shows the traffic between Lagos and other West African countries, the table depicts data on the city pair, the flight frequency showing the arrival as well as the departure, the city pair share for the aircraft movement and the passenger movement for the year 2010. For the aircraft flow, Lagos–Accra (83.56%), for the passenger for the same city pair (94.70%).This is the highest for the whole year for city pair flow. This is followed by Lagos-Cotonou, aircraft (7.53%), passenger (1.70%) and Lagos–Dakar, aircraft (1.37%), passenger (1.24%). The city pairs with the lowest for the year are Lagos-Ouagadougou, aircraft (0.12%), passenger (0.02%), Lagos-Banjul, aircraft (0.06%), passenger (0.02%), and Lagos-Conakry, aircraft (0.01%), passenger (0.01%).

Table 4.28 shows the analysis of the city pair traffic flows from Abuja to other West African countries for the year 2010.The city pairs with the highest flow from Abuja are Abuja-Accra, aircraft (50.90%), passenger (65.49%), Abuja-Monrovia, aircraft (8.90%), passenger (11.63%), and Abuja-Cotonou, aircraft (7.08%), passenger (6.14%). And the city pairs with lowest for the year from Abuja are Abuja-Banjul, aircraft (0.59%), passenger (0.07%), Abuja-Conakry, aircraft (2.01%), passenger (0.19%) and Abuja-Praia, aircraft (1.42%), passenger (0.51%).

Figure 4.45 and Figure 4.46 show the spatial pattern of flight flow from Lagos to other West African countries from 2010 to 2011. During this period, the distribution of aircraft flow shows a high concentration of flight flow from Lagos to other West African countries. The most significant of these flight flows is the Lagos-Accra, other city pairs are Lagos-Abidjan, Lagos- Freetown, Lagos-Dakar, Lagos-Cotonou and Lagos-Lome respectively. Whereas, the distribution of flight flows from Lagos- Ouagadougou, Lagos-Conakry, Lagos-Monrovia, Lagos-Praia and Lagos-Banjul, are quite low. The distribution reveals that some city pair increased significantly and some decline in flight flow from year 2010 to 2011. These are Lagos-Accra, from 45353 in 2010 to 100,508 in 2011 and Lagos- Monrovia from 92 in 2010 to 107 in 2011.Those that declines in flight flows are Lagos-Lome from 2238 in 2010 to 712

in 2011, Lagos-Abidjan from 944 in 2010 to 192 in 2011 and Lagos-Cotonou from 4086 in 2010 to 1716 in 2011. Generally, the flight pattern reveals a huge concentration of flight flow for Lagos-Accra from 2007 to 2011.

The spatial pattern of passenger flow from Lagos to other West African countries from 2010 to 2011 is shown in Figure 4.47 and Figure 4.48. It shows an increase in the passenger flow pattern from Lagos to Accra, during the period. The total volume increases from 3175944 in 2010 to 7632155 in 2011. Also, some city pair, like Lagos-Cotonou, Lagos-Lome and Lagos to Freetown increases in the total pattern of passenger flow for the period. Clearly, a slight decrease in the flow from Lagos-Abidjan was noticed from 2010 to 2011.The flow from Lagos to Abidjan decreases from 13421 in 2010 to 10931 in 2011. Similar patterns were also noticeable in Lagos-Dakar which decreases from 41600 in 2010 to 8279 in 2011. However, the following city pair, Lagos-Conakry, Lagos-Praia, Lagos-Ouagadougou, Lagos-Bamako and Lagos-Banjul is low in passenger traffic during the period. Generally, the flow pattern for the passenger and the flight increases intensely from 2007 to 2011.

Table 4.27: Traffic between Lagos and other West African Countries 2010

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Lagos – Freetown	169	164	333	0.61	12480	11847	24327	0.73
Lagos – Monrovia	45	47	92	0.17	3845	3921	7766	0.23
Lagos – Dakar	360	382	742	1.37	19879	21721	41600	1.24
Lagos – Accra	22451	22902	45353	83.56	1565420	1610524	3175944	94.70
Lagos – Conakry	5	2	7	0.01	170	18	188	0.01
Lagos – Bamako	34	320	354	0.65	220	645	865	0.03
Lagos – Banjul	21	13	34	0.06	362	195	557	0.02
Lagos – Cotonou	1982	2104	4086	7.53	25655	31520	57175	1.70
Lagos – Lome	920	1318	2238	4.12	13680	16240	29920	0.90
Lagos – Abidjan	420	524	944	1.74	6215	7206	13421	0.40
Lagos – Ouagadougou	30	33	63	0.12	395	404	799	0.02
Lagos – Praia	12	17	29	0.05	251	1010	1261	0.04
		Total	54275	100		Total	3353823	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2010

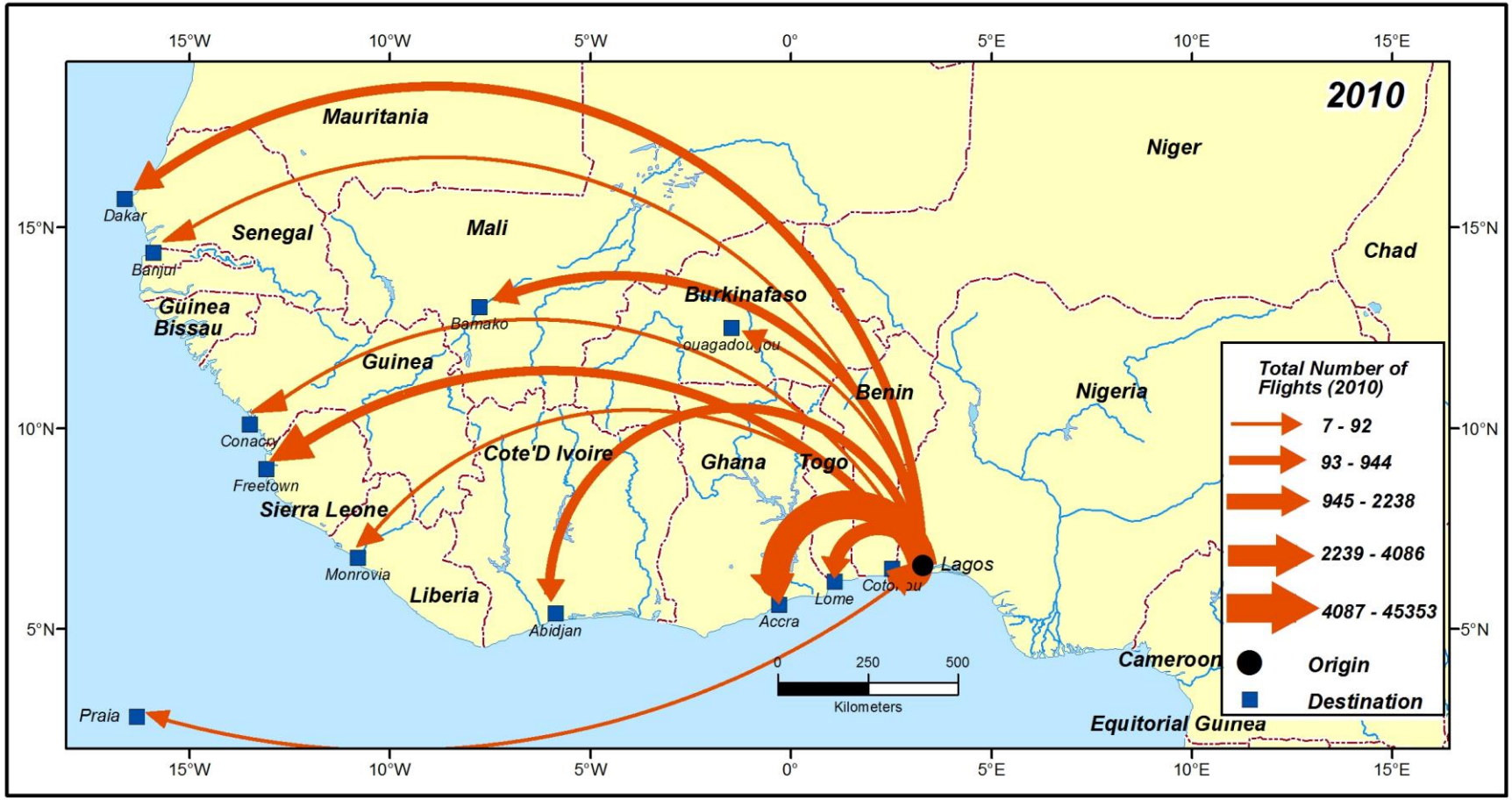

Fig. 4.45: Spatial Pattern of Flight Flow from Lagos, 2010.
Source: Author's Analysis, 2015

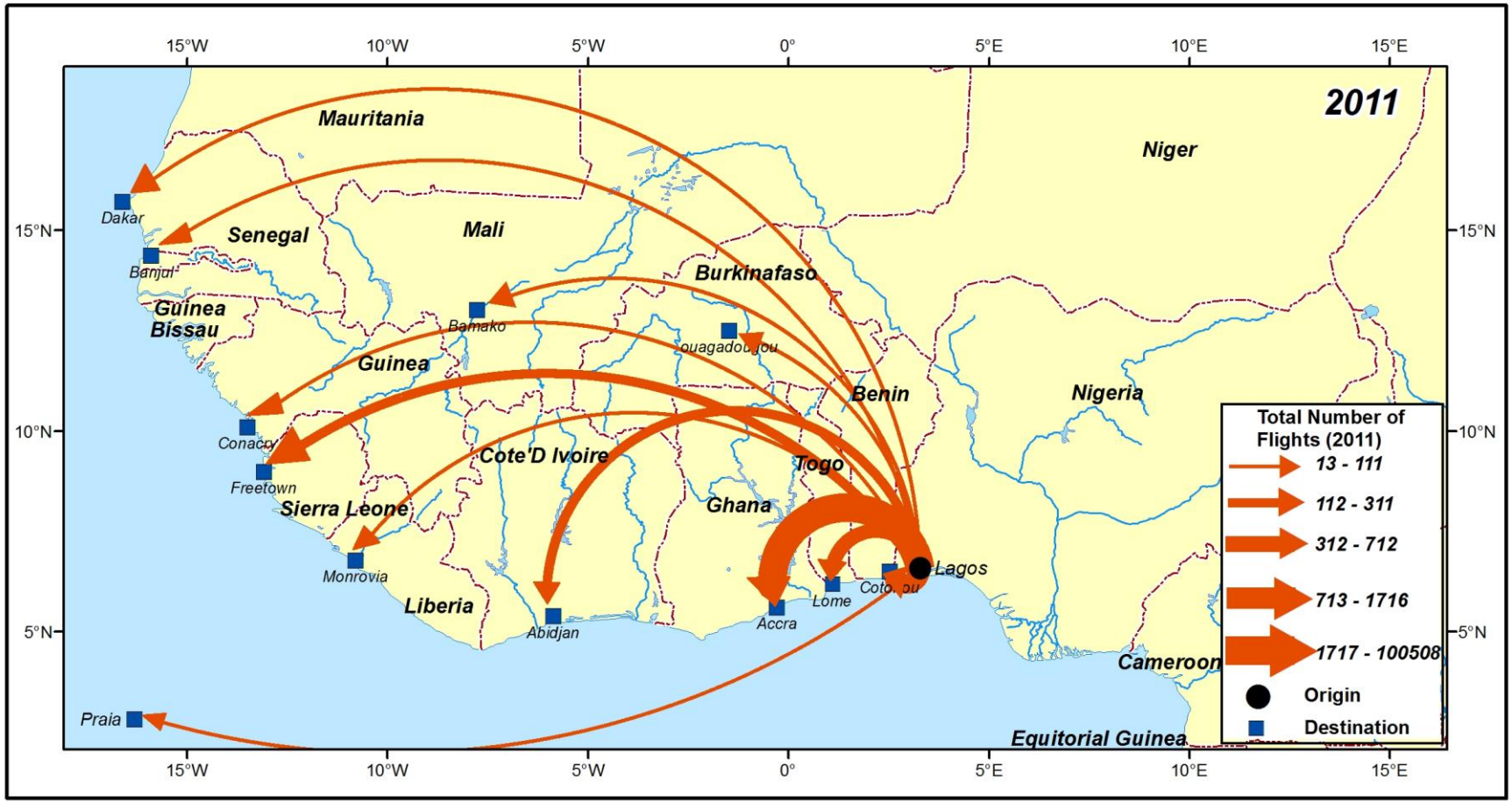

Fig. 4.46: Spatial Pattern of Flight Flow from Lagos, 2011.
Source: Author's Analysis, 2015

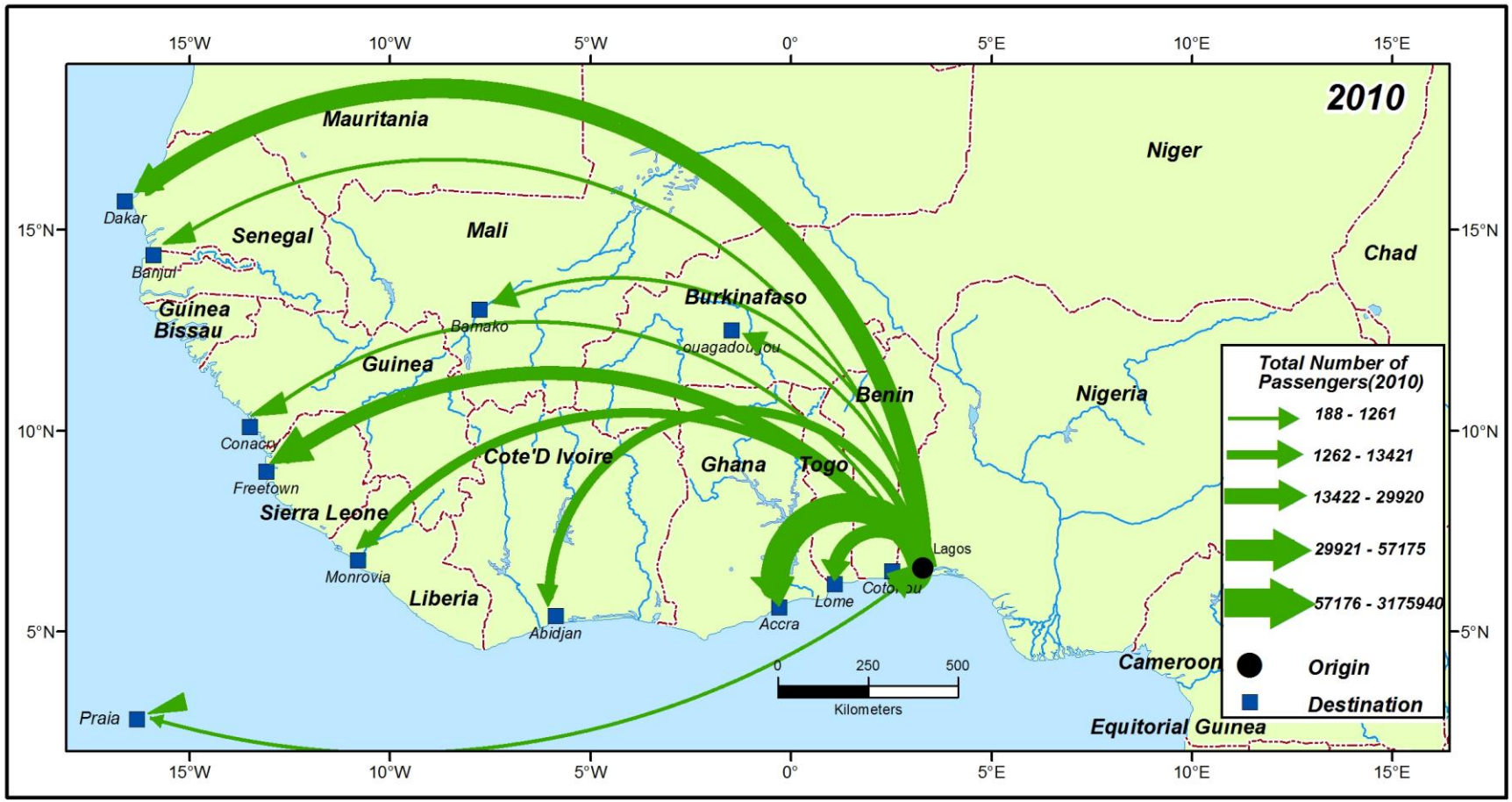

Fig. 4.47: Spatial Pattern of Passenger Flow from Lagos, 2010.
Source: Author's Analysis, 2015

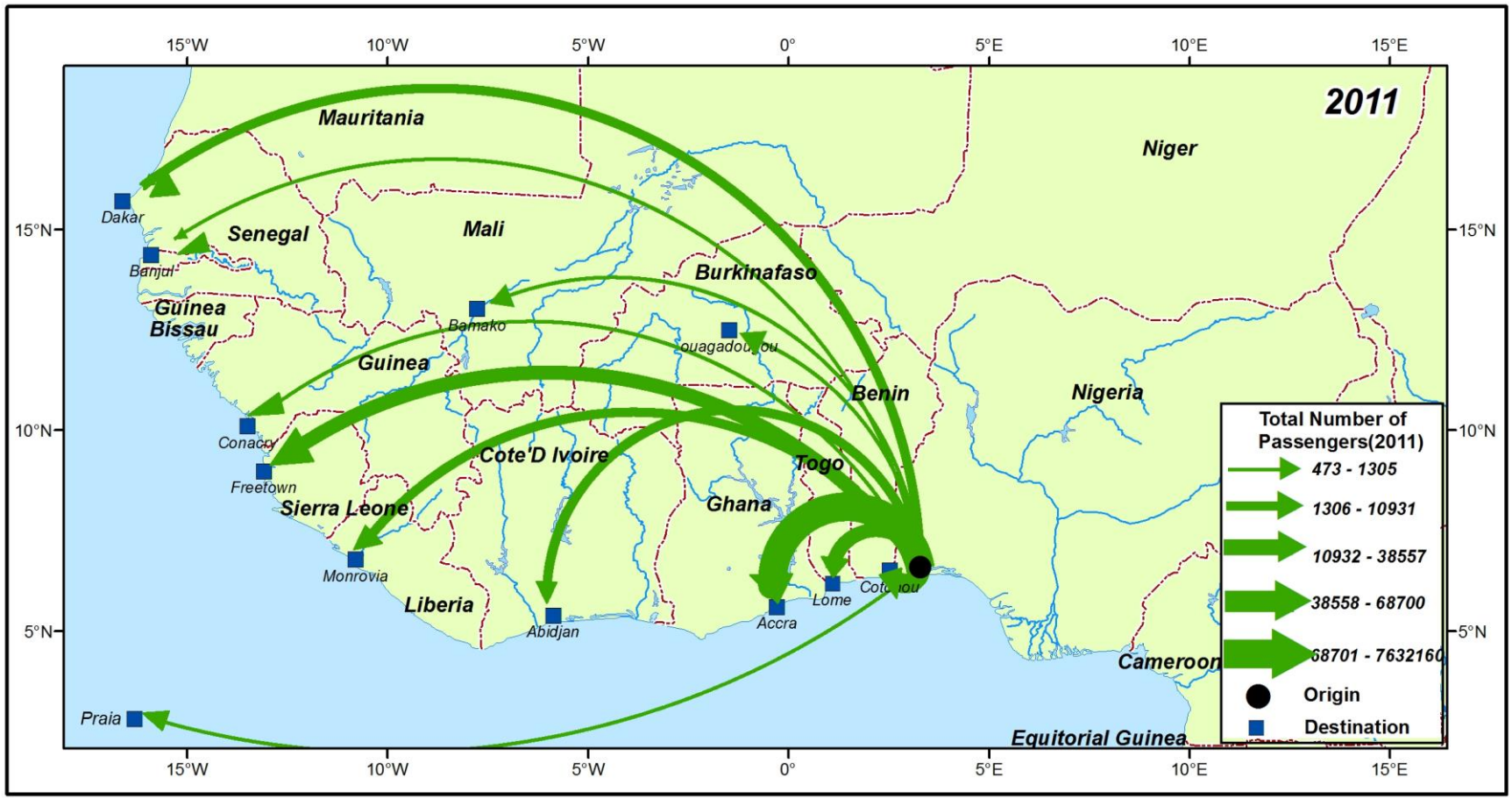

Fig. 4.48: Spatial Pattern of Passenger Flow from Lagos, 2011.
Source: Author's Analysis, 2015

Table 4.28: Traffic between Abuja and other West African Countries 2010

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Abuja – Freetown	16	19	35	4.13	316	384	700	1.80
Abuja – Monrovia	34	41	75	8.90	1997	2534	4531	11.63
Abuja – Dakar	14	11	25	2.95	286	224	510	1.31
Abuja – Conakry	5	12	17	2.01	31	42	73	0.19
Abuja – Accra	212	219	431	50.90	12567	12945	25512	65.49
Abuja – Banjul	2	3	5	0.59	12	14	26	0.07
Abuja – Bamako	9	8	17	2.00	210	205	415	1.07
Abuja – Cotonou	29	31	60	7.08	1150	1242	2392	6.14
Abuja – Lome	34	35	69	8.15	982	1102	2084	5.35
Abuja – Abidjan	29	24	53	6.26	892	905	1797	4.61
Abuja – Ouagadougou	25	23	48	5.67	394	321	715	1.84
Abuja – Praia	8	4	12	1.42	181	17	198	0.51
		Total	847	100		Total	38953	100

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2010

From the Table 4.27 and 4.28, there is a surge in the aircraft and passenger movement especially for the both Lagos-Accra and the Abuja-Accra route. These routes of recent have been the most lucrative for both countries. Part of the reason for the this data is that apart from the local airlines which had increased flight time on this route, the international airlines often linked to this route as part of the extension of their route schedule for connecting flights on the routes(see Table 4.1). Also, the buoyancy of the two nations economic in the sub-region during the period encourages enhanced socio-economic interaction between the two countries.

4.5.11 City pair Aircraft and Passenger flow from Lagos and Abuja 2011

The city pair aircraft and passenger flow from Lagos and Abuja to other West African countries had been very significant in the analysis of the effects of liberalisation on the flow of both aircraft and passenger from Nigerian cities to other West African countries

Table 4.29 shows the traffic between Lagos and other West African countries, it shows data on the city pair, the flight frequency showing the arrival as well as the departure and the city pair share for the aircraft movement and the passenger movement for year 2011. For the aircraft flow, Lagos–Accra (96.73%), for the passenger for the same city pair (97.89%).This is the highest for the whole year for city pair flow. This is followed by Lagos-Cotonou, aircraft (1.65%), passenger (0.88%) and Lagos–Lome, aircraft (0.69%), passenger (0.49%). The city pairs with the lowest for the year are Lagos-Conakry, aircraft (0.09%), passenger (0.03%), Lagos-Praia, aircraft (0.03%), passenger (0.01%), and Lagos-Bamako, aircraft (0.07%), passenger (0.01%).

Table 4.30 shows the analysis of the city pair traffic flow from Abuja to other West African countries for the year 2011.The city pairs with the highest flow from Abuja are Abuja-Accra, aircraft (58.13%), passenger (69.40%), Abuja-Monrovia, aircraft (5.89%), passenger (7.51%) and Abuja-Cotonou, aircraft (7.21%), passenger (6.48%). And the city pairs with lowest for the year from Abuja are Abuja-Banjul, aircraft (0.17%), passenger (0.07%), Abuja-Conakry, aircraft(0.83%), passenger (0.18%) and Abuja-Praia, aircraft(1.49%), passenger (0.51%).

Figure 4.49 and Figure 4.50 show the spatial pattern of flight flow from Abuja to other West African countries from 2010 to 2011. During this period, the distribution of aircraft flow shows a high concentration of flight flow from Abuja to other West African countries from Abuja-Accra, Abuja-Abidjan, Abuja-Monrovia, Abuja-Dakar, Abuja-Cotonou and Abuja-Lome respectively. Whereas, the distribution of flight flows from Abuja-Praia, Abuja-Conakry, and Abuja-Banjul are very low. The distribution reveals that some city pair increases in flight flow from year 2010 and 2011. The Abuja-Accra increases from 431 in 2010 to 701 in 2011, Abuja-Lome, from 69 in 2010 to 77 in 2011, Abuja-Cotonou, from 60 in 2010 to 87 in 2011, Abuja-Abidjan, from 53 in 2010. Also, Abuja-Freetown increases in flight traffic flows from 2010 to 2011. Between 2010 and 2011, the flight flow from Abuja-Conakry, Abuja-Banjul and Abuja-Praia are quite low.

The spatial pattern of passenger flow from Abuja to other West African countries from 2010 to 2011 is shown in Figure 4.51 and Figure 4.52. It shows an increase in the passenger flow pattern from Abuja to Accra, Abuja-Lome, Abuja-Abidjan, Abuja-Cotonou and Abuja-Freetown during the period. The total volume for Abuja-Accra increased from 25512 in 2010 to 33231 in 2011. Vividly, a slight decrease in the flow from Abuja-Dakar was noticed from 2010 to 2011, from 510 in 2010 to 502 in 2011. The flow from Abuja to Monrovia decreases from 4531 in 2010 to 3596 in 2011. The city pair passenger pattern for Abuja-Freetown increases from 700 in 2010 to 822 in 2011. Overall, the flow pattern for the passenger and the flight show erratic patterns both for passenger and flight, however since 2001, there had been an increase in both passenger and freight traffic. Indeed, the spatial pattern of air traffic intensity has increased since liberalisation. The flow map analyses from Figure 4.9 to Figure 4.24 for both passenger and aircraft traffic shows an increase in the intensity of flows from 2001 to 2011.

Table 4.29: Traffic between Lagos and other West African Countries 2011

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Lagos – Freetown	155	156	311	0.30	13337	12585	25922	0.33
Lagos – Monrovia	52	55	107	0.10	4572	4928	9500	0.12
Lagos – Dakar	104	107	111	0.11	4168	4111	8279	0.11
Lagos – Accra	50246	50262	100508	96.73	3799426	3832729	7632155	97.89
Lagos – Conakry	7	6	13	0.01	242	231	473	0.01
Lagos – Bamako	47	27	74	0.07	250	469	719	0.01
Lagos – Banjul	27	21	48	0.05	542	356	898	0.01
Lagos – Cotonou	699	817	1716	1.65	30701	37999	68700	0.88
Lagos – Lome	450	262	712	0.69	20351	18206	38557	0.49
Lagos – Abidjan	116	76	192	0.18	5260	5671	10931	0.41
Lagos – Ouagadougou	40	45	85	0.08	620	685	1305	0.02
Lagos – Praia	14	19	33	0.03	274	293	567	0.01
		Total	103910			Total	7796701	

Source: Computed from Federal Aviation Authority Nigeria and Nigeria Civil Aviation Authority Civil Aviation Statistics 2011

Table 4.30: Traffic between Abuja and other West African Countries 2011

City Pair	Flight Frequency		Total		Passenger Movement		Total	
	Arrival	Departure		(%) City Pair Share	Arrival	Departure		(%) City Pair Share
Abuja – Freetown	14	24	38	2.65	386	436	822	1.72
Abuja – Monrovia	33	38	71	5.89	1466	2130	3596	7.51
Abuja – Dakar	19	20	39	3.23	258	244	502	1.05
Abuja – Conakry	3	7	10	0.83	23	64	87	0.18
Abuja – Accra	351	350	701	58.13	16521	16710	33231	69.40
Abuja – Banjul	2	0	2	0.17	16	18	34	0.07
Abuja – Bamako	14	14	28	2.32	250	146	396	0.81
Abuja – Cotonou	42	45	87	7.21	1502	1602	3104	6.48
Abuja – Lome	36	41	77	6.38	1351	1442	2793	5.83
Abuja – Abidjan	42	29	71	5.89	1236	1076	2312	4.83
Abuja – Ouagadougou	33	31	64	5.31	476	286	762	1.59
Abuja – Praia	12	6	18	1.49	210	32	242	0.51
		Total	1206	100		Total	47881	100

Sources: Computed from FAAN and NCAA Civil Aviation Statistics 2011

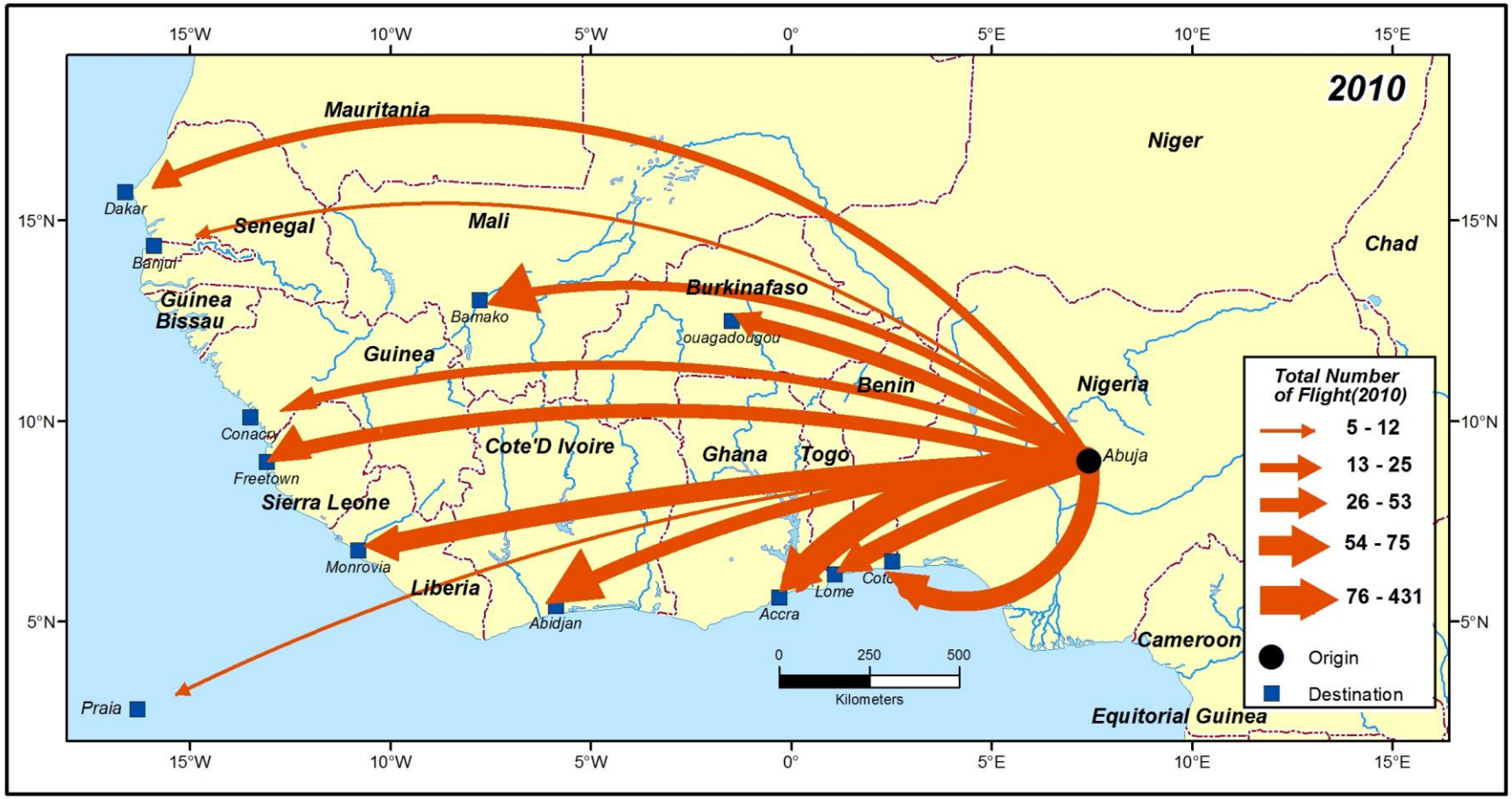

Fig. 4.49: Spatial Pattern of Flight Flow from Abuja, 2010
Source: Author's Analysis, 2015

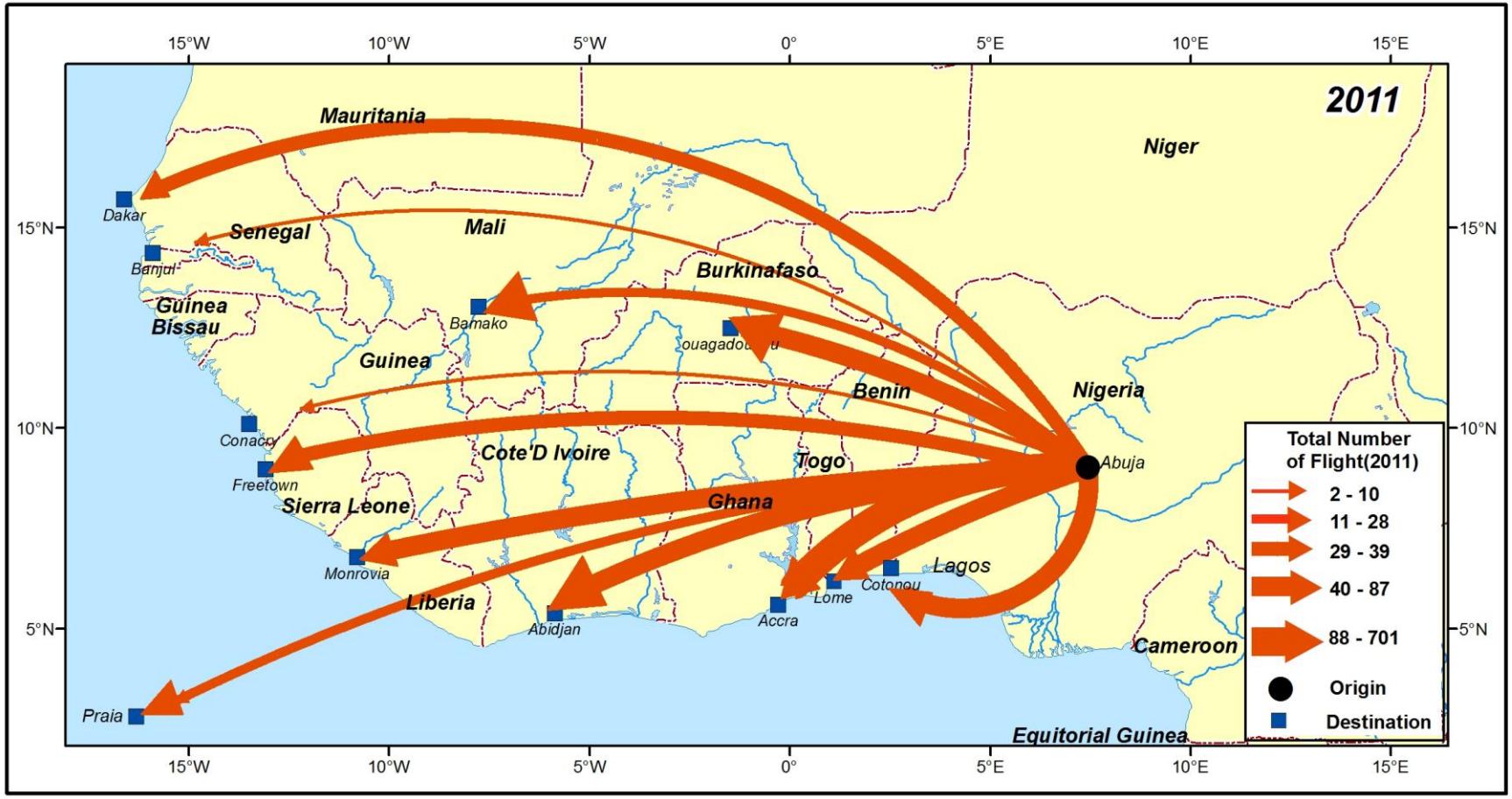

Fig. 4.50: Spatial Pattern of Flight Flow from Abuja, 2011.
Source: Author's Analysis, 2015

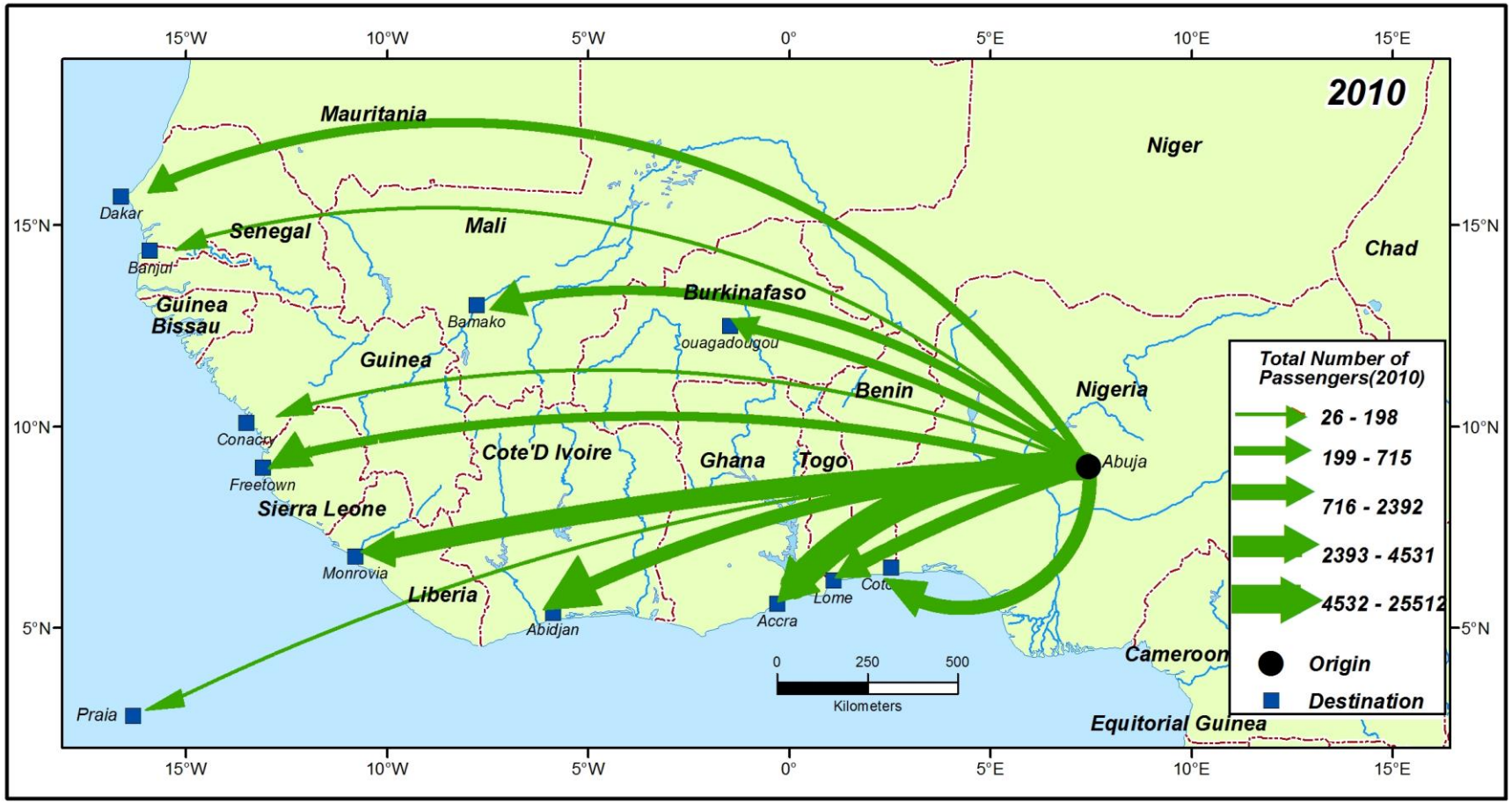

Fig. 4.51: Spatial Pattern of Passenger Flow from Abuja, 2010.
Source: Author's Analysis, 2015

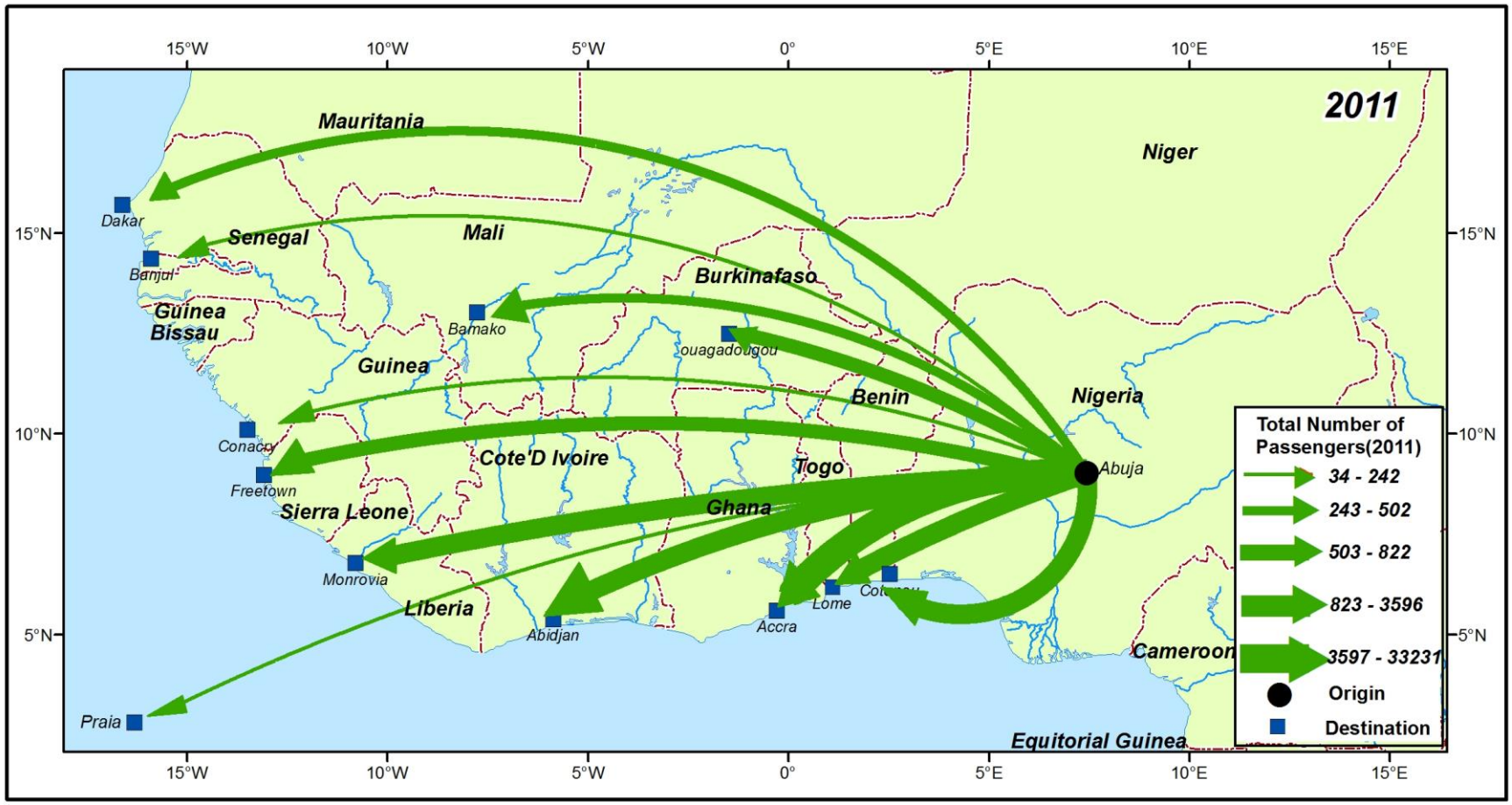

Fig. 4.52: Spatial Pattern of Passenger Flow from Abuja, 2011.
Source: Author's Analysis, 2015

Table 4.29 and 4.30, corroborate with discussion on the Table 4.27 and Table 4.28. These routes, Lagos-Accra and the Abuja-Accra witnessed an increased in the data for 2011 compared with the previous data. Also, there was an increase in the Lagos-Cotonou route compared with the previous year, proximity and economic linkage with Nigeria economic especially that of Lagos might be responsible for this increase. Also during the period of post-liberalisation, Cotonou served as the hub for some airlines into the northward cities in the West African sub-region

4.6 Significance of Departure and Arrival Passenger Flow after Liberalisation

This section examines the relationship between regional city pair flow and the independent city pair flow of arrival and departure passenger flow. The impacts of departure and arrival flow to the regional passenger movement are discussed.

4.6.1 Relationships between Regional City Pair flows and the Departing City flow to Arriving City flow

In studying the impact of liberalisation on the spatial structure of air transportation in West African, the significance of the arriving and the departing passenger flow to total regional flow ought to be ascertained. The significance of this policy relies more on a possible impact relating to arriving city pair flow and the departing city pair flow contributing to the total city pair flow. These flows ought to be considered beyond the mere chance of occurrence of flow for the arrival cities and the departing cities flow. Therefore the relative significance of both the arriving and departing flow ought to be verified scientifically.

The hypothesis which states arrival passenger movement and the departure passenger has influenced regional city pair passenger movement since liberalisation. It shows the impact of the departure passenger flow and the arrival passenger flow to the regional passenger flow. This hypothesis was tested using the paired sample t test to understand the significance of 280 city pair from Nigeria to other West African countries after liberalisation to the total regional passenger flow.

Table 4.31 shows the paired arrival passengers and the departing passengers for 280 city pair contributing to the total flow. The table shows a paired sample t test of the relative significance of the arriving and the departing passenger to the regional flow to and fro from Nigeria within the sub-region. From the paired sample t-test table, the mean is -38459.90909, the standard deviation is 19898.16641, the standard error mean is 5999.52291, the confidence interval lower is -51827.67918, the confidence interval upper is -25092.13900, the t value is 6.410, and the degree of freedom is 10. The significance level is 0.000 which shows the significance of the arrival and departure passenger flows to the overall movement from Nigeria to and fro to the other countries in West Africa.

Table 4.31: Paired T-Test for Arrival Passenger and Departure Passenger City Pair Flow after Liberalisation

Paired Arrival Passenger City-Pair Flow-Departure Passenger City Pair Flow

No.	T-Test Parameters	Results
1	Mean	-38459.90909
2	Std Deviation	19898.16641
3	Std Error Mean	5999.52291
4	Confidence Interval Lower	-51827.67918
5	Confidence Interval upper	-25092.13900
6	t	6.410
7	df	10
8	Sig.(2-tailed)	0.000

Source: Author's Analysis (2015)

4.6.2 Regional Air Transport Flows in West Africa

The socio-economic development of West African communities hinges largely on the sustained flow of these activities among the member states. One basic infrastructure that is vital for these activities requires efficient air transport terminal and effective airlines services to support passenger movement, trade and commerce across the West Africa countries. Therefore, liberalising the air transport subsector for the whole of the sub-region is vital to achieving this objective.

Table 4.32 shows the Economic Community of West Africa Sub-region (ECOWAS) air travel market. It consists of fifteen current member states excluding of Mauritanian who voluntarily pulled out in the year 2000. It consists of variables such as the passenger movement, cargo movement, aircraft movement, population, surface area and the level of economic activities measured by the gross domestic product (GDP). The highest flow recorded by countries in terms of passenger flow, cargo flow and aircraft movement are from Nigeria, Ghana and Cape Verde. The air transport market in West Africa is largely dominated by Nigeria and Ghana specifically.

Table 4.32: The ECOWAS Air Travel Market 2013

Country	PAX In Thousand	CARGO TON in Thousand	AIRCRAFT in Thousand	POPULATION In Million	SURFACE KM2 in Thousand	GDP In Billion Naira
BENIN	476.704	7.616	12.309	9.9	112.760	8.30
BURKINA FASO	523.355	7.011	9.936	17.8	273.600	12.2
CAPE VERDE	1957.747	3.0615	28.702	0.53	4.030	1.9
COTE D'IVOIRE	1152.887	17.548	18.195	22.4	318.000	28.2
GAMBIA	348.248	1.3873	5.298	1.88	10.120	0.90
GHANA	2447.989	23.437	43.688	25.2	227.540	44.2
GUINEA	331.558	3.967	8.596	11.18	245.720	6.3
GUINEA BISSAU	121	0.4	1.100	1.66	28.120	9
LIBERIA	193.175	8.6214	3.456	3.99	96.320	1.9
MALI	572.105	10.047	10.296	15.97	1220.190	11.1
NIGER	203.487	3.201	7.016	16.9	1266.700	7.4
NIGERIA	14853.248	246.2388	245.398	175	910.770	286.5
SENEGAL	1883.806	25.195	22.955	13.3	192.530	15.1
SIERRA LEONE	227.649	4.6937	3.003	5.6	71.620	4.8
TOGO	538.697	4.004	10.228	7.15	54.390	4.4
TOTAL	25831.655	366.432	430.176	328.46	5032.41	434

Sources :Ganemtore (2013), ECOWAS Commision (2013)

CHAPTER FIVE

REGIONAL TRAVEL CHARACTERISTICS PATTERN AND ATTRIBUTES FROM NIGERIA TO WEST AFRICAN COUNTRIES

This chapter examines the regional travel characteristics pattern and attributes. It describes the demographic and socio-economic factors influencing regional travel pattern from Nigeria to other West African countries. It examines the characteristics, purpose and frequency of inter-city trips before and after liberalisation. The difficulties encountered in the regional trip for both periods are discussed. The perspectives of regional air travel service and the factors affecting regional accessibility, choice of airline and the level of service characteristics before and after liberalisation are discussed. In addition, the challenges to regional city accessibility are discussed under the two eras.

5.1 Demographic and Socio-Economic factors in Regional Travel Pattern from Nigeria to other West African countries

The socio-economic factor plays a key role in the evolving travel patterns from Nigeria to other West African countries in both the pre- and post-liberalisation. The key socio-economic indicators considered for this study are sex, age, marital status, nationality, household size, education, occupation and income.

Table 5.1 shows that 275 (64.3%) of the respondents are males while 153 (35.7%) of the respondents are females. The marital status of the respondent reveals that single 3 (0.7%), married 386 (90.2%), widowed 18 (4.2%), divorced 14 (3.3%) and separated 7 (1.6%). Also, the distribution of the occupation of the respondent reveals that self-employed had (36.0%), farmer (0.9%), private sector employed (30.8%), professional (12.4%), civil servant (17.1%) and others (2.8%). Implicit in this, the majority travellers from Nigeria along the West African routes are business people, private sector employed, civil servants and professionals. The distribution of the nationality that flew from Nigeria to other West African countries during both eras is as follows: Nigerians had 288 (67.3%), Ghanaians 76 (17.8%), other West African 57 (13.3%) and other Africans 7 (1.6%). In another vein, the household size of the travellers from Nigeria to West African routes are as follows: the respondents with 1-2 household had 105 (24.5%), 3-4 household 203 (47.4%), 4-6 household 119 (27.8%) and others 1 (0.2%). In addition, the

education of the respondent is distributed as follows: senior secondary school education had 58 (13.6%), technical college/vocational centre degree 98 (22.9%), with HND/B.ED/B.Sc 157 (36.7%), post-graduate degrees 107(25.0%) and others 8 (1.9%). Most of the travellers along the West African route have basic education and can express themselves well. And for ages of the respondents, the number within the age range of 41-50 had 125 (29.2%) while age range of 51-60 had 267 (62.4%) which is the highest age range among respondents. The last age range of 61-70 had 36 (8.4%). The income distribution of the respondents, N50000-N150000 had 6 (1.4%) while the ranges between N151000-N250000 had 152(35.5%) and the range between N251000-N400000 had 270 (63.1%).

Table 5.1: Demographic and Socio-economic Characteristics of the Respondents

S/No.	Characteristics	Status	Frequency	Percentage
1	Age	41 – 50	125	29.2
		51 – 60	267	62.4
		61 – 70	36	8.4
2	Sex	Male	275	64.3
		Female	153	35.7
3	Income	N50000 –N150000	6	1.4
		N151000 –N250000	152	35.5
		N251000 – N400000	270	63.1
		N400000 above	0	0
4	Marital Status	Single	3	0.7
		Married	386	90.2
		Widowed	18	4.2
		Divored	14	3.3
		Separated	7	1.6
5	Household Size	1 – 2	105	24.5
		3 – 4	203	47.4
		5 – 6	119	27.8
		Others	1	0.2
6	Educational	Senior Secondary School	58	13.6
		Technical College/Vocational	98	22.9
		HND/B.ED/B.Sc. degree	157	36.7
		Postgraduate Degree	107	25.0
		Others	8	1.9
7	Nationality	Nigerian	288	67.3
		Ghanan	76	17.3
		Other West African	57	13.3
		African	7	1.6
8	Occupation	Self – employed	154	36.0
		Farmer	4	0.9
		Private sector employed	132	30.9
		Professional	53	12.4
		Civil servant	73	17.1
		Others	12	2.8

Source: Author's Field Survey 2015/2016

5.2 Regional Trip Pattern Characteristics of Respondents

This section examines the regional trip pattern characteristics of respondent. The purpose of regional trip characteristics is discussed. Also the frequencies and difficulties of regional inter-city trip characteristics are discussed. It examines the perspectives of passenger and cargo processing before and after liberalisation.

5.2.1 Regional Inter-City Trips Pattern before and after Liberalisation

Part of the remarkable influence of the liberalisation policy along regional travel from Nigeria to other West African countries is that there had been remarkable changes in the number of trips made in a month from Nigeria to other West African countries from pre-liberalisation to post-liberalisation eras. Table 5.2 shows that total number of trips in a month had increased from three to five in a month from Nigeria to other West African countries. The single trip in a month had the highest frequency of 312 in the pre-liberalisation era against 2 for the trip in a month and a frequency of 239 for the post-liberalisation period. All in all, the respondents' trip pattern along West African route from Nigeria had changed remarkably in terms of increases in monthly trips made on this route as shown in Table 5.2.

Table 5.2 shows the distribution of trips making pattern during the pre-liberalisation era from Nigeria to other West African countries. It shows the following distribution, those with one trip in a month had 312 (72.9%) from Nigeria to other West African countries, two trips in month 109 (25.5%) from Nigeria to other West African countries and three trips in a month 7 (1.6%) from Nigeria .While the post-liberalisation, one trip in a month had 2 (0.5%) from Nigeria to other West African countries, two trips in a month 239 (55.8%) from Nigeria to other West African countries and three trips in a month 103 (24.1%) from Nigeria. In addition, four trips in a month 74 (17.3%) and lastly five trips in a month had 10 (2.3%).

Table 5.2: Number of Regional Trips in a month before and after Liberalisation

Pre-Liberalisation Era			Post- Liberalisation Era	
Number of Trip	**Number of Respondents**	**Percentage**	**Number of Respondents**	**Percentage**
1	312	72.9	2	.5
2	109	25.5	239	55.8
3	7	1.6	103	24.1
4		0.0	74	17.3
5	-		10	2.3
	-			
Total	428	100	428	100

Source: Author's Field Survey 2015/2016

5.2.2 Purpose of Regional City Pair Trip of Respondents from Nigeria to West African

The purpose of regional city pair trips had changed significantly from the period of pre-liberalisation to the post-liberalisation eras. The respondents have both experienced air travel along the western regional countries from Nigeria during the both pre-liberalisation and post-liberalisation eras. For instance, the purpose of trips during both periods range from schooling, work related business, personal business, working, social visit, recreational/vacation, shopping, medical and tourism.

Table 5 shows the purposes of trips during the pre-liberalisation era and they are as follows: trips on schooling had 180 (42.1%), work related business 59 (13.8%), personal business 8 (1.9%), working 10 (2.3%), social visit 104 (24.3%), recreational/vacation 34 (7.9%), shopping 30 (7.0%), medical 1 (0.2%) and tourism 2 (0.5%). It reveals that during the pre-liberalisation era, schooling, work related business, social visit and recreational/vacation majorly constituted the reason for travel during this period.

Table 5.3 shows the purposes of trips in the post liberalisation period, the purposes of trip are as follows: work related business had 18 (4.2%), personal business 142 (33.2%), working 131 (30.6%), social visit 23 (5.4%), recreational/vacation 27 (6.3%), shopping 16 (3.7%), medical 33 (7.7%), and tourism 38 (8.9%). There is a change in the purposes of travel in the post-liberalisation period as personal business, working, medical and tourism were the major reason for travel in the post-liberalisation era.

Table 5.3: Purpose of Regional City Pair Trips before and after Liberalisation

		Pre- Liberalisation Era		Post-Liberalisation Era	
S/Nos	Purpose of trips	Frequency	Percentage	Frequency	Percentage
1	Schooling	180	42.1	-	-
2	Work related Business	59	13.8	18	4.2
3	Personal business	8	1.9	142	33.2
4	Working	10	2.3	131	30.6
5	Social visit	104	24.3	23	5.4
6	Recreational/vacation	34	7.9	27	6.3
7	Shopping	30	7.0	16	3.7
8	Medical	1	.2	33	7.7
9	Tourism	2	.5	38	8.9
	Total	428	100	428	100

Source: Author's Field Survey 2015/2016

5.2.3 Frequency of Regional Inter-City Trip of Respondents from Nigeria to other West African Countries

As part of examining the influence of liberalisation on the regional intercity trip pattern of respondents, the study examines the frequency of regional trip pattern of respondents. The parameter of measurement was examined along with the following movement patterns such as the daily, weekly, fortnightly, monthly, yearly and others. These frequencies were examined by dividing the trips pattern categories into trips frequency before liberalisation and trips frequency after liberalisation.

Table 5.4 shows the trips frequencies during the period of pre- liberalisation era. It reveals the following pattern, respondent with 1 (0.2%) had a daily frequency, 1 (0.2%) weekly, 30 (7.0%) fortnightly, 306 (71.5%) monthly, 86 (20.1%) yearly, 4 (0.9%) for others. Implicit in the foregoing statistics, the frequency of regional inter-city trip during the period of pre-liberalisation era reveals that monthly travels along the regional route from Nigeria occupied the dominant frequency during the pre-liberalisation. Also, the respondent who travelled along this regional route yearly follows in percentage Figure after the monthly frequency in the pre-liberalisation era.

In another vein, during the post-liberalisation era, the following frequency pattern emerged. The daily frequency as analysed from the respondent surveyed had 1 (0.2%), weekly 36 (8.6%), fortnightly 301 (70.3%), monthly 79 (18.5%), yearly 11 (2.6%) and others had nil. Comparatively, as shown in Table 5.4 below, generally the frequency of trips along the regional route from Nigeria seems to be higher in the post-liberalisation era than the pre-liberalisation era.

Table 5.4 Frequency of Regional Inter Country Trip by Respondents

		Pre-Liberalisation		Post-liberalisation Era	
S/No	**Frequency of Trips**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
1	Daily	1	.2	1	.2
2	Weekly	1	.2	36	8.6
3	Fortnightly	30	7.0	301	70.3
4	Monthly	306	71.5	79	18.5
5	Yearly	86	20.1	11	2.6
6	Others	4	.9	-	-
	Total	428	100	428	100

Source: Author's Field Survey 2015/2016

5.2.4 Difficulties Encountered during City Pair Air Travel before and after Liberalisation

The study examines the difficulties faced by the respondents who had travelled along this route in pre-liberalisation and post-liberalisation eras. The essence is to understand the different difficulties faced by travellers from Nigeria to other West African countries in the pre-liberalisation and post-liberalisation eras. The policy makers, as well as researchers, might be interested in redirecting policies to tackle the numerous challenges identified.

Table 5.5 shows the different difficulties faced by the respondents. For the period of pre-liberalisation, the identified difficulties are flight availability, socio-cultural constraints, delays, flight cancellations, theft and touting. However, during the post-liberalisation era, the identified coded variable themes are customer service issues, flight availability, delays and infrastructure inadequacy. Table 5.5 shows the distribution among the respondents in the pre-liberalisation. The flight availability had 158 (36.9%), socio-cultural constraints 69 (16.1%), delays 68 (15.9%), flight cancellation 73 (17.1%), theft 40 (9.3%) and touting had 20 (4.7%).

However, the identified difficulties in post-liberalisation era are as follows: customer service issues had 104 (24.3%), flight availability 102 (23.8%), delays 58 (13.6%) and infrastructure inadequacy had 164 (38.3%). Though both periods there seem to be different difficulties faced by the travellers from Nigeria to other West African countries; however the major that pervades both periods is the flight availability. Therefore, there is the need for more capacity development in the West African sub-region aviation subsector to enhance flow flows and improve trade and socio-economic development.

Table 5.5: Difficulties Encountered in getting to Destination Cities during City Pair Travel along Regional Route from Nigeria

	Pre-Liberalisation			Post- Liberalisation Era		
S/No	**Difficult**	**Frequency**	**Percentage**	**Difficult**	**Frequency**	**Percentage**
1	Flight availability	158	36.9	Customer service issues	104	24.3
2	Social cultural	69	16.1	Flight availability	102	23.8
3	Delays	68	15.9	Delays	58	13.6
4	Flight cancelations	73	17.1	Infrastructure inadequacy	164	38.3
5	Theft	40	9.3		-	-
6	Touting	20	4.7		-	
	Total	428	100	Total	428	100

Source: Author's Field Survey 2015/2016

5.2.5 Perceptions of Passenger on Cargo Processing

Two vital components of air travel carriages are the passenger and the cargo. It provides the basis for assessing air transport system efficiency. As the effectiveness of the air transport system are measured by how fast these two components are handled at the different air terminals across the globe. Policy initiation and recommendation are often geared towards improving processes relating to passenger and cargo handling. Therefore this study examines the impact of liberalisation on cargo and passenger effectiveness along the West African route from Nigeria to other regional cities. The perspectives on passengers who have travelled along the route in both the pre- and post-liberalisation era are the vital link to policy strength and reliability in bringing about commendable changes and transformation.

Table 5.6 shows the perspectives of passengers on cargo processing. This was assessed based on the perceptions in the pre- and post-liberalisation era. The following ratings of services among respondents were identified in the pre-liberalisation era. During this era, the perception on excellent had 2 (0.5%), very good 8 (1.9%), 106 (24.8%) good, fair 303 (70.8%) and poor had 9(2.1%). The deduction from this data is that generally during the pre-liberalisation era, the rating of services as it affects passenger and cargo were largely fair.

However, during the post-liberalisation era, the ratings of services are as follows: excellent 11 (2.6%), very good 113 (26.4%), good 276 (64.5%), fair 27 (6.3%) and poor had 1 (0.2%). Comparatively, the post-liberalisation sees significant improvement in the handling of passenger and cargo than in the pre-liberalisation era.

Table 5.6 Perceptions of Passenger and Cargo Processing

		Pre-Liberalisation		Post-Liberalisation	
S/No.	**Perceptions**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
1	Excellent	2	.5	11	2.6
2	Very good	8	1.9	113	26.4
3	Good	106	24.8	276	64.5
4	Fair	303	70.8	27	6.3
5	Poor	9	2.1	1	.2
	Total	428	100	428	100

Source: Author's Field Survey 2015/2016

5.3 Travel Characteristics of Respondents

This section examines the travel characteristics of respondents. The perceptions of air travel characteristics and factors that influence accessibility and choice of an airline from Nigeria to other West African countries are discussed. Also, the perceptions on the level of frequencies of flight activities, level of service and accessibility of regional city pair from Nigeria. Finally, it examines the challenges relating to regional city accessibility from Nigeria in the pre- and post liberalisation.

5.3.1 Perceptions of Air Travel Service Characteristics

The air travel service characteristics are very effective measure in the air transport service delivery. It helps us to understand the impact of new policy on an existing air transport systems. Typical parameters used in this study are flight availability, baggage handling, and quality of flight service, customs, immigration and security procedures, the perception of flight safety and flight bookings. These were assessed based on the two-time-frame of pre- and post-liberalisation. The perspectives of the respondents on these two periods are analysed.

Table 5.7 shows the perspectives of respondents on air travel characteristics. It was measured on the following air travel services scales of lowest, fairly low, moderate, fairly high and highest. The following ratings of services among respondents were identified in the pre-liberalisation era. The respondents with the lowest rating had 7 (1.6%), fairly low 299 (69.9%), moderate 106 (24.8%) and fairly high 16 (3.7%). However, for the post-liberalisation period, the following are the analyses on passenger perspectives on air travel services: the respondents with the lowest had 1 (0.2%), fairly low 17 (4.0%), moderate 144 (33.6%), fairly high 257 (60.0%) and highest had 9 (2.1%).

Implicit from the above, the impact of liberalisation on the air travel service characteristics was significant. There have been significant improvements in the service delivery as measured by the perspectives of respondents in the air service parameters in both the pre-liberalisation and the post-liberalisation eras.

Table 5.7: Perceptions of Air Travel Service Characteristics

Pre- Liberalisation			**Post-Liberalisation**		
(Parameters: Flight availability, Baggage Handling, Quality of flight service, customs, Immigration and security procedures, perception of flight safety, flight booking)					
S/No	**Pre-Liberalisation**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
1	Lowest	7	1.6	1	0.2
2	Fairly low	299	69.9	17	4.0
3	Moderate	106	24.8	144	33.6
4	fairly high	16	3.7	257	60.0
5	Highest	-	-	9	2.1
	Total	**428**	**100**	**428**	**100**

Source: Author's Field Survey 2015/2016

5.3.2 Factors that influence Accessibility and Choice of Airline from Nigeria to other West African countries

As part of the research effort to understand the factors that contributed to the accessibility and choice of the airline from Nigeria in the pre and post-liberalisation era, the respondents were asked to describe the factor that influences their choice of an airline in both periods. The descriptions were further recoded into the specific theme of influence also known as factor theme. For the period of the pre-liberalisation era, the following accessibility factors were identified – national pride, economic consideration, flight availability, good flight services and aircraft and airline brand. However, for the post-liberalisation era, the accessibility factors identified are customer service, safety, fares, promotions and publicity. Table 5.8 shows the respondents distribution for the accessibility factors in both the pre and post-liberalisation era. In the pre-liberalisation era, the respondents had the following accessibility factor. The national pride had 98 (22.9%), economic consideration 88 (20.6%), flight availability 85 (19.9%), good flight services 101 (23.6%) and aircraft and airline brand had 56 (13.1%). But in the post-liberalisation period, the following are the distribution: customer service had 92 (21.5%), safety 88 (20.6%), fares 110 (25.7%), promotions 72 (16.8%), and publicity had 66 (15.4%).

From the above it is discernible that the factor themes in both periods that influence the choice of airline selection differs, for instance, the major factor that influences the choice of the airline selection in the pre-liberalisation era is good flight services while in the post-liberalisation era the significant factor that influences airline selection from the respondent is the fares.

Table 5.8: Factor that influences Accessibility and Choice of Airline from Nigeria to other West African countries

	Pre- Liberalisation Era			Post-Liberalisation Era		
S/No	**Accessibility Factor**	**Frequency**	**Percentage**	**Accessibility Factor**	**Frequency**	**Percentage**
1	National pride	98	22.9	Customer service	92	21.5
2	Economic consideration	88	20.6	Safety	88	20.6
3	Flight availability	85	19.9	Fares	110	25.7
4	Good flight services	101	23.6	Promotions	72	16.8
5	Aircraft &Airline brand	56	13.1	Publicity	66	15.4
	Total	428	100		428	100

Source: Author's Field Survey 2015/2016

5.3.3 Perceptions of the Level of Frequencies of Flight activities from Nigeria to West African

The intensity of interaction among regions in space is determined by the level of air connectivity. These links are also influenced by the degree or level of flight between candidate set of cities. In this light, the interaction or the linkage between Nigeria and West African is determined by the air transport linkage as well as the level of flight activities from Nigeria to West African countries. Therefore, understanding the level of flight frequencies by air passenger along the route in both the pre-liberalisation and post-liberalisation eras is critical to assessing the impact of policy intervention of liberalisation.

The perception of the level of frequencies of flight activities from respondents in Nigeria to other West African countries in the pre-liberalisation is discussed. The respondents perception on excellent had 1 (0.2%), very good 19 (4.4%), 198 good (46.3%), and fair had 210 (44.1%). In the post-liberalisation era, the perception on excellent had 25 (5.8%), very good 241 (56.3%), good 150 (35.0%), fair 10 (2.3%) and poor had 2 (0.5%).

Therefore, comparing the respondents' perceptions from both the pre-liberalisation and post-liberalisation eras, as observed in the foregoing paragraph as observed. It reveals the impact of liberalisation policy on the level of frequency of flight activities from Nigeria to other West African countries. It shows that the respondents enjoyed more flight frequency more during the post-liberalisation era than the pre-liberalisation era.

Table 5.9: Perception on the Level of Frequency of Flight activities from Nigeria to other West African Countries

		Pre-Liberalisation		Post-Liberalisation	
S/No.	**Level of flight**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
1	Excellent	1	.2	25	5.8
2	Very good	19	4.4	241	56.3
3	Good	198	46.3	150	35.1
4	Fair	210	44.1	10	2.3
5	-	-		2	0.5
	Total	428	100	428	100

Source: Author's Field Survey 2015/2016

5.3.4 Perceptions of the Level of Services and Accessibility of Regional City Pair from Nigeria to other West African before and after Liberalisation

The level of efficiency of airline services in air transport is a very important parameter of policy adoption. The range of impact, which could either be positive or negative, reveal a lot about the success and failure of regional air transport liberalisation. Part of the relevant indicator of air transport measure is the level of services of the airline carrier. Competition through liberalisation has signalled changes in the level of services delivery. This creates dynamics for assessing the regional cities from Nigeria to other West African countries. These perspectives are evaluated from passengers' responses to the level of services offered by the airlines operating along the regional route from Nigeria to other West African countries.

Table 5.10 shows the data on the perspective of carrier's level of services and regional cities accessibility from Nigeria to other West African countries. It reveals the carrier's service level before liberalisation. The perception of respondents on carrier level of services on very good had 32 (7.5%), good 190 (44.4%), fair 157 (36.7%), poor 49 (11.4%). However, during the post-liberalisation period, respondents perception on carrier's levels of services have the following distributions, excellent had 10 (2.3%), very good 121 (28.3%), good 286 (66.8%), fair 11 (2.6%) and poor had nil.

Comparatively, it reveals that the post-liberalisation era witnessed a better carrier's level of services compared with the pre-liberalisation era. In the post-liberalisation varieties of services, the offering was created to attract more passengers along the regional route from Nigeria. Table 5.10 reflects the perspective of passengers from Nigeria in the post-liberalisation.

Table 5.10: Perceptions of Carrier's Level of Services and Accessibility of Regional City Pair from Nigeria to other West African Countries

		Pre-Liberalisation		Post-Liberalisation	
S/Nos	**Carrier's Services Level**	**Frequency**	**Percentage**	**Frequency**	**Percentage**
1	Excellent	-	-	10	2.3
2	Very good	32	7.5	121	28.3
3	Good	190	44.4	286	66.8
4	Fair	157	36.7	11	2.6
5	Poor	49	11.4	-	-
	Total	428	100	428	100

Source: Author's Field Survey 2015/2016

5.3.5 Challenges to Regional City Accessibility from Nigeria to other West African Countries

One of the objectives of this study is to examine the challenges faced in the regional city accessibility from Nigeria to other West African countries before and after liberalisation. The essence is to look at the impact of liberalisation on the flow of passengers from Nigeria to other West African countries. The challenges identified by the passenger were recorded into specific factor themes. During the period of pre-liberalisation era, the challenges are aviation infrastructure, managerial crises, insufficient capacity and entry restriction. While in the post-liberalisation, the following are the challenges: inadequate linkages, capacity deficiency, policy mismatch, weak regional intervention and economic crisis.

Table 5.11 shows that during the period of the pre-liberalisation, the distribution among the respondents on the challenges to regional accessibility is as follows: aviation infrastructure had 105 (36.5%), managerial crises 98 (22.9%), insufficient capacity 102 (23.8%) and entry restriction 123 (28.7%).While in the post-liberalisation the following are the distribution: inadequate linkage 85 (19.9%), capacity deficiency 80 (18.7%), policy mismatch 86 (20.1%), weak regional intervention 81 (18.9%) and economic crises 96 (22.4%). Further, to accentuate some of the challenges faced during the pre-liberalisation era, one of the veteran pilots of the Nigerian Airways interviewed mused thus:

> *Then the fleet capacity deployed on the regional route was basically to cover some few countries along the west coast and lack of passengers en route is often evident* (IDI/Nigeria Airways/ Pilot/2015).

Also, another veteran who had occupied the managerial position with Nigerian Airways shed more light on the challenges faced by the airline along the regional route as:

> *Most of the countries along the west coast have economic challenges and as such could not provide good aviation facilities. Also, the motive for regional flight during pre-liberalisation was purely nationalistic rather than for profit gains and professionalism*(IDI/Nigeria Airways/ Management Staff/2015).

However, for the post-liberalisation era, the challenges are also evident but with another dimension. In the post-liberalisation, the dominant airline from Nigeria plying the regional route from Nigeria are the Arik Airways and the Aero Contractor, they have the greater share of passenger traffic. When asked about the challenges faced by the airlines along the regional route they shared the following:

> *The growth of regional route development has slowed down due to weak regional aviation framework that would enhance regional open sky policy and regional air transport infrastructure development. Though in the recent times, we witnessed a fair improvement in the passenger traffic along the regional route, however, this seems more disproportionate among the countries* (IDI/Arik Airways/ Network and Route Planner/2015).

> *The major challenges we faced on the regional route from Nigeria is that of lack of funding to enhance capacity* (IDI/Aero Contractor/ Route Planner/2015).

Table 5.11: Challenges to Regional City Accessibility from Nigeria to West African Countries

	Pre-Liberalisation Era			Post Liberalisation Era		
S/No	**Challenges**	**Frequency**	**Percentage**	**Challenges**	**Frequency**	**Percentage**
1	Aviation Infrastructure	105	24.5	Inadequate linkage	85	19.9
2	Managerial Crisis	98	23.0	Capacity Deficiency	80	18.7
3	Insufficient Capacity	102	23.8	Policy Mismatch	86	20.1
4	Entry Restriction	123	28.7	Weak regional Intervention	96	22.4
				Economic Crisis	81	18.9
	Total	428	100		428	100

Source: Author's Field Survey 2015/2016

5.3.6 Most Visited Destinations from Nigeria to West African Countries

This section highlights the most visited cities in West Africa from Nigeria cities. This is noteworthy because it depicts the pattern of flow of passenger from Nigeria to other West African countries. It helps to identify the strength of flow in both the pre-liberalisation and the post-liberalisation eras.

Table 5.12 shows the most visited destination during the period of pre- and post-liberalisation eras. In the pre-liberalisation Ghana/Accra had 125 (29.2%), Sierra-Leone/Freetown 85 (19.9%), Senegal/Dakar 72 (16.8%), Liberia/Monrovia 42 (9.8%), Cote d'lvoire/Abidjan 104 (24.3%), however, in the post-liberalisation, the following are the statistics: Ghana/Accra 108 (25.2%), Sierra leone/Freetown 48 (11.2%), Senegal/Dakar 58 (13.6%), Liberia/Monrovia 32 (7.5%), Cote d'lvoire/Abidjan 64 (15%), Gambia/Banjul 15 (3.5%), Togo/Lome 44 (10.3%), Benin/Cotonou 34 (7.9%) and Mali/Bamako 25 (5.8%).

It reveals that most visited destination from Nigeria to other West African countries is Ghana/Accra in both the pre-liberalisation and the post-liberalisation eras. Apart from Ghana, the other countries in West Africa are Senegal, Cote d'lvoire and Togo. The study reveals that from statistics the economic conditions of nations in the West African sub region determine their socio-economic interaction. The big economy of the West Africa countries physically interacts more with one another when compared with the smaller one.

Table 5.12: Most Visited Destinations from Nigeria to West African Countries

	Pre-Liberalisation Era			Post-Liberalisation Era		
S/No.	**Most Visited**	**Frequency**	**Percentage**	**Most Visited**	**Frequency**	**Percentage**
1	Ghana/Accra		29.2	Ghana/Accra		25.2
2	Sierra leone/Freetown	125 85	19.9	Sierra leone/Freetown	108 48	11.2
3	Senegal/Dakar	72	16.8	Senegal/Dakar	58	13.6
4	Liberia/Monrovia	42	9.8	Liberia/Monrovia	32	7.5
5	Cote d'lvoire/Abidjan	104	24.3	Cote d'lvoire/Abidjan	64	15
6				Gambia/Banjul	15	3.5
7				Togo/Lome	44	10.3
8				Benin/Cotonou	34	7.9
9				Mali/Bamako	25	5.8
				Total	428	100
	Total	428	100			

Source: Author's Field Survey 2015/2016

CHAPTER SIX

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATION

6.1 Summary of Findings

This work complemented the existing literature on the effects of policy on the spatial structure of air transportation. While most works focused basically on the domestic network, this study seeks to identify the impact of liberalisation on the regional network from Nigeria to other West Africa. It employs both primary and secondary data. In addition, it is comparative on several attributes of traffic flow in pre- and post-liberalisation context. No doubts, the impact of liberalisation on the regional network have been so significant; some of the impacts are highlighted in this study.

This study shows that the regional air network structure from Nigeria to other West African countries has changed immensely from the pre-liberalisation era to post-liberalisation era. The air network structure has been transformed from a purely linear point to point west coast bound structure from Nigeria to a denser web linking the west coast and the northern cities in a hub and spoke structure. Initially, during the pre-liberalisation era, from Nigeria we have a single hub at Lagos from where all the regional flights are routed along the west coast, however, in the post-liberalisation, the hub has increased to two within the country-Lagos and Abuja. Also, the hubs have also grown from within Nigeria outward to include Cotonou and Lome to link the northern cities in West Africa.

Moreover, the study reveals that the pattern of passenger traffic intensity has increased from the pre-liberalisation era to post-liberalisation era. Comparatively, the mean value and the standard deviation of the passenger traffic volume in the pre-liberalisation and the post-liberalisation was significant when paired using student t-test. Implicit in this, the liberalisation policy is significant to bring about the increase in passenger traffic volume after liberalisation. Passenger movement especially from Abuja and Lagos to other West African countries witnessed an upward shift after liberalisation.

In order to assess the impact of liberalisation, the study shows the relationship between the volume of airline movement in the pre-liberalisation and post-liberalisation eras. When the

volume of aircraft movements was compared in the pre and post-liberalisation eras, the mean and the standard deviation of the model was significant. There was a significant upward shift in the volume of aircraft movement in the post-liberalisation era. This is attributed to the impact of the adoption of the liberalisation policy.

Another important relationship pattern uncovered by the study is the correlation between passenger movement and aircraft movement in the pre and post-liberalisation eras. The correlation coefficient between the passenger movement and the aircraft movement both in the pre-liberalisation and post-liberalisation eras were also significant. This shows that the load factor in passenger and aircraft movement ratio both in the pre-liberalisation and post-liberalisation eras was sufficient for passenger revenue traffic to sustain the flow of the passenger and aircraft traffic from Nigeria to other West African countries.

The study identifies the significance of the departure and arrival passenger flow to the overall regional passenger flow since liberalisation. This was tested using a paired sample t-test. It reveals that indeed there is a significant contribution from the departure and the arrival flow. This shows the importance of the liberalisation policy in the passenger traffic from Nigeria to West African countries. Therefore more intervention needed on the part of regional aviation body to ensure a steady flow of passenger traffic in the sub-region.

In addition, the spatial pattern intensity of passenger and aircraft flow from Nigeria to other West African has witnessed a tremendous increase since liberalisation. Using flow chart, the passenger and aircraft traffic reveals a significant improvement in the flow from Abuja and Lagos respectively. It shows a gradual increase from 2001 to 2011. However, some city pair, especially Lagos-Accra and Abuja-Accra increased greatly from 2007-2011. Other city pairs as Lagos-Cotonou, Lagos-Lome, Abuja-Lome, Lagos-Abidjan, Lagos-Dakar were among others that increase since liberalisation.

On the primary survey findings, the only attribute included in this section of major finding is the attribute on the challenges relating to regional city accessibility from Nigeria to West African before and after liberalisation. From the survey, 105 (24.5%) of the respondents was of the opinion that aviation infrastructure was the major challenge relating to regional city accessibility

in the pre-liberalisation era. While 96 (22.4%) of the respondents believed that weak regional policy was the major challenge facing the regional accessibility during the post-liberalisation era. However, in spite of all these challenges, there is the need for the Nigeria government to work closer with the regional body regulating aviation in the sub-region to institute framework that would improve accessibility and enhance spatial interaction in the sub-region.

6.2 Theoretical Findings

The impacts of policy on the spatial outcomes in air transportation have been documented in the literature. The first country to pioneer the policy adoption of deregulation in air transportation was the United States. The major effect of this policy was the change in spatial route structure from point to point to a hub and spoke structure. Similar or near effects was also noticeable following other countries to deregulate their air transport subsector. In line with the spatial outcomes as reviewed in literature, the regional route structure from Nigeria to West African has witnessed a significant change from the pre-liberalisation to post-liberalisation eras. In the pre-liberalisation era, the route structure from Nigeria to West African route was basically linear point to point from Lagos to other West African countries along the coast. Also during the period, Lagos acts as the only node for the regional flight from the country. Following the liberalisation, significant changes in the spatial route structure have been recorded. First, the spatial network structure has changed from the traditional linear point to point network along the coast from Lagos to other West African countries to a web of hub nodes both within the country and outside the country linking the west coast and the northern cities in radial hub and spoke structure from within the country to outside the country. The level of inter-connectedness of the route and network structure using alpha index has increased since liberalisation.

In line with the core-periphery concept which stipulates the centripetal relationship between the core cities and periphery suburbs or catchment areas. During the pre-liberalisation era, the core airport in Nigeria designated for regional flights was located in Lagos. The Lagos airport acts as the fulcrum for other airports located in different parts of the country as a gateway for the regional link from Nigeria. However, after liberalisation, the core airports for regional flights have risen to two. These are located in Lagos and Abuja respectively. The Lagos flight connects the regional city of Cotonou directly, which also act as a core city linking the coast cities and the

northern cities together. Moreover, the Abuja flight connect the city of Lome in Togo directly, this also represents a core city linking Nigeria from Abuja and also acting a web, linking Nigeria from Abuja with countries along the coast in West Africa and the northern cities. The post-liberalisation witnessed a transition from a single hub linking the local cities with the regional cities to four hubs. Two of these hubs were located in the country-Lagos and Abuja, while the other hubs were located outside the country-Cotonou and Lome.

Moreover, in line with the principle of contestability theory which created a platform for free entry and free exit, against the restrictive monopolistic market posture. The regional route structure from Nigeria to West African have benefited immensely from the contestability theory ideology. During the pre-liberalisation era, the only airline allowed to carry regional traffic from Nigeria to West African countries is the Nigerian national carrier the Nigerian Airways. However, during the post-liberalisation era, the monopolistic status given to Nigeria airways was abolished. This enables other airlines to carry passenger and cargo traffic from Nigeria to other West African countries.

The importance of the spatial interaction model such as the gravity model to the spatial interaction within the regional route structure from Nigeria to other West African countries was conspicuous. The volume of travel between some city pair in the regional air travel market is significant in this regards. For instance, the volume air travel between Lagos and Accra, especially in the post-liberalisation period, is far higher than any combination of Lagos and any other cities in West Africa. Rather than the distance, the potential in terms of the economic and productive population facilitates regional spatial interaction among West African countries.

Furthermore, this study strengthens the relationship between accessibility, spatial structure and liberalisation (Papatheodorou and Arvanitis, 2009). Comparing the pre-liberalisation and post-liberalisation era, it was noticeable that the airline and passenger traffic increased more during the post-liberalisation era. Also in the post-liberalisation era, some city pair was added to the existing city pair from Nigeria to other West African. For example, Lagos-Praia and Abuja-Praia were added to the network structure during the post-liberalisation period.

6.3 Policy Implications

Doubtless, the impacts of the liberalisation policy have been so significant. From the experiences in the US, Europe and Asia have often had been profound. So the adoption of liberalisation policy on West African route from Nigeria is not an exception. The policy implications have had far-reaching effects on the spatial structure of air transport along the sub-regional route from Nigeria to West African countries.

For instance, since the post-liberalisation, compared with the pre-liberalisation era, the average growth in passenger traffic is higher than what the number was in the pre-liberalisation era. Also, the numbers of hub have increased from one to four, two within Nigeria and two outside the country, located in Cotonou and Lome respectively. The spatial patterns of route structure have also changed from point to point along the west coast from Lagos to a hub and spoke linking the West coast and the northern cities. Moreover, since the post-liberalisation era, there is an addition to the existing city pair from Nigeria to other West African route. For example, Praia has been joined to the existing network structure. The network structure tends to be denser in the post-liberalisation period, though the concentration of passenger traffic and aircraft traffic appeared more in Lagos, Accra, Abidjan, Freetown, Lome, Dakar and Cotonou.

The data analysis reveals that there is a significant difference in the passenger and aircraft movement between the pre-liberalisation and the post-liberalisation eras. Implicit in this, there is the need for massive air transport infrastructure investment across the sub-region. Especially, in the core cities, Lagos, Abuja, Accra, Lome, Cotonou, Abidjan, Dakar and Freetown, that have witnessed an upward surge in the passenger and the aircraft movement in the post-liberalisation era. Because soon or later the existing infrastructure would be overwhelmed with demands which it may no longer be able to handle. In the light of this, refurbishment and investment in air transport infrastructure are necessary to sustain flow, route and network growth in the sub-region. It helps to redistribute the already lopsided passenger and aircraft flow in the sub-region.

Also, the study shows there is a strong relationship between the passenger movement and the aircraft movement in both the pre-liberalisation and the post-liberalisation eras. It reveals much about the profitability nature of regional route structure from Nigeria to other West African countries. That is the average load factor which is measured by the revenue passenger miles and the available seat miles. Therefore, the potential of regional route network from Nigeria to other

West African countries needs stronger regional aviation regulations and policy that encourage capacity enhancement and improvement. As revealed in the primary survey finding, on the challenges relating to regional city accessibility from Nigeria to other West African countries. After liberalisation, 22.4% of the respondents, which is the highest of the distribution, noted that weak regional intervention had been the bane of regional air transport development.

Moreover, the study also reveals through a paired sample t test there is a relationship between the total flow and the flow between the arrival and the departure flow in the 280 city pair examined in the post-liberalisation period. The implication of this is that flows from Nigeria cities contribute more to the total flow. This is reflective of a lopsided, rather than a balance of flow between the arrival and the departure flow. Therefore regional policy that would enhance socio-economic activities to the balance of passenger and aircraft flow among the countries in the sub-region ought to be encouraged.

6.4 Future Research Direction

There are no doubts that potentials still hold for future research within the scope of the present research efforts. This study seeks to understand the passenger and aircraft flow in the pre and post-liberalisation period, as well as the challenges faced by travellers during the periods. This study only considered flow from Nigeria to other West African countries. However, broader research can incorporate multiple countries flows to and fro within West Africa. Though this may be more complex and require huge financial resources, but regional wide route and network structure and the regional wide aviation challenges would be unveiled to make better regional aviation policies and decisions. Also, since the issue of liberalisation is a continent-wide initiative, future research efforts can also be tended towards understanding the nature of flows between Nigeria and other regions such as North, East and South Africa or on a continent-wide perspective.

The secondary data for the city pair passenger and aircraft data was the aggregated data for the pre-liberalisation era because of lack of disaggregated city pair data. So the future research could use a complex analysis to examine the nature of the flow, node and network structure using a disaggregated city pair data in both pre and post-liberalisation. This would give details on the city pair characteristics in both time periods and give a better comparison of the effect of liberalisation across city pair in both the pre and post-liberalisation.

The study made use of purposive sampling methods in the sample selection; however, the major challenge of this method is that the standard test could not be conducted on the sample collected. So, the major analyses in this study rely more on the longitudinal data from the secondary data source. So the future research could explore other sampling procedure that could still meet the objectives of the test research and incorporate statistical analysis techniques that could allow for standard on the phenomenon of interest.

However, future research could incorporate longitudinal multiple year data for much better inference. However, getting a longitudinal multiple year air travel data for each country in the West Africa region may pose a huge challenge.

6.5 Conclusions

No doubts, this study reveals that there is a link between liberalisation and spatial structure of air transportation in West Africa. The study shows that since liberalisation the spatial structure of air transport has changed significantly. Also, comparatively there is a significant increase in both the passenger and aircraft movement from Nigeria to other West Africa countries after liberalisation. New nodes which act as core linking the periphery cities both within Nigeria and outside to other cities in the West African sub-region have emerged after liberalisation. Though the challenges faced by air travellers in the West Africa sub-region varies in the pre and post-liberalisation. However, the study has identified possible intervention to ameliorate the current challenges faced by the travellers along the West Africa sub-region from Nigeria.

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Serial No:.....

APPENDIX I

UNIVERSITY OF IBADAN, IBADAN
FACULTY OF THE SOCIAL SCIENCES
DEPARTMENT OF GEOGRAPHY

Dear Respondent,

This questionnaire seeks information on Liberalisation and Spatial Structure of Air Transportation in West Africa, being a PhD research. Basically design for those who have flown regional route (West Coast) from Nigeria between 1988-2001 and 2001- 2011. Please provide as detailed information as you can. All information provided will be used for academic purposes only.

Location..... State.....

Nationality..... Airport Name.....

SECTION A: DEMOGRAPHIC AND SOCIO-ECONOMIC FACTORS IN REGIONAL TRAVEL PATERN

1. Demographic and Socio-economic Characteristics of Respondents

Characteristic	Status		
Sex	Male		
	Female		
Marital status	Single		
	Married		
	Widowed		
	Divorced		
	Separated		
	(Others specify)		
Nationality	Nigerian		
	(Others specify)		

Household Size	1-2		
	3-4		
	4-6		
	(Others specify)		
Education	No formal education		
	Primary school		
	Senior secondary school		
	Junior secondary school		
	Technical college/vocational centre		
Occupation	OND/NCE		
	HND/B.Ed/B.Sc degree		
	Postgraduate degree		
	(Others specify)		
	Housewife		
	Unemployed		
	Self-employed (Trader)		
	Farmer		
Estimated Monthly Income	Private Sector Employee		
	Professional (Artisan)		
	Civil servant		
	Others (Specify)		
	……		

2. Age as of last birthday .....
(Years)

SECTION B: TRIP PATTERN CHARACTERISTICS OF RESPONDENT

3. What is the exact number of regional intercity-trip you always make within 30days? Please specify ……. Before Liberalisation ☐

After Liberalisation ☐

4. Please state the purpose of your regional inter city trips

S/N	Purpose of Trips	Before Liberalisation	After Liberalisation
i	Schooling		
ii	Work Related Business		
iii	Personal Business		
iv	Working		
v	Social Visit		
vi	Recreational/Vacation		
vii	Shopping		
viii	Medical		
ix	Tourism		
x	Others		

5. Please state how many trips you usually made within a month for each of the following:

		Number of Trips	
S/N	Purpose of Trips	Before Liberalisation	After Liberalisation
i	Schooling		
ii	Work Related Business		
iii	Personal Business		
iv	Working		
v	Social Visit		
vi	Recreational/Vacation		
vii	Shopping		
viii	Medical		
ix	Tourism		
x	Others		

7. How would you describe the frequency of your regional trips during this period?

S/N	Frequency of Trips	Before Liberalisation	After Liberalisation
i	Daily		
ii	Weekly		
iii	Fortnightly		
iv	Monthly		
V	Yearly		
vi	others		

8 Please describe the difficulties often encounter in getting to your destination city during city pair travel

Difficulties encounter during city pair air travel	
Before Liberalisation	After Liberalisation

9. What is your rating of passenger and cargo processing during your trip?

		Passenger and Cargo Processing	
S/N	Rating of Services	Before Liberalisation	After Liberalisation
I	Excellent		
ii	Very Good		
iii	Good		
iv	Fair		
V	Poor		

SECTION C: TRAVEL CHARACTERISTICS OF RESPONDENT

10. Please rank the following air travel service characteristics during the both period

		Rank(1,Lowest and 5 highest)	
S/N	Air services parameters	Before Liberalisation	After Liberalisation
I	Flight Availability		
ii	Baggage Handling		
iii	Quality of Flight Service		
iv	Customs,Immigration and security Procedures		

v	Perception of Flight Safety		
vi	Flight Booking		

11. What are the factors that influence your choice of Airline selection from Nigeria to other West Africa Cities?

Factors that influences Passenger choice of Airline Selection	Before Liberalisation	After Liberalisation

12. How would describe the level of frequency of service of flights activities from Nigeria to other West Africa cities?

		Frequency of Flight Services	
S/N	Rating of Services	Before Liberalisation	After Liberalisation
i	Excellent		
ii	Very Good		
iii	Good		
iv	Fair		
v	Poor		

13. How would you describe the services level of carriers along your origin and destination?

		Services Level of Carriers	
S/N	Rating of Services	Before Liberalisation	After Liberalisation
i	Excellent		
ii	Very Good		
iii	Good		
iv	Fair		
v	Poor		

14. Do you always have readily available flight to any of your destination cities in West Africa at time of the day during both periods? Yes ☐

No ☐

15. What do you think are the challenges relating to flight access in a regional city pair travel?

	Challenges of Regional City Pair Travel	
Challenges Relating to Flight Access in Regional City Pair Travel	Before Liberalisation	After Liberalisation

16. Please state the destination cities in West Africa you often visited

	Regional Cities often Visited	
Destination cities often visited	Before Liberalisation	After Liberalisation

17. Can you please suggest ways to improve regional city pair travel from Nigeria to other West African
countries?.....

……
……
……

APPENDIX 11

```
GET
  FILE="C:\Users\Redeemer's\Documents\adeniyi2\PhD Research\Passenger and Airline movement data.sav".
DATASET NAME DataSet1 WINDOW=FRONT.
T-TEST PAIRS=PRELIBNWPF2 WITH PTLIBNWPF2 (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

T-Test

[DataSet1] C:\Users\Redeemer's\Documents\adeniyi2\PhD Research\Passenger and Airline movement data.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Passenger traffic in the pre btw Nigeria and West Africa	228750.7778	9	14400.55681	4800.18560
	Passenger traffic in the post btw Nigeria and West Africa	550736.2222	9	308011.99398	102670.66466

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Passenger traffic in the pre btw Nigeria and West Africa & Passenger traffic in the post btw Nigeria and West Africa	9	-.751	.020

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Passenger traffic in the pre btw Nigeria and West Africa - Passenger traffic in the post btw Nigeria and West Africa	-321985.44444	318966.21288	106322.07096	-567164.57974	-76806.30915	3.028	8	.016

T-Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Aircraft movement in the pre lib. btw Nigeria and W.Africa	3995.3333	9	236.42599	78.80866
	Aircraft Movement in the post lib. btw Nigeria and W.Africa	9377.8889	9	5201.97137	1733.99046

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Aircraft movement in the pre lib. btw Nigeria and W.Africa & Aircraft Movement in the post lib. btw Nigeria and W.Africa	9	-.815	.007

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Aircraft movement in the pre lib. btw Nigeria and W.Africa - Aircraft Movement in the post lib. btw Nigeria and W.Africa	-5382.55556	5396.36975	1798.78992	-9530.57255	-1234.53857	2.992	8	.017

```
CORRELATIONS
  /VARIABLES=PRELIBNWPF PRELIBNWATF PTLIBNWPF PTLIBNWATF
  /PRINT=TWOTAIL NOSIG
  /MISSING=LISTWISE.
```

Correlations

Correlations[c]

		Passenger traffic in the pre btw Nigeria and West Africa	Airline movement in the pre lib. btw Nigeria and W.Africa	Passenger traffic in the post btw Nigeria and West Africa	Airline Movement in the post lib. btw Nigeria and W.Africa
Passenger traffic in the pre btw Nigeria and West Africa	Pearson Correlation	1	.629*	.835**	.757**
	Sig. (2-tailed)		.028	.001	.004
Airline movement in the pre lib. btw Nigeria and W.Africa	Pearson Correlation	.629*	1	.276	.139
	Sig. (2-tailed)	.028		.384	.668
Passenger traffic in the post btw Nigeria and West Africa	Pearson Correlation	.835**	.276	1	.970**
	Sig. (2-tailed)	.001	.384		.000
Airline Movement in the post lib. btw Nigeria and W.Africa	Pearson Correlation	.757**	.139	.970**	1
	Sig. (2-tailed)	.004	.668	.000	

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

c. Listwise N=12

```
GET
  FILE="C:\Users\Redeemer's\Documents\adeniyi2\PhD Research\Passenger and
Airline movement data.sav".
DATASET NAME DataSet1 WINDOW=FRONT.
T-TEST PAIRS=ARRPCPFLOW WITH DEPPCPFLOW (PAIRED)
  /CRITERIA=CI(.9500)
  /MISSING=ANALYSIS.
```

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Arrival passenger city pair flow	716919.5455	11	1145956.46079	345518.87332
	Departure passenger city pair flow	755379.4545	11	1150064.42774	346757.47196

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Arrival passenger city pair flow - Departure passenger city pair flow	-38459.90909	19898.16641	5999.52291	-51827.67918	-25092.13900	6.410	10	.000