



Infrastructure Gap Analysis and Aviation Master Planning



ICAO WORKSHOP ON AVIATION INFRASTRUCTURE GAP ANALYSIS

ABUJA, NIGERIA

“Aviation Infrastructure Gap Analysis and Master Plan Development Process - Exchange of experiences and lessons learned, on a case of Gap Analysis or Master Planning”

19th - 21st March 2019

Overview of Gap Analysis

Overview of Presentation:

- Introduction to Aviation Infrastructure Gap Analysis
- Objectives of Infrastructure Gap Analysis
- Conducting Infrastructure Gap Analysis
- Stages in Infrastructure Gap Analysis
- Identification of Gaps
- Development and Actualisation of Roadmap for Infrastructure Gap Analysis
- Funding Options for Aviation Infrastructure
- Conclusion.



Infrastructure Gap Analysis and Aviation Master Planning



Introduction to Gap Analysis

➤ **Introduction to Aviation Infrastructure Gap Analysis:**

- The Infrastructure Concession Regulatory Commission was inaugurated in November 2008, as a way of addressing the huge infrastructure deficit in Nigeria and the desolate state of existing infrastructure. The ICRC Act 2005 also empowers federal ministries, departments and agencies (MDAs) to utilise PPPs as procurement vehicle of choice, where suitable, to rapidly turn around the country's infrastructure insufficiency. The Act envisages the ICRC to serve as the primary driver agency to catalyse and facilitate engagement of the private sector by Ministries, Departments and Agencies of the federal government in initiating, developing and implementing PPP projects in a fit-for-purpose, transparent, competitive and sustainable manner that would ensure value for money for the Nigerian economy, while putting in place world-class infrastructure for use by Nigerians.

Introduction to Gap Analysis

- It has been projected that Nigeria needs to invest about \$10 billion annually over the next 10 years for it to significantly reduce its infrastructure deficit. Some of the sectors that require huge investments include power, housing and highways, railways, ports, airports, dams, bridges and tunnels, oil and gas pipelines, water and sanitation and telecommunication.
- Infrastructure refers to those physical structures that facilitate the production of goods and services, without themselves being part of the production process. These are often referred to as the 'stock of capital goods'.



Introduction to Gap Analysis

➤ **Aviation Infrastructure Gap Analysis Conducted:**

- Nigeria has conducted two recent aviation infrastructure gap analyses:
- **1.** Aviation Infrastructure Gap Analysis conducted in Nigeria from 1st June to 30th September 2017 coordinated and facilitated by ICAO WACAF Regional Office in preparation for ICAO World Aviation Forum.
- **2.** Air Navigation Infrastructure gap analysis conducted by NAMA in 2018 by Catamaran and Reid Aviation Solutions.



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Objectives of Gap Analysis

➤ Objectives of Infrastructure Gap Analysis:

- To establish existing infrastructure
- Identify future infrastructure requirements
- Identify gaps in infrastructure
- Identify Projects to close the identified gaps
- Identify challenges
- Conduct Cost Benefit Analysis
- Develop appropriate business models
- Identify funding sources or options
- Develop implementation strategies.

Deliverables of Gap Analysis

- **The Deliverables of Gap Analysis Conducted by NAMA:**
 - *To Provide a Comprehensive Gap Analysis Report*
 - *To Provide an Implementable Roadmap and Action Plan Report.*

Steps in Conducting Gap Analysis

Steps in Aviation Infrastructure Gap Analysis:

- Developing Gap Analysis Methodology and Template
- Collection of Data from Agencies and Airports
- Data Validation Mission (Visit to sites)
- Conduct of Air Navigation Infrastructure Gap Analysis
- Mission to Validate the Gap Analysis
- Project Development and Costing
- Project implementation.

Template and Methodology for Gap Analysis

➤ **Developing a Template and Methodology for Infrastructure Gap Analysis:**

➤ **The Gap Analysis conducted was divided into 4 Stages namely:**

➤ **Stage I - Assessment of NAMA Facilities and Development of Gap Analysis**

➤ **Stage II - Confirmation of Assessment and and Development of Roadmap**

➤ **Stage III - Actualisation of Roadmap**

➤ **Stage IV - Implementation of Roadmap**

Assessment of NAMA Existing Facilities

➤ **Stage I - Assessment of NAMA Facilities and Development of Gap Analysis**

- *The Following steps were followed in Stage I:*
- Assessment of Existing ANS Infrastructure
- Identification of Future Infrastructure Needs
- Conducting the Gap Analysis between Existing and Future Infrastructure Requirements.

Confirmation of Assessments and Development Roadmap

➤ **Stage II - Confirmation of Assessment and and Development of Roadmap**

➤ *The Following steps were followed in Stage II:*

➤ Confirmation of Assessment

➤ Investment Required and Return on Investment

➤ Development of Roadmap.

Actualisation of Roadmap

➤ Stage III - Actualisation of Roadmap

➤ *The Following steps were followed in Stage III:*

- Interaction with the NAMA Project Team
- Design of Systems and Procedures.

Implementation of Roadmap

➤ Stage IV - Implementation of Roadmap

➤ *The Following steps were followed in Stage IV:*

➤ Procurement of CNS/ATM Systems

➤ Installation of CNS/ATM Systems

➤ Commissioning of CNS/ATM Systems.

Data Collection for Gap Analysis

➤ Data Collection for Infrastructure Gap Analysis:

- The following data were collected for the infrastructure gap analysis:
- Aerodrome data
- Air Navigation infrastructure data
- Flight statistics and forecast data
- Data on existing aerodrome and ATM capacity
- Data on future demand and capacity requirements as well as future plans

Actual Conduct of Gap Analysis

➤ **Actual Conduct of the Gap Analysis:**

- Having assessed NAMA's current situation and defined the future requirements, a gap analysis was undertaken to identify variation between business requirements and existing capabilities and make recommendations to ensure that the future requirements are safely and efficiently met.
- The gap analysis addresses both operational and strategic aspects of future performance, and was developed along the following themes:

Actual Conduct of Gap Analysis

➤ **i. Organisational transformation**

➤ The scale of the ambition of NAMA and the aviation sector in Nigeria mean that organisational transformation is required to change the way the business is done; more than simple structural changes, this will address the attitude of employees, their perspectives and the culture of the organisation as it undergoes a significant change.

➤ **ii. Infrastructure investment, planning and asset management**

➤ Ensuring that the operations of the Agency are aligned to the future needs of customers and international best practices. Effective planning, implementation and ongoing asset management of this critical national infrastructure will ensure that the benefits of investment are fully realised.

Actual Conduct of Gap Analysis

➤ **iii. Staff training and leadership development**

- It is imperative that once the future state of the organisation is defined, the necessary staff numbers and skills required to operate and deliver the service is identified, including technical, operational and support staff; and associated recruitment and training plans created.

➤ **iv. Recommended Programmes**

- A more holistic approach is required to allow an alignment of goals and associated delivery projects around the key organisational benchmarks highlighted in this report. This in turn will facilitate a prioritisation of objectives and focus all parts of the Agency on the achievement of shared goals.

Actual Conduct of Gap Analysis

- **Stage II: Confirmation of Assessment and Development of Roadmap**
- **Confirmation of Assessment**
- Upon presentation of the assessment done in Stage 1, NAMA and the Consultants discussed the facts gathered in the gap analysis. The aim of this activity was to ensure the engagement of the existing NAMA Projects Delivery Team to ensure a coordinated approach.
- The joint approach to developing the roadmap was aimed at:

Actual Conduct of Gap Analysis

- Ensuring cohesion between the various transformation and operational work streams.
- Ensuring critical path activities are understood and focused upon.
- Providing NAMA management with a tool to brief stakeholders, and track progress.
- Ensuring the outcome of the gap analysis is accepted as being a NAMA plan and not an imposed plan by consultants.

Actual Conduct of Gap Analysis

➤ **Analysis of Investment Required and Return on Investment**

- A detailed financial analysis was carried out, indicating the investment in the Communications, Navigation, Surveillance/Air Traffic Management (CNS ATM) systems required to mitigate the gaps identified in Stage 1 of this gap analysis. Sources of funds were weighed, and the best options recommended, considering that the investment will be required to improve the revenue of NAMA as well as pay itself back.

Development of Roadmap

➤ Development of Roadmap:

- NAMA already had a range of projects underway, including control tower automation upgrade, increasing national VHF coverage, and automating its Aeronautical Information Systems.
- In addition, the specialists used their unique experience to recommend tailored development plans for the key subjects identified through the gap analysis.
- At this stage, equipped with a clear and unambiguous understanding of the difference between the current and desired future states of NAMA, and an understanding of the priorities and ongoing projects of the organisation, the team designed the transformation roadmap, describing what should be done in what order.

Development of Roadmap

➤ **The completed roadmap was submitted to NAMA Managing Director with three specific requests:**

- 1. Endorsement of the roadmap
- 2. Appointment of a senior level sponsor for the transformation programme
- 3. Creation of a programme management office to oversee the programme and report on progress.

Actualisation of Roadmap

➤ **Stage III: Actualisation of Roadmap:**

- At this stage, the design of the Communications, Navigation, Surveillance/Air Traffic Management (CNS ATM) systems required to close the identified gaps shall commence.
- At this stage, workforce development programs to close the skills gap of NAMA staff shall be implemented to enhance their productivity.
- Properly tailored billing systems should be implemented to improve Customer Service, Retain Customers, and Increase Profits.

Implementation of Roadmap

➤ **Stage IV: Implementation of Roadmap**

- This stage involves the processes of procurement, installation and commissioning of the Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM) systems.
- Particular effort shall be made to identify and procure from reputable international equipment and technology vendors with proven track record.
- Ensure proper structuring of the agreement with equipment suppliers to ensure that the equipment procured are properly maintained and upgraded.

Major Gaps Identified

➤ Major Gaps Identified in Air Navigation Infrastructure:

- Inadequate ATC Manpower - a shortfall of 200
- Lack of Second Runway in Abuja with attendant delays from VIP movements
- Inadequate Radar Working Positions at Abuja and Port Harcourt
- Inadequate RCCs at Lagos and Kano
- Inadequate Sub RCCs at Abuja and Port Harcourt
- Lack of Automated ATM systems at other airports
- Lack of Surface Movement Radar and Ground Control at Lagos and Abuja.
- Inadequate funding and lack of financial autonomy.



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Major Gaps Identified

➤ Major Gaps Identified in Air Navigation Infrastructure Contd:

- Lack of a Centralised ATM Centre at Abuja
- Lack of Sectorisation of Lagos Area Control
- Lack of automated flight Planning systems
- Lack of Runway Visual Range Data from NiMet for low visibility operations
- Obsolete Tower systems at all non international aerodromes
- Lack of ATS Inter-facility Data Communication system (AIDC)
- Lack of ATS Message Handling System for Gateways.



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Major Gaps Identified

➤ Major Gaps Identified in Air Navigation Infrastructure Contd:

- Lack of Traffic Sequencing Manager (AMAN/DMAN) for Lagos and Abuja.
- Inadequate ground to ground ATS/DS Links
- Lack of Mode S data link system
- Inadequate Power Supply
- Inadequate Long Range VHF communication system at Lagos and Kano.
- Inadequate visual aids for ILS Cat II and III operations
- Lack of Nav aids Monitors and Runway Lighting System Remote Control

Recommended Projects to the Gaps

- **Projects to be implemented to close the Gaps:**
- To develop a Strategic Disaster Recovery Centre for contingency,
- Construction of new Control Tower at Abuja and Lagos
- Provision of Surface Movement and Ground Radar systems at Lagos & Abuja,
- Provision of 2 additional Mobile Control Towers for contingency use,
- Provision of 2 Mobile Radar Systems as strategic backup for Lagos and Abuja,
- Implement PBN Approaches with Vertical Guidance (BARO VNAV).
- Construction of second Runway at Abuja.



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Recommended Projects to Close the Gaps

- Procurement of 3-Dimensional Virtual Tower Simulator in Lagos for ATC training.
- Establish additional Terminal Approach Radar Control Units at Enugu and Benin.
- Establish a single centralised Area Control Centre at Abuja.
- Development of well trained and motivated work force to drive the future growth.
- Implementation of Space Based ADS-B
- Implementation of SBAS and GBAS.
- Upgrade of Radar system for Flight Plan 2012 and Electronic Flight strips
- Recruitment and training of 200 ATCs to close manpower gap.



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Recommended Projects to Close the Gaps

- Implement Arrival and Departure Manager (DMAN and AMAN) at Lagos and Abuja.
- Implement ATS Inter-facility Data Communication (AIDC)
- Implement ATS Message Handling System (AMHS)
- Implement Digital ATIS (D-ATIS) and Digital VOLMET (D-VOLMET)
- Implement Airport Collaborative Decision Making (ACDM)
- Implement Air Traffic Flow Management System (ATFM)
- Implement System Wide Information Management (SWIM).

Financing Options for Infrastructure Gap Analysis Projects

- **Financing Options for the Infrastructure Projects:**
- Preliminary analysis of the future requirements indicate that the following amount will be required to be invested on each programme in the near future:
 - 1. Total and Improved Surveillance Coverage –\$50M in the first 3 years, and \$3M-\$5M per annum over the next 7 year.

Financing Options for Infrastructure Gap Analysis Projects

➤ Financing Options for the Infrastructure Projects:

- 2. Total and Improved Communications Coverage - \$3M-\$5M per annum over the next 5 years
- 3. Improved Navigational Systems - \$3M-\$5M per annum over the next 5 years
- 4. Improved and Efficient Power Supply - \$1M-\$2M per annum over the next 5 years
- 5. Improved Air Traffic Control Systems - \$3M-\$5M per annum over the next 5 years
- 6. Enhanced Capacity Building – N500M per annum over the next 5 years.

Financing Options for Infrastructure Gap Analysis Projects

- **Financing Options for the Infrastructure Projects:**
- To finance the recommended programmes and achieve its future obligations, the following financial actions were recommended after the gap analysis:
 - **1. To grow NAMA Annual Internally Generated Revenue (IGR) by 10% per annum over the next 10 years.**

Financing Options for Infrastructure Gap Analysis Projects

➤ 2. Contractor Financing

➤ Another source of finance for the recommended infrastructures is by Contractor Finance. This involves the contractor taking out a loan against a signed contract after fulfilling the pre-conditions established by the lender, and which will be used to complete the project, while NAMA then pays the contractor based on the terms and agreement reached.

➤ 3. Accessing the Bilateral Air Service Agreement (BASA) Fund.

Financing Options for Infrastructure Gap Analysis Projects

➤ 4. Development Loans

➤ NAMA may seek loans from Development Banks such as the African Development Bank (ADB) to fund these strategic infrastructure programmes. This loan application should be supported by a viable business strategy on income generation and repayment plan, based on the terms of the loan agreement.

➤ **5. Another funding option for NAMA is through IATA**, the organisation responsible for the collection of NAMA navigational charges. Thus, IATA can fund infrastructure projects and deduct at source from collected revenue.

Challenges in Conducting Infrastructure Gap Analysis

➤ Challenges in Conducting Infrastructure Gap Analysis:

- The African Development Bank (AfDb) has urged African countries to improve the business environment, in order for more PPPs to emerge in the continent.
- The AfDB observed that serious constraints exist in many African countries, including: *inadequate legal and regulatory framework for PPPs; lack of technical skills to manage PPP programmes and projects; unfavourable investor perception of country risk, Africa's limited role in global trade and investment, small market size, limited infrastructure and limited financial markets.*

Challenges in Conducting Infrastructure Gap Analysis

- Also, additional challenges include inadequate information on traffic growth forecasts, airline route development plans, and inconsistencies in Government policies and plans.
- Lack of integrated planning and delayed budget process.
- Low level of ease of doing business in African countries.

Challenges in Conducting Infrastructure Gap Analysis

- Furthermore, in keeping with global trends, several challenges, such as safety concerns, high costs of aviation fuel, and high operational costs have had negative effects on the aviation sector in Nigeria. This has consequently had an impact on the ability of service providers (airlines, airports, air navigation service providers, etc) to meet the needs of customers or guarantee return on investment.

Conclusion

- The ICAO Workshop on Aviation Infrastructure Gap Analysis couldn't have come at a more appropriate time than now when many African states are struggling with the implementation of their air navigation plans in compliance with regional and national priorities and timelines. Therefore it is hoped that this workshop will avail the AFI Region the opportunity of sharing from global experts as well as benchmarking with major service providers in order to enhance the capacity of AFI member states to:
- Conduct Infrastructure Gap Analysis
- Drive and execute projects efficiently and timely
- Develop linkages between Aviation plans and national plans
- Identify and attract required funding to fund aviation infrastructure development
- Reduce prevailing or perceived high cost and risk in operating environment.



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Thank You Very Much

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