Aviation Professionals Study

Part 1

Review and Finalization of the Existing Analysis and Assessment

EXECUTIVE SUMMARY

The objective of the SWOT and PEST analyses is to understand what external and internal forces may affect the development of sustainable aviation professionals to carry out effective regulatory and oversight responsibilities in each area of the ICAO Strategic Objectives. Understanding current external and internal influences allows for the formulation of strategies based on facts rather than assumption.

A Political, Economic, Social and Technological (PEST) analysis seeks to provide strategists with a framework through which to increase their awareness of the external environment. The PEST analysis relies more on expert knowledge and existing literature of the various sub-regions of the Africa-Indian Ocean (AFI) region rather than information received by way of questionnaires. The approach in this report is to summarize the PEST outlook along for each of the WACAF, ESAF, EUR/NAT and MID regions so that proposed strategies can be monitored or driven by the Regional Offices.

The Western and Central African (WACAF) region consists of 24 States, i.e. five English-speaking, three Portuguese-speaking and 16 French-speaking: Benin, Burkina Faso, Cabo Verde, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone and Togo. The region has had quite a considerable number of political upheavals, coup d'états and terrorist insurgency. The economic strength of this region is the weakest in the AFI region albeit countries like Nigeria have a strong economy and others have modest economies like Cameroon, Côte d'Ivoire, Ghana and Senegal. The penetration of information and communication technology (ICT) and access to electricity is still low to moderate within this region.

The Eastern and Southern African (ESAF) region consists of 24 States, i.e. 18 English-speaking, two Portuguese-speaking and four French-speaking): Angola, Botswana, Burundi, Comoros, Djibouti, Eritrea, Eswatini, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Rwanda, Seychelles, Somalia, South Africa, South Sudan, Uganda, United Republic of Tanzania, Zambia and Zimbabwe. The region has mixed climatic, ecological, political and social conditions. Agriculture is the main stay of several States. There is great production of industrial crops and food among some States. The ESAF region is a mixed bag of stable and unstable States, and several are making great strides in ICT.

The three AFI States in the European and North Atlantic (EUR/NAT) region, i.e. Algeria, Morocco and Tunisia, and the three AFI States in the Middle East (MID) region, i.e. Egypt, Libya and Sudan, are referred to in this report as AFI-EUR and AFI-MID, respectively. Political instability and internal conflicts in several of these countries have increased poverty levels despite the availability of natural resources such as oil and minerals.

Before 2020, most African States were making significant growth in gross domestic product (GDP) and serious efforts at reducing unemployment. However, the COVID-19 pandemic and its attendant crisis has dramatically increased poverty and threatening human capital. Beyond disrupting the economy, the COVID-19 pandemic risks rolling back the recent gains in health and human capital development if effective prevention and control measures do not continue to be implemented rapidly and at a scale. Because a large share of Africa's population is close to the poverty line, even a mild economic shock can push numerous households into poverty. The impact of the crisis has been especially acute among households that rely on self-employment and informal microenterprises in urban areas.

The period of the year 2020 and beyond has been marked by economic downturn or stagnation, a sharp reduction in exports caused by the pandemic's disruption to global value chains and the collapse of

receipts from tourism, slow growth, increased poverty and rising public debt levels. GDP growth contracted below-potential revenue mobilization and unfavourable budget structures, with limited allocations to key sectors, such as health and education.

Whilst the effect of the pandemic cannot be underestimated, some scholars, however, believe that the severity of the impact of the COVID-19 pandemic on the economies of Africa underscores the weak and fragile economic fundamentals underpinned by longstanding corruption, ineptitude and poor economic management prior to the crisis.

The development of technology in the ESAF region has been very varied, but overall much better than in the WACAF region. Admittedly, considerable efforts have been made by several countries, particularly in Kenya, Rwanda and South Africa in developing ICT areas such as telecommunications and broadcasting, mobile/cellular service, mobile money transaction, fibre optic coverage, international internet bandwidth, 3G/4G coverage, internet domains, broadcast services and subscriptions (frequency modulation), newspaper circulation and online newspaper readership.

Kenya is at the forefront of technological innovations and is often referred to as the Silicon Savannah of Africa, Rwanda as a centre of excellence at a regional level in the area of technologies, particularly with ICT and South Africa as a regional hub and supply base for neighbouring countries. South Africa's ICT products and services industry is penetrating the fast-growing African market.

Availability of energy has been a major challenge. On the average, access to reliable electricity has been low in most African countries, although there are highflyers such as Egypt (100 per cent penetration), Ghana and South Africa (85 per cent). Liberia has one of the lowest electricity access rates in the world, with only about 8 per cent of households connected to the national grid. Less than 7 per cent of the population in Monrovia has regular access to electricity, and less than 2 per cent of the population in rural areas.

Most African States have launched national policies on science, technology and innovation with the main objective policy being to integrate science, technology, scientific research and innovation in the context of the issues facing their countries. To that end, technology needs assessment (TNA) processes are at various stages of development to decide priority sectors and implementation for both mitigation and adaptation.

The SWOT analysis aims at defining internal and external relevant factors that have a direct bearing on the strategic planning process of each of the AFI States. Internal factors usually can be classified as strengths (S) or weaknesses (W), while external factors can be classified as opportunities (O) or threats (T). The terms are defined as follows:

a) Strengths: resources and capabilities within the ambit of the aviation agency that can be used;

b) Weaknesses: absence of certain strengths within the ambit of the aviation agency

c) Opportunities: external (national or global) environmental analysis may reveal certain new opportunities for the State/region (aviation agency)

d) Threats: changes in the external (national or global) environmental factors which could be detrimental to the State/region (aviation agency)

The SWOT analysis in this report seeks to identify those internal and external factors that affect and will need to be strengthened or mitigated to promote State safety oversight systems. To achieve this, the State safety oversight system is analysed by using the States' safety oversight index (SSI), State Safety

Briefings (including SMS), information from ICAO's Global Aviation Training Office (GAT) and staff needs. It must however be noted that the SSI has been removed from the targets of the Global Aviation Safety Plan (GASP) 2023-2025. Therefore, this final report does not include SSI. The main consideration is the States' level of Effective Implementation (EI), which is part of the State Safety Briefing.

A summary of the SWOT analysis, including PEST, by region is provided in chapter 16. The PEST summary is included as opportunities and threats.

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ABBREVIATIONS

AATO	Association of African Aviation Training Organizations
AFCAC	African Civil Aviation Commission
AfDB	African Development Bank
AFI	Africa-Indian Ocean
AFRAA	African Airlines Association
AGA	Aerodromes and ground aids
AIG	Aircraft accident and incident investigation
AIM	Aeronautical information management
AIR	Airworthiness of aircraft
ANS	Air navigation services
AOP	Aerodrome operational planning
AOSTI	African Observatory of Science, Technology and Innovation
AT	Air transport
ATM	Air traffic management
ATO	Approved training organization
AU	African Union
BAGASOO	Banjul Accord Group Aviation Safety Oversight Organisation
BCEAO	Central Bank of West African States
CAPP	Central African Power Pool
CE	Critical element
CEMAC	Economic and Monetary Community of Central Africa
Chart	Aeronautical charts
CMA	Continuous monitoring approach
CNS	Communications, navigation and surveillance
COMESA	Common Market for Eastern and Southern Africa
DDR	Disarmament, demobilization and reintegration
EAE	Ethiopian Airports Enterprise
EAG	Ethiopian Airlines Group
EASA	East African School of Aviation
ECOWAS	Economic Community of West African States
EI	Effective implementation
ENV	Environment
ESAF	Eastern and Southern Africa
EUR/NAT	Europe and North Atlantic
FAA	Federal Aviation Administration
FAL	Facilitation
FDI	Foreign direct investment
GASP	Global Aviation Safety Plan
GAT	Global Aviation Training Office
GNI	Gross national income
GO-SPIN	Global Observatory of Science, Technology and Innovation Policy Instruments
GSI	Government safety inspector
HCI	Human Capital Index
HIC	High income country
HIPC	Heavily indebted poor countries
IASA	International Aviation Safety Assessment
IATA	International Air Transport Association
IFC	International Finance Corporation
IMF	International Monetary Fund
iSTARS	Integrated Safety Trend Analysis and Reporting System (iSTARS)

ITP	ICAO Training Package
ITU	International Telecommunication Union
MET	Aeronautical meteorology
MIC	Middle income country
MID	Middle East
MONUSCO	United Nations Organization Stabilization Mission in the Democratic Republic of the Congo
NCAT	Nigerian College of Aviation Technology
OECD	Organization for Economic Cooperation and Development
OIOS	Office of Internal Oversight Services
OLF	Online framework
OPS	Aircraft operations
ORG	Civil aviation organization
PANS-OPS	Procedures for Air Navigation Services — Aircraft Operations
PBN	Performance-based navigation
PEL	Personnel licensing and training
PEST analysis	Political, economic, social and technological analysis
PPP	Purchasing power parity
PQ	Protocol question
PSTN	Public switched telephone network
RAIO	Regional accident investigation organization
REER	Real effective exchange rate
RFF	Rescue and fire fighting
RSOO	Regional safety oversight organisation
SADC	Southern African Development Community
SAR	Search and rescue
SARPs	Standards and Recommended Practices
SEC	Aviation security
SMP	Staff Monitored Program
SO	Strategic Objective
SOI	Safety oversight index
SSC	Significant safety concern
SSI	State safety index
SSP	State safety programme
STEM	Science, technology, engineering and mathematics
STI	Science, technology and innovation
STP	Standardized training package
SWOT	Strengths, weaknesses, opportunities and threats
TCB	Technical Cooperation Bureau
TFA	Trade Facilitation Agreement
TFWA	Trade Facilitation West Africa
TNA	Technology needs assessment
UNAMID	United Nations – African Union Hybrid Operation in Darfur
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNITAMS	United Nations Integrated Transition Assistance Mission in Sudan
USAID	United States Agency for International Development
USOAP	Universal Safety Oversight Audit Programme
WACAF	Western and Central Africa
WAEMU	West African Economic and Monetary Union

1. BACKGROUND

1.1 Introduction

1.1.1 It has been observed variously that the challenge of inadequate aviation professionals is prevalent globally and more so in the Africa-Indian Ocean (AFI) region. ICAO aviation safety and security audits have identified the lack of enough qualified aviation personnel as one of the common deficiencies and root cause for low levels of effective implementation (EI) of the critical elements (CEs) of a State's safety oversight system, hence low levels of compliance with ICAO SARPs in many African States. This adversely impedes States' fulfilment of their international obligations under the Chicago Convention and effective participation in the global aviation market.

1.1.2 The enhancement of aviation human resource capacity in Africa remains a key component of the deliverables of the AFI region initiatives, including the Comprehensive Regional Implementation Plan for Aviation Safety in Africa (AFI Plan), the Comprehensive Regional Implementation Plan for Aviation Security and Facilitation in Africa (AFI SECFAL Plan) and the Human Resources Development Fund (HRDF).

1.1.2.1 The aim of the current project is to provide support or a basis for the development of sustainable aviation professional personnel to carry out effective regulatory and oversight responsibilities in each area of ICAO's Strategic Objectives. These Strategic Objectives are as follows:

a) Safety: Enhance global civil aviation safety. This Strategic Objective is focused primarily on the State's regulatory oversight capabilities. The GASP outlines the key activities for the triennium.

b) Air Navigation Capacity and Efficiency: Increase the capacity and improve the efficiency of the global civil aviation system focusing primarily on upgrading the air navigation and aerodrome infrastructure and developing new procedures to optimize aviation system performance. The Global Air Navigation Capacity and Efficiency Plan (Global Plan) outlines the key activities for the triennium.

c) Security & Facilitation: Enhance global civil aviation security and facilitation. This Strategic Objective reflects the need for ICAO's leadership in aviation security, facilitation and related border security matters.

d) Economic Development of Air Transport: Foster the development of a sound and economically viable civil aviation system. This Strategic Objective reflects the need for ICAO's leadership in harmonizing the air transport framework focused on economic policies and supporting activities.

e) Environmental Protection: Minimize the adverse environmental effects of civil aviation activities. This Strategic Objective fosters ICAO's leadership in all aviation-related environmental activities and is consistent with the ICAO and UN system environmental protection policies and practices. This objective was not included in this study.

1.1.3 The specific objectives of this current project are to:

a) establish baseline data/information on aviation professionals in the region and build a sustainable platform for available data on expertise in real-time;

b) assess the existing gaps of expertise in specific areas and present future anticipated demand to effectively carry out the oversight responsibilities of States in the AFI region;

c) develop a tool to support a data bank/platform providing information on the available aviation professional and accessible to relevant stakeholders such as the African Civil Aviation Commission (AFCAC), the African Airlines Association (AFRAA), the International Air Transport Association (IATA), the Association of African Aviation Training Organizations (AATO), ICAO's Technical Cooperation Bureau (TCB), the AFI Plan, the AFI SECFAL Plan, regional safety oversight organizations (RSOOs), regional accident investigation organizations (RAIOs), etc.;

d) address the gender balance and parity inadequacies in the AFI region; and

e) prioritize and provide the required training and competencies.

1.1.4 It is envisaged that the study would encompass actions aimed at achieving the project objectives, including the development of a database on aviation professionals for each Strategic Objective that will facilitate access to real-time information in all concerned areas.

1.2 The Initial ICAO Contract

1.2.1 In April 2021, ICAO published a vacancy notice for a consultancy with the functions outlined in the table below.

Function	Duties
1	a) A comprehensive analysis and assessment, including SWOT and PEST on AFI States' aviation professionals capacity-building strategies in all areas of ICAO Strategic Objectives starting with safety and air navigation in the AFI region as Phase I. b) Develop a database on aviation professionals in major areas.
2	Analyse the existing professional gap and anticipated demand in various professional categories.
3	a) Propose an implementation strategy and plan, including the required resource to address the existing gap and future demand at least in the coming ten (10) years (2022-2032); b) Review the present capacity of aviation approved training centres to meet the forecast capacity building demand; and c) Propose mechanisms/options for the sustainable funding of the proposed implementation of the plan.

1.2.2 A consultant carried out considerable work, however the study was incomplete. Several documents were submitted to the ICAO. These documents form a starting point for this revised contract and include:

a) Staffing Needs Assessment_Consolidated_v21, a workbook which captures data and provides a dashboard for the initial survey carried out by ICAO, including current staffing (total and female staff), average age of current staff, required staffing and corresponding gaps in each area of ICAO's Strategic Objectives for each AFI State;

b) PEST ANALYSIS DRAFT_ICAO, which includes basic data and am assessment of political, economic, social and technological factors for each AFI State;

c) SWOT ANALYISIS Methodology_ICAO, which captures specific information of each AFI State, including the State safety briefing, the ratio of inspectors compared to other similar countries, the safety oversight index, the number of ATOs and training staff and main airports data (a SWOT analysis had been initiated, but only one State was captured, i.e. Algeria); and

d) DATA BASE V 0.1, which captures information of individual personnel engaged with approved training organizations (ATOs), i.e. personal details, academic qualifications, name of the ATO and courses delivered or attended in any of the areas of ICAO's Strategic Objectives.

1.2.3 Other relevant documents reviewed to meet the requirements of the deliverables of the current contract include:

a) the report on the *AFI Training Database Development* (2010) developed in the context of the ICAO AFI Comprehensive Implementation Plan (ACIP); and

b) the *African Aviation Training Roadmap*, developed by AATO (2019).

1.3 The Revised ICAO Contract

1.3.1 The deliverables of this current contract are as follows:

a) a review and finalization of the existing analysis and assessment, including SWOT and PEST of AFI States capacity-building strategies in the areas of safety and air navigation in the AFI region;

b) update the existing database on aviation professionals in major areas;

c) analyse the existing professional gap and anticipated demand in various professional categories of safety and air navigation capacity;

d) propose an implementation strategy and plan to address the existing gap and future demand at least in the coming ten (10) years (2022 – 2032);

e) review the present capacity of aviation approved training centres to meet the forecast capacity building demand; and

f) propose mechanisms/options for the sustainable funding of the proposed implementation of the plan.

1.4 Objective of the SWOT and PEST Analyses

1.4.1 The objective of the SWOT and PEST analyses is to understand what external and internal forces may affect the development of sustainable aviation professionals to carry out effective regulatory and oversight responsibilities in each area of the ICAO Strategic Objectives. Understanding current external and internal influences allows for the formulation of strategies based on facts rather than assumption.

1.4.2 The approach employed in the SWOT and PEST analyses of this document is influenced by the publications of Sammut-Bonnici and Galea (2015) on these two forms of analysis.

1.4.3 SWOT and PEST analyses are complementary business analysis tools to evaluate internal and external factors that may have effect on business objectives. In this regard, the SWOT and PEST analyses enable strategic decisions to be made, considering the strength and weaknesses inherent in a business as well as the opportunities and threats in its external environment. The external environment is analysed through the lenses of political, economic, social and technological changes over which the business may have little to no control of. Even though a business may lack control over these external factors, any change in the factors may lead to unprecedented and untold effect on the strategic objectives of the business.

1.4.4 For this project, the SWOT analysis aims at defining internal and external relevant factors that have a direct bearing on the strategic planning process of each of the AFI States. Internal factors usually can be classified as strengths (S) or weaknesses (W), while external factors can be classified as opportunities (O) or threats (T). The terms are defined as per the table below.

Term	Definition
Strengths	Resources and capabilities within the ambit of the aviation agency that can be used
Weaknesses	Absence of certain strengths within the ambit of the aviation agency
Opportunities	External (national or global) environmental analysis may reveal certain new opportunities for the State/region (aviation agency)
Threats	Changes in the external (national or global) environmental factors which could be detrimental to the State/region (aviation agency)

1.4.5 The following strategy is employed to conduct the PEST analysis:

a) identification of the PEST factors;

b) analysis of their effect on the business;

c) categorization of the factors into opportunities or threats;

d) prioritization of the factors; and

e) proposal of pre-emptive and corrective strategic actions.

1.4.6 Data was collected on PEST factors for the 54 African States. This data has been enhanced and analysed in the section *Review and Finalization of the Existing Analysis and Assessment* and summarized as opportunities and threats in the SWOT analysis to show how these factors may affect the objective of developing sustainable professional personnel to carry out effective regulatory and oversight responsibilities in each area of the ICAO Strategic Objectives.

1.5 Limitations

1.5.1 This contract has been limited by the following factors:

a) previously collected data was limited;

b) the time allotted was rather too short to update the data to be collected from respondents; and

c) it was recognized that there is probably questionnaire fatigue and therefore expecting a completion of the data in the short time available through responses from States was not feasible.

1.5.2 A recommendation is made to make the data collection and maintenance a continuous real-time process via a web-based database software. An Aviation Professionals Study for the AFI region (APSAR) database should be a comprehensive database application designed to address the challenges of inadequate aviation professionals in the AFI region. The application should aim to support the development of a sustainable pool of qualified aviation personnel capable of effectively carrying out regulatory and oversight responsibilities aligned with ICAO's Strategic Objectives.

1.6 Remainder of the Document

1.6.1 The following sections of the present document describe:

a) the outcomes of deliverable 1.3.1.a, i.e. of the review and finalization of the existing analysis and assessment, including SWOT and PEST analyses (chapters 2 to 14);

b) the outcomes of deliverable 1.3.1.c, i.e. the review of the capacity of approved training centres (chapter 15); and

c) the summary of the final SWOT and PEST analyses, which combines items a) and b) above (chapter 16).

2. PEST METHODOLOGY

2.1 General

2.1.1 A PEST analysis seeks to provide strategists with a framework through which to increase their awareness of the external environment. However, experts advise users of the framework that if not used judiciously, a PEST analysis may become an endless evaluation of political, economic, social and technological factors, which may result in an inconclusive analysis. The fundamental principle of the framework is that only those factors that have a direct bearing on the attractiveness of the industry and which are likely to change in the foreseeable future should be included.

2.1.2 The analysis relies more on expert knowledge and existing literature of the AFI region rather than information received by way of questionnaires. This approach was to save time but also because of the realisation that questionnaires on PEST could be sensitive and responses would not be forth coming.

2.1.3 The draft PEST analysis, prepared by the previous consultant, provides basic data and discusses political, economic, social and technological factors as they appear in each AFI State. The approach in this report is to summarize the PEST outlook along the ICAO ESAF, WACAF, EUR/NAT and MID regions. This approach is believed, will be more favourable allowing any proposed strategies to be monitored or driven by the ICAO Regional Offices.

2.1.4 There are three AFI States in the EUR/NAT region, i.e. Algeria, Tunisia and Morocco, and three AFI States in the MID region, i.e. Egypt, Libya and Sudan. Those States are referred to in this report as AFI-EUR and AFI-MID, respectively.

2.2 Political Factors

2.2.1 The political stability in the countries of the AFI region is critical for success. Opportunities for growth of aviation and training will be available and more sustainable in countries that are politically stable with Governments implementing activities aimed at the promotion of civil aviation. Continued political stability is conducive to the growth of the aviation industry. However, political instability may lead to reduced travel due to travel advisories. A framework on ATOs cross-border collaboration will guide on student transfers where political instability affects training in the host State.

2.3 Economic Factors

2.3.1 The improvement in general economic performance resulting in growth in economies and increase in disposable incomes will boost the aviation industry through increased demand for air services. This will trigger demand for more human resources, hence the need to train more personnel. Scholarship and fellowship programmes will address participants' financial challenges during harsh economic times.

2.4 Social Factors

2.4.1 The social dynamics in Africa are constantly changing. The populace has become more knowledgeable and better informed and is therefore in higher demand for better quality services. Africa has the highest population of youth between 15 and 25 years, which constitutes 51 per cent of the total population in Africa. This generation of people requires jobs and, more importantly, it needs to be considered how the aviation industry attract, train and retain this workforce. Economic growth in the States has a direct correlation to employment opportunities within the aviation sector, as aviation is directly linked to a country's economic growth.

2.5 Technological Factors

2.5.1 The advancement in the level of technology in the aviation industry requires support from skilled, dynamic and flexible workforce that is able to learn and adopt new technologies for use in the workplace. The ATOs will therefore need to offer training on emerging technologies that can be applied on the next generation equipment. The ATOs will need to work with development partners towards acquisition and utilisation of current technology in training. Technology can also be harnessed as a methodology to provide training initiatives, e.g. in the form of online and e-learning programmes, communities of learning, blogs, etc. Therefore, a solid technological infrastructure with affordable and accessible data is necessary in countries adopting this approach to learning.

3. PEST ANALYSIS (WACAF)

3.1 The WACAF region consists of 24 States, i.e. Benin, Burkina Faso, Cabo Verde, Cameroon, Central African Republic, Chad, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Sao Tome and Principe, Senegal, Sierra Leone and Togo.

3.2 Political Factors

3.2.1 The WACAF region includes five English-speaking, three Portuguese-speaking and 16 French-speaking countries. The region has had quite a considerable number of political upheavals, coups d'état and terrorist insurgency. In the last couple of years, three countries have been politically unstable: Burkina Faso, Guinea and Mali, all in the Francophone zone of the region. These upheavals come on the backdrop of serious civil wars that ravaged countries like Liberia and Sierra Leone within the last three decades. These upheavals obviously have affected all economic activities and the aviation sector has had its own share.

3.2.2 In each decade between 1958 and 2008, according to one researcher, West Africa had the highest number of coups on the continent, accounting for 44.4 per cent. Since 2010, there have been over 40 coups and attempted coups in Africa; some 20 occurred in West Africa and the Sahel, including Chad. Since 2019, there have been seven coups, five successful and two failed.

3.2.3 Between 1958 and 2008, most coups in Africa occurred in former French colonies, as did six of the seven since 2019. Similarly, 12 of the 20 coups in the sub-region since 2010 happened there. The latest successful putsch in Burkina Faso came on the heels of two attempted ones, in 2015 and 2016.

3.2.4 In the last two years, three fragile countries in West Africa, i.e. Burkina Faso, Guinea and Mali, succumbed to instability and experienced military takeovers. West Africa's latest successful coup, in Burkina Faso on 24 January 2022, has renewed unease about coups returning and democracies dying in Africa. The recent attempt in Guinea-Bissau adds to the number. While the COVID-19 pandemic may have played a role in pushing these countries over the edge, they were on the precipice of instability long before the emergence of the virus due to deep-seated vulnerabilities such as chronic insecurity, political corruption and mass unemployment. Indeed, in all three countries, military interventions came not as a surprise but on the back of long-ignored systemic failures and growing societal discontent.

3.2.5 In Burkina Faso, repeated attacks by armed groups and a failure to govern, which is partly evidenced in the apparent ill-equipping of the country's security forces against such groups, created a security vacuum. In Mali, attempts by the ruling party to manipulate the results of the 2020 parliamentary elections in favour of candidates supported by the then president led to street demonstrations during which aggrieved masses called on the government to resign. In Guinea, the September 2021 military coup was the consequence of a months-long political crisis, triggered by President Alpha Condé's bid to remove presidential term-limit restrictions through a constitutional referendum in March 2020 – a move that allowed him to seek a third term in office.

3.2.6 None of these coups, or the challenges that led to them, materialised suddenly. International development organisations and think tanks have been pointing to the extreme security and governance challenges facing these countries for years. Even before the beginning of the COVID-19 pandemic, the think tank The Fund for Peace had rated these countries as on high warning or on alert in its Fragile States Index, suggesting that their vulnerabilities could lead to instability if not outright armed conflict. Similarly, the Economist Intelligence Unit, in its Democracy Index of 2019, had suggested that there was a steady decline in the quality of democratic governance in Burkina Faso, Guinea and Mali.

3.2.7 So far, all attempts by regional bodies like the Economic Community of West African States (ECOWAS) and the African Union (AU) to turn back this trend have failed, largely because such attempts focused on punishing the militaries rather than understanding and attempting to help fix the underlying causes that led to civilian populations supporting their actions. As a result, the recent wave of military coups in Africa has raised questions about the role regional and continental multilateral organisations can play in averting democratic backsliding.

3.2.8 President Denis Sassou-Nguesso, who led the People's Republic of the Congo from 1979 to 1992, returned to power in 1997. He won the presidential elections in 2002, 2009 and 2016. In November 2017, a ceasefire agreement was signed between the Government and representatives of the former rebel leader, Frédéric Bintsamou (known as Pastor Ntoumi), who had reignited a rebellion in the department of Pool following the 2016 presidential elections. Peace and security have since gradually returned, while the government and the international community strive to consolidate the still-fragile peace in this southern department of the country. A disarmament, demobilization and reintegration (DDR) program established under the control of the United Nations. In 2018, an audit was conducted of the program by the Office of Internal Oversight Services (OIOS) which made a number of recommendations that have been accepted are being implemented by the United Nations Organization Stabilization Mission in the Democratic Republic of the Congo (MONUSCO).

3.2.9 The crisis in northern Mali, according to the OECD as at April 2013, is the outcome of long-term factors converging with recent developments in regional terrorist activity and the knock-on effects of the Libyan civil war in 2011, i.e. long-standing socio-economic grievances, Touareg desire for autonomy from Bamako and the outflow of weapons and fighters from Libya culminating in the revolt in the north in January 2012. The current security crisis there underscores the policy challenges and risks which the international community faces in reaching a resolution. It argues that Bamako's loss of control over the north is due to longstanding socioeconomic grievances among the Touareg, compounded by complex new threats and developments. The exploitation of the Touareg rebellion by radical Islamist terrorist groups presents a unique and complex challenge not only to Mali but also to the wider region. As military intervention looms so too do the prospect of protracted conflict that will very likely affect the entire region. Planning will need to look beyond short-term responses to the crisis: sustainable security will depend upon sustainable development.

3.2.10 Terrorism has been a major challenge for Nigeria over the years. A report of the Organization for Economic Cooperation and Development (OECD) (2013), *Conflict over Resources and Terrorism: Two Facets of Insecurity*, discusses the political, economic and religious factors that gave rise to Boko Haram, the most active terrorist group in Nigeria. It argues that Boko Haram's tactics may be evolving from a locally focused insurgency to transnational terrorist activities and that the movement poses a growing threat to neighbouring countries, particularly Mali and Niger. The report alleges that Nigerian government's failure to address socio-economic marginalisation, combined with heavy-handed counter-terrorism measures may have hindered efforts to end the Islamist-led insurgency in the north. Nigeria's experience and Boko Haram's dramatic escalation of violence, provides lessons for other countries about the need to understand and tackle this new and evolving threat. Boko Haram embodies a growing regional security challenge that requires a coordinated regional response, including joint security initiatives and shared commitment to development and governance in vulnerable area. The tactics employed by Boko Haram, including abductions and bombings, have made it extremely dangerous for aviation activity. The Nigerian College of Aviation Technology (NCAT) centre in Zaire is at the centre of Boko Haram insurgent activity. This has obviously made the NCAT unattractive to participants especially from foreign countries.

3.3 Economic Factors

3.3.1 The economic strength of the WACAF region is the weakest in the AFI region. Nigeria undoubtedly has a large and strong economy and has been a kingpin in supporting the Banjul Accord Group Aviation Safety Oversight Organisation (BAGASOO) financially. A few other countries in the region may be said to have modest economies like Cameroon, Côte d'Ivoire, Ghana or Senegal. Others such as Gambia, Guinea, Guinea-Bissau, Liberia and Sierra Leone are below average.

3.3.2 The largest economies in the region, i.e. Côte d'Ivoire, Ghana and Nigeria, accounted for 25 per cent of Africa's GDP in 2020. West Africa has experienced a surge in economic growth since the early 1990s. Since 2000, its collective GDP has risen from $105 billion to more than $659 billion in 2020. A report of the International Monetary Fund (IMF) from Wikipedia estimated the GDPs of Nigeria at $1,116 billion, Ghana at $187 billion, Mali at 50 billion, Sierra Leone at $14 billion, the Central African Republic at $5 billion and Cabo Verde at $4 billion.

3.3.3 Congo, Gabon, Ghana, Guinea-Bissau, Sierra Leone and Togo are classified as "debt distressed" as they all have debt totalling more than 70 per cent of their respective GDP, according to data from the IMF and the World Bank as at December 2021.

3.3.4 Prior to the global shock triggered by the pandemic, Côte d'Ivoire had one of the most robust economies in Africa and in the world and had grown at an annual average rate of 8 per cent since 2012. However, the global health situation adversely affected Ivorian households and businesses and slowed the growth rate to 1.8 per cent in 2020. Robust domestic demand and stable exports are expected to drive the country's economic recovery from 2021.

3.3.5 As the population in the WACAF region booms and its economy continues to expand, the opportunities for businesses to trade across the region are vast. Despite this, economic growth rates in most of the countries are lagging and poverty remains high. Essentially, the region's farmers and firms produce and trade in highly localized markets and do not achieve the sufficient economies of scale required to attract broad-based investments that could accelerate growth and reduce poverty. This is due to several constraints, including inefficient transportation and trade barriers along corridors and at borders, a heavy reliance on family and informal sources of financing and an insufficient supply of reliable and affordable power. These factors result in West African products being uncompetitive in the international marketplace.

3.3.6 The United States Agency for International Development (USAID) West Africa's strategy has been to work through regional organizations and private sector associations to address critical constraints to competitiveness and demonstrate West Africa's productive potential to trigger greater regional investment.

3.3.7 West African countries have long-standing, thriving business connections. Over the years, these existing trade relationships have been formalized and enhanced into important cross border trade along key corridors and serve as the main source of livelihoods for many traders, notably women, transport operators and businesses connected to trade such as hotels and restaurants.

3.3.8 Unfortunately, West Africa and the larger WACAF region, also has some of the longest road transportation times for travel between countries and some of the highest travel costs per kilometre of any region in the world. The region's corridors are laden with administrative barriers such as cumbersome border and customs clearance processes, as well as formal and informal checkpoints and roadblocks that keep trucks stationary for extended periods of time.

3.3.9 These are serious impediments to the region's economic growth and development. In addition, implementation of trade facilitation related policies such as the Trade Facilitation Agreement (TFA), the adoption and implementation of the ECOWAS Customs Code and the enforcement of the existing regional measures (like Common External Tariff and ECOWAS Trade Liberalization Scheme) are not yet fully enforced. Whilst these limitations may tend to promote air travel, the fact that they limit the spending capacity of the populace acts as a disincentive to promoting aviation.

3.3.10 In response to these challenges, USAID/West Africa partnered with ECOWAS, the West African Economic and Monetary Union (WAEMU), the European Commission (EU), the World Bank, Germany (GTZ) and the Netherlands to develop the Trade Facilitation West Africa (TFWA) program.

3.3.11 Since 2018, TFWA has strived to advance ECOWAS's regional agenda to support the free movement of goods, support countries to implement the World Trade Organization Trade Facilitation Agreement, decrease the time and cost of goods to move along key regional corridors and increase engagement of the private sector and civil society in trade facilitation reforms, with a particular focus on women and small-scale traders.

3.3.12 The Democratic Republic of the Congo is endowed with exceptional natural resources, including minerals such as cobalt and copper, hydropower potential, significant arable land, immense biodiversity and the world's second largest rainforest. However, the country has the third largest population of poor globally. Poverty in the country is high, remains widespread and pervasive and is increasing due to impacts from COVID-19.

3.3.13 It is estimated that Africa and for that matter WACAF will only experience a demographic dividend by 2035, when its young and growing labour force will have fewer children and retired people as dependents as a proportion of the population, making it more demographically comparable to the United States and Europe. It is becoming a more educated labour force, with nearly half expected to have some secondary-level education by 2020. A consumer class is also emerging in Africa and is expected to keep booming. These factors support a growth in Aviation activity.

3.4 Social Factors

3.4.1 The COVID-19 pandemic may be classified as a social factor, as it has led to the most devastating global economic disruption in recent times, particularly due to the pronounced decline in oil prices prior to the Ukraine-Russian war and spikes in risk aversion in global capital markets. In the WACAF region, over 40 per cent of populations live below the poverty line, while another 25 per cent are vulnerable. With COVID-19, many of these vulnerable people could fall into poverty. The magnitude of the health impact depends on the duration and the domestic spread of the outbreak, while the economic impact hinges on oil prices, fall in the hospitality and tourism industry and a near collapse of the aviation sector.

3.4.2 Oil accounts for over 80 per cent of exports, a third of banking sector credit and half of the government of Nigeria's revenues. Oil prices also affect growth in non-oil industries and services, with additional pressures arising from foreign portfolio investors' reassessment of risks and domestic liquidity management.

3.4.3 Within the primary sector, agricultural activity stands out, as it is the base of most of the economies in the WACAF region, including Cameroon, Côte d'Ivoire and Ghana, and the countries' leading employer. It focuses on the production of industrial crops and food: timber, cocoa, coffee, cotton, pineapples, bananas and rubber. Cameroon for instance is considered the "breadbasket of the region" and the sector has great growth potential.

3.4.4 A report from the think tank WATHI, a new civil society organization focusing on West Africa, reports the region is confronted with the realities of energy vulnerability, fuel price volatility and system unreliability. Energy poverty and its consequences for local economies and social development are projected to remain the predominant challenge for West Africa through to 2030.

3.4.5 Without considerable investment, energy poverty and its profound economic and societal consequences will continue to be a challenge for West Africa in 2030. The region with a total population in excess of 340 million has one of the lowest modern electricity consumption rates in the world. Electricity access rates in the region vary from below 20 per cent in countries like Liberia, Sierra Leone, Niger and Burkina Faso to more than 50 per cent in Senegal and more than 70 per cent in Ghana.

3.4.6 In Nigeria, the largest country in West Africa, it has been estimated that 96 million people, i.e. 55 per cent of the population, do not have access to electricity. For the ECOWAS region, only 19 per cent of the rural population has access, with this predominantly being in larger rural centres and some localities. Poor electricity access in the region is due to a variety of regulatory, social, economic, technical and financial constraints such as insufficient generation, high prices of petroleum, lack of financing and transmission and distribution losses.

3.4.7 A report of the World Economic Forum in 2015 quoted officials to have said that large parts of Central Africa have big potential to generate hydroelectric power, which could help pull more than 700 million people out of poverty. Insufficient energy supplies have been a major hurdle on the region's path towards economic growth.

3.4.8 According to Cameroon's energy and water minister, Atangana Kouna, low access to energy has hampered efforts to meet the Millennium Development Goals, contributing to acute poverty and high child malnutrition rates. "The Central African region is facing a huge development setback that can be addressed through investments in energy supply and energy infrastructure," the minister told a November meeting in Yaounde that endorsed an implementation plan for a regional energy strategy. The plan, which runs through to 2030, has since been approved by energy ministers from the Economic Community of Central African States. The Central African Power Pool (CAPP), which organised the Yaounde gathering, will coordinate the inter-State electricity connection project, based on a $4.6 million study funded by the African Development Bank (AfDB). Authorities say the project will provide a regional response to Central Africa's energy and development challenges, curb greenhouse gas emissions and give a boost to the emerging economies of Cameroon, Chad, Central African Republic, Congo, Democratic Republic of the Congo, Equatorial Guinea and Gabon.

3.4.9 Based on estimates from the IMF, investors withdrew $83 billion from emerging markets since the start of the COVID-19 crisis. Capital outflows are likely to lead to a sharp drop in foreign direct investment (FDI) and to increased financing costs. The impact of internal transmission channels, reduction in consumption and domestic investment, will depend on contagion risk and the public policy choices made to combat the pandemic.

3.4.10 As most countries were beginning to recover from the impact of the COVID-19 pandemic, the war in Ukraine has made things even worse. Whilst the few oil-producing countries like Cameroon, Equatorial Guinea, Nigeria and to some extent Ghana, may be experiencing a windfall, high rise of finished petroleum products (petrol and diesel) prices, high cost of living and inflation have all led to lower standards of living globally.

3.4.11 However, the problems of the region are also partly self-inflected. For instance, Nigeria's decision to unilaterally close its land borders with its neighbours in August 2019 has dealt a major blow to economic activity in Benin, Cameroon, Ghana and Togo. Others followed suit because of the spread of

the COVID-19 pandemic. In March 2022, Ghana has opened its land boarders; however, until its neighbours do same, the negative economic effect on several of these countries will persist.

3.4.12 Rising public debts and deteriorating exchange rate of national currencies have also affected the social life of the people of the region. Ghana's public debt rose to over 80 per cent of the GDP and the currency was adjudged to be one of the worst performing in the world as it depreciated by about 20 per cent in the first quarter of 2022. As at November 2022 the Cedi had at a point become the worse performing currency in the world, depreciating by over 60 per cent in 9 months in 2022 with the World Bank predicting that public debt could close the year at over 104 per cent of the GDP. These challenges have led to austerity measures by the governments, including increased taxes, high fuel prices and projected debt restructuring. The consequences have been unrest, strikes and lower disposable income.

3.4.13 Eight States of the WACAF region belong to WAEMU. Their monetary policy is managed by the Central Bank of West African States (BCEAO), which keeps the CFA franc pegged to the euro. The BCEAO's foreign exchange reserves were equivalent to 4.9 months of imports in 2019, against 4.5 months in 2018, owing primarily to community-wide fiscal consolidation and net capital inflows. The real effective exchange rate (REER) depreciated by 5 per cent in 2019, driven by the nominal depreciation of the euro against the US dollar and the persistently lower inflation rate of WAEMU in relation to its trading partners.

3.4.14 Countries of the central zone of WACAF are members of Economic and Monetary Community of Central Africa (CEMAC), which experienced a crisis up to early 2022 because of its large dependence on oil exports and lack of sufficient buffers, such as government deposits and international reserves. Equatorial Guinea, for instance, announced plans for adjustment, but has not yet reached an agreement with the IMF.

3.4.15 Until the outbreak of Ebola in May 2014, Sierra Leone was seeking to attain middle-income status by 2035, but the country still carries its post-conflict attributes of high youth unemployment, corruption and weak governance. The country continues to face the daunting challenge of enhancing transparency in managing its natural resources and creating fiscal space for development. Problems of poor infrastructure and widespread rural and urban impoverishment persist despite remarkable strides and reforms.

3.4.16 To restore its external and fiscal imbalances, Equatorial Guinea for instance is undertaking several reforms and has entered into an IMF Staff Monitored Program (SMP) in May 2018.

3.5 Technological Factors

3.5.1 The development of technology in the WACAF region has been very varied, but overall very low. Despite considerable efforts made by several countries, limitations of electricity coverage, poor road infrastructure, corruption and mismanagement have made it difficult to develop ICT areas such as telecommunications and broadcasting, mobile/cellular service, mobile money transaction, fibre optic coverage, international internet bandwidth, 3G/4G coverage, internet domains, broadcast services and subscriptions (frequency modulation), newspaper circulation and online newspaper readership.

3.5.2 Nigeria's ICT sector has grown from less than 1 per cent of the GDP in 2001 to almost 10 per cent of the GDP (OC&C Consulting, 2018). Nigeria has also surpassed South Africa to emerge as a premier investment destination with 55 active tech hubs raising a total of $94.9 million, while South Africa raised $60 million with 59 active start-ups (Usman, Choi, & Dutz, 2019). The country is also the continent's biggest technology market and accounts for 23 per cent of internet users in Africa with 122 million people online in December 2018 (Internet World Stats, 2019). It also has the largest

number of telecommunications subscribers, with a tele-density figure of almost 90 per cent (Nigerian Communications Commission, 2019). The growth of the tech sector offers new possibilities for Nigeria's growing labour force, in terms of employment and entrepreneurship. In Nigeria, over 100 million people have access to mobile telephones and internet use has risen to almost 50 per cent (Internet World Stats, 2019). Mobile telephony and internet connectivity, combined with urbanization and population growth, have created an environment for technology products and services. However, a very unreliable energy sector has lowered all the gains made in the ICT sector.

3.5.3 Ghana has one of West Africa's most developed national innovation systems. There is a Council for Scientific and Industrial Research, established in 1958, with 13 specialized institutes for research on crops, animals, food, water and industry. Other scientific institutions include the Ghana Atomic Energy Commission, the Centre for Scientific Research into Plant Medicine and the Noguchi Memorial Institute for Medical Research at the University of Ghana. However, Ghana has only a small pool of researchers of 39 per million population in 2010. However, they are increasingly publishing in international journals.

3.5.4 In Ghana, telecommunications and broadcasting, mobile/cellular service, mobile money transaction, fibre optic coverage, international internet bandwidth, 3G/4G coverage, internet domains, broadcast services and subscriptions (frequency modulation), newspaper circulation and online newspaper readership are well developed. Electricity coverage in Ghana is over 80 per cent of the population and reasonably stable giving great value to the ICT development. Ghana fostered business incubators for ICTs, industrial parks for textiles and garments and smaller experimental incubators within research institutes like the Food Research Institute. These are all located in the Accra-Tema metropolis where they are too inaccessible for the thousands of entrepreneurs living outside the capital who need these facilities to develop their businesses.

3.5.5 E-commerce sites have been established in the fields of energy, agriculture, banking, transportation, logistics, health and finance in countries like Ghana and Nigeria. Several large tech companies have emerged over the past few years; these have attracted international attention and funding.

3.5.6 As in the case of the six other Francophone countries situated mainly in the West African region, Niger expressed interest in participating in the Global Observatory of Science, Technology and Innovation Policy Instruments (GO-SPIN) programme and designated a technical group that participated in the GO-SPIN training workshop held in Dakar in March 2013. The project funding of the Spanish funded-project on capacity building in science, technology and innovation (STI) Policy in Africa was used entirely for this activity, as well as to support the completion of the GO-SPIN survey, in collaboration with African Observatory of Science, Technology and Innovation (AOSTI).

3.5.7 Mali is a landlocked country in the heart of the Sahel, a region particularly threatened by drought and desertification; approximately 65 per cent of Mali's land area is either desert or semi-desert. Mali's economy is dominated by the primary sector, which contributes 35 per cent to GDP. Agriculture, water and health are all key sectors that are particularly vulnerable to the adverse impacts of climate change. Accordingly, the target group for technology transfer in the TNA is the vulnerable rural population, who represent 70 per cent of Mali's total population.

3.5.8 Liberia is currently in the process of working on its TNA. It has completed its sectors and technology prioritization process and is currently about to complete its second reports (Barrier Analysis and Enabling Frameworks). Nearly half of Liberia's area is covered by forest, and around 40 per cent of the Upper Guinea Forest falls within Liberia's borders.

3.5.9 Other countries in the region have made some modest efforts, which are however not sufficient to support innovative strategies in the use of ICT. The government of Guinea-Bissau announced

its intention to liberalize the telecom industry, extend telecommunications to the whole country and introduce a cellular network. The internet access for the network would be provided by USAID. Guinea-Bissau has one of the lowest electrification rates in Africa. This rate indicates the number of people with electricity access as a percentage of the total population. Electricity is not accessible to a large part of the population, mostly due to corruption and inefficiency.

3.5.10 The government of Guinea is promoting access to ICTs and their use in teaching, scientific research and administration. Guinea currently has one of the lowest rates of internet penetration in Africa, at just 1.5 per cent.

3.5.11 As a desire to link training with STI development, Gambia's Programme for Accelerated Growth and Employment (PAGE), covering the period 2012–2015, drives its own vision of attaining middle-income status. Just 14 per cent of the population has access to internet, for instance, and only three in four Gambians have access to a clean water supply. Overall, however, STI in Gambia is characterized by inadequate infrastructure and insufficient skills and institutional capacity to realize its science and innovation goals, combined with a lack of funding. The National Science, Technology and Innovation Policy is intended to address these constraints.

3.5.12 Côte d'Ivoire has six main public universities and a virtual university. In comparison, Ghana has over 30 public and private universities and Nigeria over 50. In spite of several visible improvements, Côte d'Ivoire's research and innovation system is still underfinanced and needs to strengthen or operationalize its framework laws, e.g. for public-private partnerships, research contracts etc., as well as fundamental public and private infrastructure.

3.5.13 Chad's business and investment climate remains challenging. Private sector development is hindered by poor transport infrastructure, lack of skilled labour, unreliable energy, weak contract enforcement, corruption and high tax burdens on private enterprises. Chad is currently in the process of working on its technological needs assessment. It has prioritised its key sectors, and work is now underway to determine which technologies to prioritize.

3.5.14 Togo's cooperation with the United Nations Educational, Scientific and Cultural Organization (UNESCO) in STI policy started in 2009, with the implementation of the first phase of the Spanish funded project on capacity building in STI Policy in Africa. The project is still not completed.

3.5.15 Infrastructure in the Central African Republic, in particular, is in a very poor State. For instance, only 10 per cent of the population, mainly in the capital of Bangui, has access to electricity, which is not available to the rural population. This strong potential is also beset by a dire reality: the central African region has the worst infrastructure on the African continent. According to a report by the AfDB, the "region stands out on the continent as one with the least infrastructure network, particularly transport and energy, which impacts negatively on production capacities and regional trade as well as social conditions and welfare." Other services like telecommunication and banking are either lacking or non-existent beyond Bangui. Corruption within the government not only fuels instability, but also hinders developmental and growth efforts in the country as natural resources like diamond and gold are exploited within the inertia of instability.

3.5.16 The impact of the relatively poor technological factors became manifest during the COVID-19 pandemic. Several virtual courses were introduced to maintain training in aviation and other sectors, and meetings were held virtually. However, individuals from several countries in the WACAF region were unable to participate either as instructors or as participants.

4. PEST ANALYSIS (ESAF)

4.1 The ESAF region consists of 24 States, i.e. Angola, Botswana, Burundi, Comoros, Djibouti, Eritrea, Eswatini, Ethiopia, Kenya, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Rwanda, Seychelles, Somalia, South Africa, South Sudan, Uganda, United Republic of Tanzania, Zambia and Zimbabwe.

4.2 The region has mixed climatic, ecological, political and social conditions. Agriculture is the main stay of several States. There is great production of industrial crops and food among some States: grains and cereals such as rice, wheat, barley and soybeans in South Africa; tomatoes, potatoes, carrots, cabbage, butternuts, beans and groundnuts, dates, grapes, watermelons, span speck, citrus and others in Namibia; cotton, sunflower, pyrethrum, barley, tobacco, sisal, coconut, cashew and Bixa in Kenya; coffee, sugarcane, chat (stimulant plant), tobacco, castor oil seed, cotton, tea, Jatropha in Ethiopia etc.

4.3 Political Factors

4.3.1 The ESAF region is a mixed bag of stable and unstable States. Countries such as Eswatini, Malawi, Mauritius, Mozambique, Rwanda and Seychelles are currently experiencing stable democratic governance, which is promoting rapid economic development.

4.3.2 Eswatini has been a monarchy since its independence proclaimed in 1968, but has been politically stable. King Mswati III, who has reigned since 1986, is the head of State who appoints the ministers, including the prime minister. It exercises simultaneously the executive and the legislative power. Traditionally the King rules alongside the Queen Mother, who is seen as a spiritual leader.

4.3.3 Malawi has been a predominantly peaceful and stable country since its independence in 1964. The one-party rule ended in 1993 and since then presidential, legislative and local elections have been held every five years.

4.3.4 Mozambique achieved independence in 1975, but a few years later a civil war was declared between the FRELIMO government and the Mozambique National Resistance (RENAMO) guerrillas. However, since 1994, Mozambique has since remained stable.

4.3.5 The Rwandan genocide took place in 1994. President Kagame has had three terms in office consolidating the hegemony in the power of the Rwandan Patriotic Front (RPF). Kagame had an impact on its own development model, focused on improving the education sector and promoting the private sector. Kagame runs a joint government with the presence of young technocrats.

4.3.6 Seychelles acceded to independence from the United Kingdom on 29 June 1976. President Manchan was deposed during a coup on 5 June 1977. However, Seychelles has remained stable and a great tourist destination since.

4.3.7 In January 2009, in Madagascar, protests began against the government of President Marc Ravalomanana, in whose repression many people lost their lives. Finally, in March 2009, a transitional government was formed headed by the mayor of the capital, Antananarivo, Andry Rajoelina. The European Union, like the rest of international organizations, including the AU and the Southern African Development Community (SADC), refused to recognize the new government. There were several attempts at international mediation, among which the SADC stands out. Madagascar is however currently stable.

4.3.8 The main challenge in South Africa is to respond to the problems that have not been solved since the fall of apartheid: education, health, energy security, employment, improving security,

fighting corruption and agrarian reform, among others. The COVID-19 crisis has only deepened inequalities and put enormous pressure on the health system that is pending global reform that would include the private sector. Education remains another of the pending challenges for post-apartheid governments. In a recent report by Amnesty International, its Executive Director for Sothern Africa, Shenilla Mohamed, stated that "youth cannot continue to be punished for the failures of governments", which has worsened during the pandemic and it is difficult to achieve the proclaimed interest in which the recovery involves the full participation of young people in the economy in a country where only 10 per cent of households have access to the internet, investment in education is limited and school equipment is deficient. Overall, however, South Africa, one of Africa's largest economies remains relatively politically stable.

4.3.9 Comoros, a former French colony, since its independence in 1975, has suffered considerable political instability, with a score of attempts and coups, social unrest, secessionist demands and arrest of several foreign and Comorian citizens.

4.3.10 Djiboutian politics has been characterized as a dominant single-party system, because opposition parties have only been represented in parliament since 2013. The subsequent presidential and parliamentary elections were all characterized by boycotts by the opposition and, despite this, the ensuing victory for Guelleh and his party. The constitutional limitation of two terms was amended in 2010, so he could be inaugurated in 2011 for the third time and in 2016 for the fourth time.

4.3.11 Eritrea obtained its independence after the referendum held in April 1993. The presidency of the country has been held since then by Isaias Afewerki, supported by the Front for Democracy and People's Justice (FDJP). Although a new constitution was approved in May 1997, i.e. a year before the war with Ethiopia began, which would last until 2000, it has not yet entered into force. Legislative power resides in a transitional assembly which is made up of 150 deputies, all of them members of the FDPJ. Its functions include the election of the president.

4.3.12 Ethiopia is one of the most complex countries in Africa, whose stability depends largely on difficult ethnic balances, but also on social discontent, which make tensions and protests a constant in the history of the oldest country on the continent. Since 2015, and after the holding of general elections that shattered any aspiration for pluralism and democratization, social unrest has led to a series of riots and protests led by the majority ethnic group, the Oromo people, who protested the hegemony of the Tigrinya ethnic group and the poor socio-economic situation. Despite the ambitious reforms of the charismatic Prime Minister, the instability and inter-ethnic clashes have led to recurrent violent outbreaks throughout the country (Gambella, Oromía, Amhara, Somali and Hawassa). Proof of this was the attempted coup in June 2019 or, more recently, the violent protests in late June and early July 2020. The instability in Ethiopia has affected Aviation Training. In the recent violence, several potential participants in ICAO Government Safety Inspector (GSI) Courses for instance withdrew their applications as several news media reported violence near Addis Ababa.

4.3.13 After the December 2007 elections in Kenya, there was a tragic episode of violence that caused more than 1,000 fatalities and half a million displaced people. The situation, which did not normalize until the signing of the National Reconciliation Agreements in February 2008, revealed the persistence of ethnic-based tensions, as the lines of confrontation coincided with the traditional conflicts between the Luo, the Kalenjin and the Kikuyu and rekindled historical feuds between these communities over the distribution of land in the Rift Valley and around Lake Victoria. The reconciliation agreements resulted in a coalition government with Mwai Kibaki as president and opponent Raila Odinga as prime minister. In 2010, a new Constitution was promulgated. The "Building Bridges Initiative" (BBI) is the constitutional reform project promoted by the Kenyatta President and by the opposition leader Raila Odinga. Despite this recent history, Kenya may be considered as a relatively stable country. There have

however been repeated terrorist attacks mostly claimed by Al-Shabaab. The latest was as recent as 11 March 2022, on a construction site in Lamu County. At least four people were killed.

4.3.14 In Lesotho, the results of the May 2012 elections resulted in an unprecedented government coalition formed by Prime Minister Thabane's All Basotho Convention (ABC); the LCD of Deputy Prime Minister Metsing and the Basotho National Party (BNP) of Minister Morena Maseribane, the first experience of its kind on the African continent. However, this arrangement broke down in 2014. In the short term, Lesotho will face several challenges, such as coping with the country's political instability and responding to SADC's scrutiny of the need for constitutional and security sector reforms. Particularly hard is the SADC Statement with the presence of members of the Lesotho armed forces in a multitude of polling stations. Newly elected Prime Minister Thabane has stated that he has no plans to disband the army, but that he will work to separate it from political life to ensure peace and stability.

4.3.15 A transitional constitution July 2011 established that the Republic of South Sudan is a democratic republic and is defined as a "multi-ethnic, multicultural, multilingual, multi-religious and multiracial entity". It also establishes the separation between Church and State and equal rights between men and women. On 9 July 2011, after decades of war, South Sudan achieved its independence. The region has remained relatively calm until a coup d'état took place on 11 April 2019, when Sudanese President Omar al-Bashir was overthrown by the Sudanese army after popular protests demanded his departure. On 25 October 2021, the Sudanese military, led by General Abdel Fattah al-Burhan, took control of the government in a military coup. At least five senior government figures were initially detained. The separation of South Sudan, after a referendum agreed with Khartoum in 2011, meant for Sudan the loss of a large part of its population, a third of its territory and most of its public income, which came from the oil that is extracted in that area. Since then, the economic situation in Sudan has remained very complicated, with a chronic shortage of foreign exchange, a very high public deficit and inflation that exceeded 200 per cent in 2020. The recovery necessarily involves the consolidation of public finances and the debt relief. The lifting of sanctions on the previous regime, the economic reforms undertaken by the transitional government in accordance with the IMF SMP and the recent payment of arrears to the World Bank clear the way towards the cancellation of the external debt under the Heavily Indebted Poor Countries (HIPC) Initiative.

4.3.16 After the collapse of the Siad Barre regime in 1991, a period marked by war and anarchy began in Somalia. Fighting between rival factions and clans plunged the country into chaos. In terms of security, the situation is very precarious. Although it has been possible to regain control of the main urban centres, the terrorist group Al-Shabaab, which has about 5,000 troops, still controls large rural territories. Its financial capacity is remarkable and maintains a great operational power, inside and outside Somalia.

4.3.17 Uganda is a former British colony, it was not until 9 October 1962 that it declared itself independent by electing Milton Obote, leader of the Uganda People's Congress (UPC), as Prime Minister. The subsequent years were marked with coups, dictatorship and violence. In December 2017, after several months of political tension, street protests and chaotic parliamentary debates, the Ugandan Parliament passed Constitutional Amendment Law No. 2. In 2019, the rise in popularity of the opposition Robert Kyagulanyi known as Bobi Wine, who has managed to present himself as a potential threat to the power of President Museveni, has led the security forces to harass Wine, a trend repeated in the presidential elections of January 2021. Wine's arrest at the beginning of the campaign caused several days of incidents in mid-November 2019 and the repression of protests by the security forces caused more than 80 deaths. Although Museveni revalidated his mandate by obtaining about 58 per cent of the votes in the elections of 14 January 2021, the results have been answered by Wine and viewed with suspicion by the international community due to the climate of harassment of the opposition and the press, with blocking access to the internet and social networks- during the electoral campaign. However, Wine's results of 35 per cent of votes guarantee that Museveni will reach 40 years in office, postponing the

debate on his succession until 2026. It may be summarized therefore that Uganda is presently enjoying an uneasy quiet.

4.3.18 The United Republic of Tanzania may be classified among the stable countries in the ESAF region. The country was formed in 1964 from the union of two independent States, Tanganyika and Zanzibar. Since its creation, the politics of Tanzania has been structured around the existence of a single party that was successively changing its name. At present, its name is Chama Cha Mapinduzi (CCM), party of the revolution in Swahili. All the presidents of the country who have alternated in power after the withdrawal of the independence leader Julius Nyerere in 1985 and the subsequent reintroduction of a multi-party system have belonged to this party. Zanzibar has its own president, government and House of Representatives. After independence, in December 1963, Zanzibar became a constitutional monarchy headed by Sultan Jamshid bin Abdullah. However, the "Africanist" parties, as opposed to those with greater Arab influence, staged a coup in January 1964, constituting a Revolutionary Council with the aim of applying policies close to those of the Soviet bloc. The fear of an international intervention to re-establish the sultanate, in the context of the cold war, galvanized the union with Tanganyika.

4.3.19 President Edgar Lungu of Zambia was re-elected president in the last elections, which took place on 11 August 2016 and which, according to international observers, were peaceful, free and fair, although there were some episodes of violence during the election campaign and limitations on the right to freedom of the press. The leader of the majority opposition party, the United Party for National Development (PUDN or UPND), Hakainde Hichilema, who was contesting the presidency with Lungu, refused to accept the 2016 results even after the constitutional court had ruled against him. He was arrested and detained, and it took the mediation of Commonwealth Secretary-General Patricia Scotland and Nigerian President Muhammadu Buhari to get him released. Hakainde Hichilema won the 2021 elections that were marred by sporadic violence. Hichilema, a former CEO at an accounting firm before entering politics, would face a daunting task turning around the economic fortunes of one of the world's poorest countries.

4.3.20 In power since the beginning of independence in 1980 in Zimbabwe, President Robert Mugabe began his eighth presidential term after winning an absolute majority in the July 2013 elections. These elections marked the end of the validity of the Global Political Agreement promoted by the SADC, which established a Government of National Unity in response to the campaign of violence and electoral fraud that took place in the 2008 elections. The intensification of factional fighting within the ZANU-PF party over Mugabe's succession since the 2013 elections, with the expulsion of former vice president Joice Mujuru in December 2014, the entry into politics of Grace Mugabe and, finally, the removal of Vice President Emerson Mnangagwa, led to the November 2017 military intervention against Robert Mugabe. Following the intervention and Mugabe's forced resignation as president, there was a swift appointment of a successor by the ZANU-PF party in the person of former vice-president Emmerson Mnangagwa, who was sworn in as president on 24 November 2017. The new president first had to complete Mugabe's term in office, so elections were called for 30 July 2018 (presidential, parliamentary and local). In these elections, President Mnangagwa won and was confirmed in office with 50.8 per cent of the votes, against the new opposition leader, Nelson Chamisa of the Movement for Democratic Change-Alliance (MDC-A), in second place with 44.3 per cent of the votes. Today, Zimbabwe is relative calm politically.

4.4 Economic Factors

4.4.1 The economies of most countries in the ESAF region have suffered from the COVID-19 pandemic and the global economic disruptions caused by it. Admittedly, the effects have been varied with the more southern States like Botswana, Eswatini, Malawi, Mauritius, Mozambique, Namibia, South Africa, the United Republic of Tanzania and others like Comoros and Seychelles having their economy

heavily impacted by the pandemic. Most States experienced a serious contraction in GDP in 2020 and are just beginning to recover.

4.4.2 The second wave of the COVID-19 pandemic was more severe than the first. The industries most hit were the hospitality, tourism and aviation sectors. Trade and supply were also badly affected due restriction in movement and social distancing. The economic impact of COVID-19 includes increased prices of basic foods, rising unemployment, slowdown in growth and increase in poverty. The fiscal deficit of several States is widening due to a slowdown in revenue collection because of the COVID-19 pandemic combined with increasing spending pressures resulting from responses to the pandemic, debt service costs and unbudgeted arrears.

4.4.3 Angola, Eritrea, Kenya, Mozambique, South Africa and Zambia all have debt totalling more than 70 per cent of their respective GDP, according to the most recent data from the IMF and the World Bank.

4.4.4 A World Bank report shows that Mauritius became a high-income country in July 2020. It reached this milestone in one of the worst years in its history due to the global COVID-19 pandemic, which has wreaked havoc on its economy. It therefore slipped back into upper-middle-income status in 2021 due to the impact of the pandemic.

4.4.5 Mozambique's economy registered its first contraction in 2020 in nearly three decades. It is expected to gradually recover in 2021, however substantial downside risks remain due to uncertainty surrounding the path of the COVID-19 pandemic, while growth is expected to rebound over the medium-term, reaching about 4 per cent by 2022.

4.4.6 The COVID-19 pandemic is set to have an unprecedented impact on Namibia's economy and has exacerbated pre-existing structural challenges. Real GDP contracted by 7.4 per cent year-on-year over Q1-Q3 2020. The mining sector, which is an important earner of foreign exchange, contracted by 12.2 per cent year-on-year affected by domestic factors and falling global demand (especially diamonds). On the back of local and foreign travel restrictions, the hospitality industry recorded a large contraction of 46.5 per cent year-on-year. Overall, GDP is expected to have contracted by 7.3 per cent in 2020.

4.4.7 The economic and social shock from the COVID-19 pandemic on the economy of Seychelles has been severe. Economic growth declined significantly in 2020 to -13.5 per cent from 3.9 per cent in 2019, due to the significant disruptions in economic activities, driven by lower tourism activities which declined by more than 60 per cent. In addition, the fiscal deficit widened to 22.6 per cent of the GDP in 2020 on account of lower revenues and higher COVID-19-related spending and is projected to be 15.3 per cent in 2021. Recovery is expected to gradually begin in 2021 driven by a resumption of tourism and related capital flows.

4.4.8 During June and July 2020, the World Bank conducted a COVID-19 Business Pulse Survey covering 1,000 small and medium enterprises in the United Republic of Tanzania. The survey data indicates that about 140,000 formal jobs were lost in June 2020 and that another 2.2 million nonfarm informal workers suffered income losses.

4.4.9 For others like Djibouti, however, the country's medium-term economic outlook remains positive despite the impact of the COVID-19 pandemic.

4.4.10 Ethiopia succeeded in maintaining a real GDP growth of 6.1 per cent in 2019/2020 despite the COVID-19 pandemic.

4.4.11 A regional locust infestation, which started early 2020, also affected some parts of Ethiopia, Kenya (especially the Northeast) and Somalia.

4.4.12 Oil producing countries like Angola are still suffering the effects of lower oil prices and production levels despite significant progress on macroeconomic stability and structural reforms. The oil sector accounts for one-third of the GDP and more than 90 per cent of exports of Angola. The transformation of a State-led oil economy to a private-sector-led growth model is a complex and long-term process and the oil sector will continue to play an important role during this transition period. Macroeconomic stability has been restored and maintained through a more flexible exchange rate regime, restrictive monetary policy and fiscal consolidation. The authorities are actively addressing financial sector vulnerabilities.

4.4.13 Botswana has historically enjoyed strong and stable growth since independence, with sizable fiscal buffers and prudent policies playing a key role in shielding the economy. More recently, however, the limitations of Botswana's diamond-led development model have become more apparent: growth is slower, inequality remains high and job creation is limited. At the same time, increased diamond market volatility, including growing competition from synthetic diamonds, reduced Southern African Customs Union transfers and fiscal expansion have resulted in eroded fiscal buffers.

4.4.14 There are several on-going IMF/World Bank macroeconomic stability, structural reforms and effective governance programmes with the States in the ESAF region. Burundi for instance receives financing from the Bank Group through the International Development Association (IDA) on a three-year performance-based cycle. A Systematic Diagnostic of the private sector to be conducted by the International Finance Corporation (IFC) is being prepared. This diagnostic will provide options for IFC's strategic engagement in Burundi.

4.4.15 The COVID-19 pandemic and the related restriction measures affected trade between the Central African Republic and the rest of the world and is disrupting input and food supply chains. However, the sound performance of the agricultural sector helped reduce the downturn in economic activity.

4.4.16 The COVID-19 pandemic is impacting Comoros' economy through various channels. The slowdown of economic activity due to social distancing measures and the disruption of trade and tourism caused by the pandemic constitutes a threat for Comoros' trade and tourism-related sectors. The expected drop of remittances from the diaspora would substantially reduce households' income, especially the poorer ones. Revenues from trade, which represent the bulk of the government's domestic resources, will decrease significantly raising the fiscal deficit.

4.4.17 Djibouti is one of the smallest countries in Africa. The size of its economy limits its ability to diversify production and increases its reliance on foreign markets, making it more vulnerable to market downturns and hampering its access to external capital. Djibouti's economy is driven by a State-of-the-art port complex, among the most sophisticated in the world. Trade through the port is expected to grow rapidly in parallel with the expanding economy of the country's largest neighbour and main trading partner, Ethiopia. Djibouti's ongoing infrastructure projects, such as the construction of a ship repair yard, a new oil jetty at the Port of Damerjog and new hospitality infrastructure are also expected to boost growth and job creation, barring protracted delays in these new projects. The shipyard's repair and maintenance capabilities are expected to attract more ships to Djibouti, giving the country's main port a competitive advantage over neighbouring ports and cementing its position as a regional trade and logistics hub.

4.4.18 Eritrea's recent growth performance has been marked by significant volatility in part due to its dependence on a predominantly rain-fed agriculture sector, accounting for about one-third of the

economy. In recent years, Eritrea has significantly tightened fiscal policy to reverse the chronic deficits it suffered after the increase in regional insecurity in 1998. In 2018, the fiscal surplus widened to around 11 per cent of the GDP. This was largely achieved by a sharp drop in capital spending as well as some revenue measures. However, fiscal pressures, both recurrent and wage-related are likely to mount. The economic outlook of Eritrea is potentially favourable in the medium term, reflecting the new mining operations coming on stream, but is also dependent on measures to relax restrictions on the private sector imposed and to reopen access to concessional development finance. Poverty appears to have remained widespread in Eritrea, but the lack of data limits available quantitative evidence.

4.4.19 Eswatini has close economic linkages to South Africa, which it depends on for about 70 per cent of its imports and about 65 per cent of exports. Eswatini is a member of the Common Monetary Area (CMA), with Lesotho, Namibia and South Africa.

4.4.20 Ethiopia's main challenges are sustaining its positive economic growth and accelerating poverty reduction, which both require significant progress in job creation, as well as improved governance. The government is devoting a high share of its budget to pro-poor programs and investments. Large-scale donor support will continue to provide a vital contribution in the near-term to finance the cost of pro-poor programs. Key challenges are related to: the unprecedented social and economic impact of the COVID-19 pandemic; the worst locust invasion the country has been experiencing in decades, which may undermine development gains and threaten the food security and livelihoods of millions of Ethiopians; political disruption, associated with social unrest, which could negatively impact growth through lower foreign direct investment, tourism and exports; limited competitiveness, which constrains the development of manufacturing, the creation of jobs and the increase of exports; and an underdeveloped private sector, which would limit the country's trade competitiveness and resilience to shocks. The government aims to expand the role of the private sector through foreign investment and industrial parks to make Ethiopia's growth momentum more sustainable. Ethiopian economy is supported by a strong aviation industry. Aviation accounts for over 80 per cent of U.S. exports to Ethiopia. Prior to the spring of 2020, the sector had been growing rapidly with rising demand for air transportation, both passenger and cargo. It will continue to play an outsize role given Ethiopian Airlines status as the leading airline on the continent and the airline's infrastructure ambitions. The Ethiopian Airports Enterprise (EAE), a company within the Ethiopian Airlines Group (EAG), carried out an expansion of the Addis Ababa Bole International Airport. The objective is to triple the capacity of the airport from seven million passengers per year to 21 million. During the past decade, EAG has registered average revenue growth of 20 per cent per annum. EAG has been following an aggressive 15-year plan, called Vision 2025, with a goal to make EAG the most competitive aviation group in Africa. According to CentreforAviation.com, EAG operates the largest number of aircraft in Africa followed by Egypt Air and South African Airways, with the latter two operating 68 and 64 passenger aircraft respectively. EAG today operates about 135 aircraft, with over 65 per cent of these aircraft supplied by Boeing. EAG aspires to retain its leading African airline position in both passenger and cargo loads. Under Vision 2025, EAG seeks to double its fleet numbers, increase the number of destinations to 125, carry more than 18 million passengers and 800,000 metric tons of cargo and improve its current $2.5 billion annual revenue to $10 billion. To support is ambitious plan the EAG has opened its own 4-star hotel, Skylight Hotel the most luxurious and the largest hotel in Ethiopia located at the heart of Africa's diplomatic hub Addis Ababa, just five minutes away from Bole International Airport to support transit passengers. The Ethiopian Academy also supports in the training of aviation professionals in several areas of the ICAO Strategic Objectives. EAG has invested $100 million in expanding and upgrading its aviation academy. The scale and scope of the expansion seals the academy's position as the largest and the most advanced aviation academy in Africa with an annual intake capacity of 4,000 students training in piloting, aircraft mechanics and technicians, cabin crew, ticket agents and procurement officials. In addition, EAG has invested another $100 million for the first phase of a new cargo terminal that will increase its cargo carrying capacity to 1 million tons, for both dry and perishable goods. The cargo terminal began operating in 2018.

4.4.21 Kenya has made significant political and economic reforms that have contributed to sustained economic growth, social development and political stability gains over the past decade. However, its key development challenges still include poverty, inequality, climate change, continued weak private sector investment and the vulnerability of the economy to internal and external shocks. Over the period 2015-2019, Kenya's economic growth averaged 5.7 per cent, making it one of the fastest growing economies in sub-Saharan Africa. The performance of the economy has been boosted by a stable macroeconomic environment, positive investor confidence and a resilient services sector. Nevertheless, moving into 2021, a significant economic recovery has been underway in Kenya, although it remains highly uneven across sectors, with some, such as tourism, remaining under severe pressure, and there continues to be elevated uncertainty regarding the outlook. The downside risks include a weaker than expected global economic recovery undermining Kenya's export, tourism and remittance inflows, renewed disruption to domestic economic activity from the pandemic, fiscal slippages and weather-related shocks.

4.4.22 In recent years, Lesotho's economic performance has been negatively affected by sluggish global economic growth amid a major downturn in both emerging markets and advanced economies, as well as natural disasters. Sustained political instability, coupled with slow economic growth in the South African economy, also contributed to slow economic performance. In the medium-term, economic growth is expected to be boosted by construction-related projects, including the second phase of the Lesotho Highlands Water Project (LHWP-II), the Lesotho Lowlands Water Development Projects (LLWDP-I and LLWDP -II) and roads. The water and electricity subsectors are expected to be boosted by green energy projects, while the tertiary sector is envisaged to be supported inter alia by government initiatives to reinforce financial inclusion.

4.4.23 Prior to the COVID-19 pandemic, Madagascar was on an upward growth trajectory. Following a prolonged period of political instability and economic stagnation, growth accelerated over the previous five years to reach an estimated 4.8 per cent in 2019, its fastest pace in over a decade. Due to the pandemic, vulnerable populations in urban areas are particularly exposed to economic hardship and poverty traps. Declining tax revenues and COVID-19-related spending has widened the fiscal deficit and created a sudden increase in financing needs. These developments emphasize the importance of implementing robust emergency measures to save lives, protect vulnerable populations and safeguard jobs in the short term as well as accelerate reforms to stimulate investment for long-term recovery, strengthen resilience to future shocks and maintain public debt at a sustainable course. The World Bank is committed to working with the government to achieve those objectives with the full array of its instruments.

4.4.24 Given a widening fiscal deficit, the stock of public debt has continued to increase in Malawi, largely driven by high-cost domestic debt. Malawi is at high risk of overall debt distress and moderate risk of external debt distress, with limited space to absorb shocks.

4.4.25 As the recent Mozambique Economic Update of March 2021 notes, the country needs to press ahead with its structural reform agenda as the pandemic subsides. In the near-term, measures to support viable firms and households would be crucial for a resilient and inclusive recovery. In the recovery phase, policies focusing on supporting economic transformation and job creation, especially for the youth, would be critical. Targeted interventions to support women and alleviate gender inequalities as well as to harness the power of mobile technology would support sustainable and inclusive growth in the medium term.

4.4.26 After experiencing average annual growth of 4.4 per cent between 1991 and 2015, Namibia's economy fell into recession in 2016 and has since struggled to recover. Namibia is largely dependent on investments in mineral extraction and government spending and has suffered from falling commodity prices, weak growth in key trade partners (Angola, South Africa) and tight fiscal policy on the back of government's effort to rebalance public finances.

4.4.27 Rwanda now aspires to reach Middle Income Country (MIC) status by 2035 and High-Income Country (HIC) status by 2050. This aspiration will be carried out through a series of 7-year National Strategies for Transformation (NST1), underpinned by detailed sectoral strategies that are aimed toward achievement of the Sustainable Development Goals. Rwanda's public-sector led development model has shown limitations, as public debt has increased significantly in recent years. Rwanda's growth model has relied heavily on large public investments (12.3 per cent of the GDP in 2019) leading to substantial fiscal deficits financed mainly through external borrowing. Consequently, the debt-to-GDP ratio rose to 56.7 per cent in 2019 (from 19.4 per cent in 2010). External financing through grants, concessional and non-concessional borrowing played an important role in financing public investments. Going forward, the private sector will play a bigger role in helping to ensure economic growth. Low domestic savings, skills and the high cost of energy are some of the major constraints to private investment. Stronger dynamism in the private sector will help to sustain high investment rate and accelerate the growth.

4.4.28 Somalia is continuing to rebuild economic governance institutions amid challenging circumstances. Continuous reform implementation enabled Somalia to reach the first milestone in obtaining debt relief and fully reengage with the international community in March 2020. However, an incomplete political settlement, vulnerability to shocks (such as climate related disasters, locust's infestation and floods) are jeopardizing the recovery from fragility. Somalia also has several opportunities. Rapid urbanization, growing use of digital technologies, planned investments in sectors such as energy, ports, education and health can support economic growth and job creation.

4.4.29 South Africa is a country on the southernmost tip of the African continent, marked by several distinct ecosystems. Inland safari destination, Kruger National Park, is populated by big game. The Western Cape offers beaches, lush wine lands around Stellenbosch and Paarl, craggy cliffs at the Cape of Good Hope, forest and lagoons along the Garden Route and the city of Cape Town, beneath flat-topped Table Mountain. South Africa has therefore a large and varied economy ($301.9 billion GDP in 2020). It made considerable strides to improve the wellbeing of its citizens since its transition to democracy in the mid-1990s, but progress has stagnated in the last decade. The percentage of the population below the upper-middle-income-country poverty line fell from 68 per cent to 56 per cent between 2005 and 2010, but has since trended slightly upwards to 57 per cent in 2015 and is projected to reach 60 per cent in 2020. Structural challenges and weak growth have undermined progress in reducing poverty, which have been heightened by the COVID-19 pandemic. The achievement of progress in household welfare is severely constrained by rising unemployment, which reached an unprecedented 32.5 per cent in the fourth quarter of 2020. The unemployment rate is highest among youths aged between 15 and 24, at around 63 per cent. According to The Africa Report, South African Airways (SAA), the national carrier, entered voluntary business rescue in December 2019 because of many years of financial losses and suspended all operations the following year. In June 2021, the government announced that to revive the airline, it had entered into a partnership with the Takatso Consortium, which would hold a 51 per cent controlling stake. The South African Civil Aviation Authority confirmed on 4 August 2021 that SAA's air operator certificate had been reissued with an approved fleet of eight aircraft.

4.4.30 South Sudan economy is especially vulnerable to weather, oil price and conflict related shocks. The economy had picked up strongly before the COVID-19 pandemic, with GDP real growth reaching 9.5 per cent in the financial year 2019/2020. The oil sector has continued to be the primary driver of growth, with estimated oil production of 62.1 million barrels in the financial year 2019/2020, representing a 26.5 per cent increase on the 49.1 million barrels realized in the financial year 2018/2019. In the agricultural sector, cultivated area increased by 6 per cent in 2020 compared to the previous year, however it is still far from reaching the pre-conflict levels. Expenditures on key social sectors, including health, education, water and sanitation as well as agriculture and rural development are limited. Consequently, poverty levels are expected to remain extremely high on the back of severe food insecurity

and limited access to basic services across the country. About 82 per cent of the population in South Sudan is poor according to the most recent estimates, based on the $1.90 2011 purchasing power parity poverty line. The main priority for the government is to address the underlying causes of the conflict and stabilize the economy. The secession of South Sudan induced multiple economic shocks. The biggest one being the loss of the oil revenue that accounted for more than half of Sudan's government revenue and 95 per cent of its exports. This has reduced economic growth and resulted in double-digit consumer price inflation, which, together with increased fuel prices, triggered violent protests in September 2013. The outbreak of civil war in South Sudan damaged both economies depriving Sudan of much needed pipeline revenues. This war also precipitated an increase in Sudan's already large population of refugees and internally displaced persons, with Sudan now serving as a source, destination and transit country for irregular migration, including refugees and asylum-seekers using the East African North-bound migratory route through Libya to Europe. Continuous food price hikes led to the December 2018 demonstrations which resulted in the removal of President El-Bashir from power in April 2019. This led to the formation of a Transition Government in September 2019.

4.4.31 After the slowdown experienced in 2012, economic activity in Uganda has been gaining strength in the last three years, in a macroeconomic context without major imbalances, with low inflation and a recovery in the level of international reserves. In addition, Uganda's gross domestic product in 2018 has accelerated by almost 3 tenths compared to 2017, exceeding all estimates, due to strong growth in services, the strengthening of domestic demand, the recovery of the industry and the growth of manufacturing and all despite the postponement of the start of the oil industry in Lake Albert. Most of the products exported by Uganda historically remained in the Common Market for Eastern and Southern Africa (COMESA), although the percentage of exports has fallen below 50 per cent since 2013 in favour of Europe, which received 25 per cent of total Ugandan exports in 2018, but especially with the emergence of the United Arab Emirates and the establishment of direct cargo flights between Entebbe and Dubai. In the origin of its imports, Asia continues to be the main source for Uganda, reaching its highest percentage in 2019 with 64 per cent of the total, partly thanks to the strong growth of China as the main supplier with 16 per cent of imports. India and the United Arab Emirates also stand out, both with 11 per cent, Kenya is now Uganda's fourth supplier, having exceeded the 10 per cent threshold, leading the African bloc, which already represents 20 per cent of Ugandan imports. In third position, we find Europe with 15 per cent of total imports.

4.4.32 Reflecting strong income growth over the past decade, on 1 July 2020, the World Bank announced that the United Republic of Tanzania's gross national income (GNI) per capita increased from $1,020 in 2018 to $1,080 in 2019, exceeding the threshold for lower-middle income status. The country's broad vision of its development goals as a middle-income country in 2025 are set out in the Tanzania Development Vision 2025, characterized by high-quality livelihoods, peace, stability and unity, good governance, a well-educated and learning society and a competitive economy capable of sustainable growth and shared benefits. Tanzania has fared relatively well compared to its regional peers, however economic growth has slowed significantly.

4.4.33 After 15 years of significant socio-economic progress and achieving middle-income status in 2011, Zambia's economic performance has stalled in in recent years. Between 2000 and 2014, the annual real GDP growth rate averaged 6.8 per cent. The GDP growth rate slowed to 3.1 per cent per annum between 2015 and 2019, mainly attributed to falling copper prices and declines in agricultural output and hydroelectric power generation due to insufficient rains and insufficient policy adjustment to these exogenous shocks. A gradual recovery is expected, with GDP growth projected at 1.8 per cent in 2021 and will average 2.8 per cent over the period 2021-2023. Higher copper prices, the commissioning of a new hydro power station and a return to normal rainfall patterns are expected to support growth in agriculture and electricity production, key contributors to Zambia's industry and service sectors. However, the impact of the COVID-19 pandemic will continue to dampen activity, especially in tourism and retail and wholesale trade. The risks to this outlook are balanced.

4.4.34 After facing an economic crisis exacerbated by the COVID-19 pandemic, Zimbabwe's economy is set to rebound by 2.9 per cent in 2021, supported by recovery of agriculture and due to base effects. Expected bumper harvest and continuation of rule-based monetary policy will stabilize food prices and improve food security. However, disruptions caused by the pandemic will continue to weigh on economic activity in Zimbabwe, limiting employment growth and improvements in living standards. Operating restrictions led to depressed manufacturing, non-mineral exports, hospitality, trade and transport sectors. Sales of manufacturing and services firms in July 2020 were about half sales in 2019. Supply-side shocks subsided after easing of mobility restrictions, but domestic demand was weak in an environment of triple-digit inflation, high unemployment and income losses. Fiscal and monetary policy responses to the pandemic have been limited to contain volatility of prices. The pandemic and its impacts disrupted livelihoods, especially in urban areas, and added 1.3 million to the extreme poor. Estimates suggest the number of extreme poor reached 7.9 million in 2020, i.e. almost 49 per cent of the population. Surveys indicate that nearly 500,000 households have at least one member who lost their job in 2020, causing many to fall into poverty and worsening the plight of the existing poor.

4.5 Social Factors

4.5.1 According to the World Bank (2020), the per capita income in Angola stands at $2,791 at current prices, $6,966 PPA (World Bank, 2019). The World Bank considers it a lower middle-income country.

4.5.2 Living conditions have improved in Botswana, and poverty has fallen significantly. This rapid poverty reduction can be attributed mainly to a combination of increasing agricultural incomes, including subsidies and demographic changes. Progress in reducing poverty has been accompanied by improvements in shared prosperity. However, Botswana's performance was only in the middle of the worldwide shared-prosperity distribution. Inequality has fallen as well, albeit still being high. The recent Botswana *Multi-Topic Survey: Labour Force Module Report* indicates that the unemployment rate has gone up to 24.5 per cent, with youth unemployment (32.4 per cent) posing a critical challenge.

4.5.3 Burundi has experienced a unique economic situation over the last six years, due particularly to the decline in foreign aid since 2015, which has caused both fiscal and balance of payments difficulties and has impacted all macroeconomic accounts.

4.5.4 Comoros is densely populated, with approximately 465 inhabitants per square kilometre. More than half the population (53 per cent) is under the age of 20. High population density places intense pressure on natural resources and the environment. Due to its location and topography, Comoros is among the countries which are most vulnerable to climate change. More than half the population (54.2 per cent) live in at-risk areas. Nearly one fourth of the population is extremely poor, unable to buy enough food to meet the minimum nutritional requirements of 2,200 kilocalories per person per day. While Comoros compares reasonably well with lower middle-income countries in sub-Saharan Africa, the country's Human Capital Index at 0.41 lags the global average for lower-middle income countries.

4.5.5 Djibouti has a GDP per capita of $3,500 (World Bank, 2019), a Gini coefficient per capita of 41.6 (World Bank, 2017) and an illiteracy rate of 32.1 per cent. The birth rate is however high at 22.7 in 2019.

4.5.6 Although there are no standardized indicators of wealth per inhabitant, poverty is one of the main socio-economic characteristics of Eritrea, which has nevertheless seen important advances in recent decades in issues such as the literacy rate, which is estimated to have reached about 75 per cent of the adult population. Furthermore, since 1960, many Eritreans have left their country first due to the wars of independence with Ethiopia and later due to other circumstances, including socio-economic deprivation and the lack of openness of the regime. Today Eritrea constitutes one of the main countries of

nationality for asylum seekers in many Western countries and the money remittances sent to their country of origin by Eritreans living abroad represent 30 per cent of Eritrea's GDP.

4.5.7 Poverty has persisted despite Eswatini's lower-middle-income status. In 2017, 58.9 per cent of the inhabitants lived below the national poverty line, following a decline from 63 per cent in 2009 and 69 per cent in 2001. Use of international poverty lines also supports the persistence of poverty: the $1.90 per person per day (2011 purchasing power parity (PPP)) international poverty rate has hover around 30 per cent since 2016, estimated at 29.7 per cent in 2020. This rises to 52.7 per cent when the 2011 PPP $3.20 per person per day poverty line for lower middle-income countries is used. Thus, poverty levels have historically been high and there has been little progress in reducing them.

4.5.8 With more than 112 million people (2019), Ethiopia is the second-most populous nation in Africa after Nigeria, and the fastest growing economy in the region. However, it is also one of the poorest, with a per capita income of $850. Ethiopia aims to reach lower-middle-income status by 2025. The consistent higher economic growth in Ethiopia brought with it positive trends in poverty reduction in both urban and rural areas. The share of the population living below the national poverty line decreased from 30 per cent in 2011 to 24 per cent in 2016. The government has launched a new 10-year perspective plan which will run from 2020/2021 to 2029/2030. The plan aims to sustain the remarkable economic growth achieved under the Growth and Transformation Plans, while putting more emphasis on the private sector.

4.5.9 Kenya has made major gains in social development, including reducing child mortality, achieving near universal primary school enrolment and narrowing gender gaps in education. Interventions and increased spending on health and education are paying dividends. The country has the potential to be one of Africa's success stories, given its growing youthful population, a dynamic private sector, skilled workforce, improved infrastructure, a new constitution and its pivotal role in East Africa.

4.5.10 In Lesotho, the COVID-19 pandemic is expected to lead to a significant increase in poverty and to a setback in human capital accumulation. While the human capital index increased from 0.34 in 2010 to 0.40 in 2020, Lesotho already fares below the average of lower middle-income countries and the situation has been exacerbated by the COVID-19 pandemic. In addition to the immediate impact of income losses, disruptions in essential health and education services are likely to reverse progress made in human capital accumulation and poverty alleviation thus far. The World Bank's macro-poverty outlook projections estimate that an additional 3.2 per cent of the population has already been pushed into extreme poverty because of the pandemic, with the extreme poverty rate now estimated at 30.5 per cent. Furthermore, in February 2021, the government declared State of emergency after Lesotho experienced heavy rains that covered the whole country from the end of December 2020 to the end of January 2021, causing devastating damage to infrastructure such as roads, bridges, houses and fields which were washed away. High HIV/AIDS prevalence and tuberculosis (TB) remain Lesotho's greatest health challenges. The HIV prevalence rate in Lesotho is 25 per cent in the adult population aged 15 to 49, which is the second-highest in the world. The incidence of TB stands at 611 cases per 100,000, according to the World Health Organization's Global TB Report 2019. While high health costs exert more pressure to the fiscal burden, high HIV/AIDS and TB rates continue to contribute to persistently high inequality and poverty. Lesotho has a high birth rate of 31 births per 1,000 individuals and a high illiteracy rate of 35.3 per cent of adults (in 2015).

4.5.11 Malawi has made progress in building its human capital, the knowledge, skills and health that people accumulate over their lives, in recent years. However, poverty and inequality remain stubbornly high. The latest poverty figures show the national poverty rate increased slightly from 50.7 per cent in 2010 to 51.5 per cent in 2016, but extreme national poverty decreased from 24.5 per cent in 2010/2011 to 20.1 per cent in 2016/2017. Poverty is driven by low productivity in the agriculture sector, limited opportunities in non-farm activities, volatile economic growth, rapid population growth

and limited coverage of safety net programs and targeting challenges. The country's development challenges are multi-pronged, including vulnerability to external shocks such as weather and health. Other challenges include rapid population growth and environmental degradation. Energy shortages still stand out, with about 11.4 per cent of the population having access to electricity. Infrastructure development, the manufacturing base and adoption of new technology are low. Corruption levels remain high with Transparency International ranking Malawi at position 129 out of 180 economies in 2020.

4.5.12 Mauritius has the largest per capita income in Africa, i.e. $22,000, a relatively low illiteracy rate of 7.4 per cent of people ages 15 and above and a birth rate of 1.75 per 1,000 people (all figures for 2017).

4.5.13 Since its independence in 1990, Namibia had achieved notable progress in reducing poverty, However, in part due to the negative impact of the COVID-19 pandemic on livelihoods, poverty rates are projected to increase in the near to medium term, with the upper middle-income poverty rate projected to stay around 64 per cent until 2022. Progress toward reducing inequality has been slow and as a result, Namibia remains one of the most unequal countries in the world.

4.5.14 Rwanda's strong economic growth was accompanied by substantial improvements in living standards, with a two-thirds drop in child mortality and near-universal primary school enrolment. Mortality rate and poverty levels have been dropping since the 1990s. However, the COVID-19 pandemic is dramatically increasing poverty and threatening human capital.

4.5.15 Among Seychelles' development challenges is the importance to focus on greater productivity, participation and performance of its economy as means to increasing shared prosperity. Some of the main institutional challenges in this regard are notably barriers to open and operate businesses, inefficiencies in public sector management, such as limited statistical capacity, scope for a more strategic and sustainable approach to social protection, as well as the need to broaden access to quality education and skills development. Climate change adaptation, including through strengthened disaster preparedness systems and enhanced coastal management, is also key.

4.5.16 The 2011 Provisional Constitution, the 2012 establishment of the federal government and the subsequent formation of four new Federal Member States are re-drawing Somalia's new federal map and creating the space for a political settlement.

4.5.17 South Africa's political transition is known as one of the most remarkable political feats of the past century. However, inequality and poverty remain high. It was estimated that the persistence of the COVID-19 pandemic at the global and domestic levels would continue to constrain the economic recovery during the first half of 2021. In addition, as economic activity restarts, pre-existing structural constraints, such as electricity shortages, are becoming binding again. The World Bank estimates that the economy contracted by 7 per cent in 2020, as the pandemic weighed heavily on both external demand and domestic activity as the government implemented containment measures.

4.5.18 South Sudan became the world's newest nation on 9 July 2011. Renewed conflicts in December 2013 and July 2016 have undermined the development gains achieved since independence and worsened the humanitarian situation. Consequently, South Sudan remains caught in a web of fragility, economic stagnation and instability a decade after independence. Poverty is ubiquitous and has been reinforced by a history of conflict, displacement and shocks. Insecurity, lack of basic services and unresolved housing, land and property issues prevented people from returning home in large numbers.

4.5.19 Uganda's Human Capital Index (HCI) is low. A child born in Uganda today is likely to be 38 per cent as productive when she grows up, as she could be if she enjoyed complete education and full health. Only 95 out of 100 children born in Uganda survive to age five. Undernutrition is high and

stunting affects 29 per cent of children in Uganda aged five years and below. Beyond disrupting the economy, the COVID-19 pandemic risks rolling back the recent gains in health and human capital development if effective prevention and control measures do not continue to be implemented rapidly and at scale.

4.5.20 The United Republic of Tanzania's rapid population growth has caused the number of people living below the national poverty line to increase steadily. In 2020, the pandemic-induced economic slowdown caused the poverty rate to rise to an estimated 27.2 per cent, compounding the effect of population growth on the absolute number of people living in poverty. Because a large share of the country's population is close to the poverty line, even a mild economic shock can push numerous households into poverty. The impact of the crisis has been especially acute among households that rely on self-employment and informal microenterprises in urban areas.

4.5.21 Zambia is experiencing a large demographic shift and is one of the world's youngest countries by median age. Its population, much of it urban, is estimated at about 17.9 million and growing rapidly at 2.8 per cent per year, partly because of high fertility, resulting in the population doubling close to every 25 years. This trend is expected to continue as the large youth population enters reproductive age, which will put even more pressure on the demand for jobs, health care and other social services.

4.5.22 The economic challenges and extraordinary shocks caused by the drought, cyclone and pandemic provide opportunities to press forward with measures to protect lives and livelihoods and support Zimbabwe's longer-term recovery. The 2021-2025 National Development Strategy sets out an ambitious plan to support the recovery. Meeting the Government 2030 aspiration of attaining upper middle-income status will also require authorities to strengthen governance; ensure greater transparency and accountability; and increase public financing and investments focused on critical sectors.

4.6 Technological Factors

4.6.1 The development of technology in the ESAF region has been very varied, but overall much better than in the WACAF region. Admittedly, considerable efforts have been made by several countries particularly in Kenya in developing ICT areas such as telecommunications and broadcasting; mobile/cellular service; mobile money transaction, fibre optic coverage; international internet bandwidth; 3G/4G coverage; internet domains; broadcast services and subscriptions (frequency modulation); newspaper circulation and online newspaper readership.

4.6.2 The Ministry of Science and Technology in Angola launched in 2013 and 2014 the first National Study of Science, Technology and Innovation. The study fundamentally emphasized seven areas of incidence of the National Policy of Science, Technology and Innovation. These are Agriculture, Energy and Water, Health, Telecommunications and Information Technologies, Food Safety, Oil and Gas and Education. Angola has very advanced means for technological and scientific research in the oil sector. Angola has a National System of Science, Technology and Innovation (SNCTI) that is dedicated to scientific research, development and innovation.

4.6.3 The Botswana Technology Centre (BOTEC) is dedicated to identifying technology needs and providing professional expertise to develop solutions to those needs. In line with the country's overall government strategy, BOTEC's main focus is on renewable energy. In 1998, BOTEC opened a solar (photovoltaic) power plant that supplies electricity to a clinic, a primary school, street lighting and up to 14 households in the village of Motshegaletau. This project has improved the quality of life of the residents and has led to the growth of local businesses. These and other previously developed technologies have been successfully transferred to local companies. Sustainable architecture is another area of expertise for which BOTEC has become known. The building that houses the Centre, completed in 2001, is designed as a demonstration project incorporating energy-efficient and climate-friendly

features such as evaporative cooling, a lattice atrium, solar chimneys, rainwater harvesting and wastewater recycling.

4.6.4 The outcome of Burundi's TNA culminated in the making of two Technology Action Plans. In the barrier analysis, the limited means available to implement the plans has been highlighted as a risk in respect of most of the technologies. On this basis, the TNA emphasizes that commitment on the part of Burundi's government is essential to mobilize funding to implement the project ideas to actively involve the stakeholders identified.

4.6.5 Comoros started on its TNA process in 2020 as part of the TNA IV project, at which point it was to start deciding its priority sectors and technologies for both mitigation and adaptation. The Comoros, as an island developing nation, is highly vulnerable to the impacts of climate change. The main hazards related to climate change are increases in temperatures and sea levels, changes in precipitation and more intense tropical cyclones, the modification of the wind regime and the acidification of the ocean.

4.6.6 Djibouti is currently in the process of working on its TNA. In Djibouti, climate change is having significant impacts on vulnerable sectors, including water resources and agriculture. Given the increase in external events such as droughts and flooding, water erosion will rise and groundwater recharging will be reduced, affecting the mobilization of underground water resources for human and animal consumption and irrigation. Moreover, the country, which has an arid to semi-arid climate, is experiencing major challenges from its water supply being subject to chronic deficits.

4.6.7 The researchers in Eritrea, particularly those engaged in empirical research, are facing several challenges. Some of the important problems include a lack of a scientific training in the methodology of research, a lack of interaction between university research departments, unsatisfactory mode of functioning libraries and problems of conceptualization.

4.6.8 Due to favourable insolation in Eswatini, solar photovoltaics were chosen as priority technology in the TNA, with a dissemination project also being outlined. Its target is to install 13,000 1.5 kW solar home systems and 15,000 50 kW institutional solar photovoltaic systems from 2019 to 2024. The overall aim for the technology is ultimately to generate 12,950 GWh, which will lead to a reduction of 9,971 gigatons of CO_2 over a 25-year period. Eswatini has large quantities of renewable biomass resources. Some companies from its well-developed sugar and timber industries are already using biomass combined heat and power technology. This technology was highlighted as a priority for further dissemination, but the TNA revealed that cheap energy imports from the South African company Eskom are hindering the local uptake of this technology.

4.6.9 The revised National Science, Technology and Innovation Policy of Ethiopia has been operational since 2010. It seeks to "build competitiveness through innovation". Its strengths include upgrading the Science and Technology Commission to ministerial level with a consequential name change to Ministry of Science and Technology, advocating an annual government allocation of at least 1.5 per cent of the GDP for STI in all sectors and the creation of a centralized innovation fund for research and development resourced from a contribution of 1 per cent of the annual profits realized in all productive and service sectors.

4.6.10 According to the Business Monitor International (BMI), Kenya's ICT market was valued at $717 million at the end of 2019 with computer hardware accounting for nearly 60 per cent of the total ICT investments and the remaining balance from ICT services. Kenya is at the forefront of technological innovations and is often referred to as the Silicon Savannah of Africa. The Government of Kenya has invested heavily in the broadband sector. There are currently four undersea fibre optic cables that land off the coast of Kenya: SEACOM, TEAMS, EASSY and LION2, which are the core drivers of the heavy

fixed internet penetration in the country making it one of the highest, fastest and most reliable in the region. As mentioned above, Kenya is a regional leader in terms of internet connectivity, general ICT infrastructure investments, value added services, mobile money and mobile banking services.

4.6.11 Lesotho is starting on its TNA process in 2020 as part of the TNA IV project, at which point it will start deciding its priority sectors and technologies for both mitigation and adaptation. The country is focusing on energy efficiency and demand management, coupled with increasing investments in a renewable energy programme for the electricity, construction and waste sectors.

4.6.12 Madagascar is located near southern Africa, off the coast of Mozambique. As climate change impacts are worsening, extended droughts, floods and an increasingly variable rainfall regime have become commonplace. These conditions are challenging for the large proportion of the population that base their livelihoods on agriculture. The country completed its TNA in 2018. The TNA prioritized agroforestry, industry expansion and bioplastics as a technology to support Madagascar's mitigation efforts. To secure technology diffusion, the Technology Action Plans details a project in which the relevant stakeholders agreed to establish three bioplastic manufacturing units. It is estimated that this action will lead to a reduction of 360 tons of CO_2, as well as reducing sales of conventional plastics by ninety tonnes and increase employment.

4.6.13 Malawi is currently in the process of working on its TNA. It has completed its sectors and technology prioritization process and is currently working on its second reports (Barrier Analysis and Enabling Frameworks). Currently, most rural communities are experiencing chronic food deficits in many parts of the country on a year-round basis owing to the effects of floods and droughts.

4.6.14 Mauritius used to rely mainly on its sugar and tourism industries, but the Government of Mauritius has sought to diversify and remains active in trying to develop new sectors to create growth in the economy. The Ebene Cybercity in Mauritius was developed with the idea of being a high-tech hub and has now developed into a modern financial centre providing high-quality offices and amenities. It is now regarded as the second business city of Mauritius after Port Louis, and many businesses have subsequently moved there.

4.6.15 Namibia launched a National Space Science and Technology Policy on 4 June 2021. The policy framework aims to guide the use of space resources to contribute towards the socio-economic growth and development of Namibia.

4.6.16 The Rwandan situation was exacerbated by the 1994 genocide, which led to the loss of its meagre human and infrastructural resources in the science base. Today, Rwanda has a vision on science and technology, which is the surest route to developing the nation. The Vision 2020 envisages Rwanda as "a modern nation, able to generate and disseminate technological knowledge and innovation" and as "a centre of excellence at a regional level in the area of technologies, particularly with ICT." Building on that Vision, the National Policy on Science, Technology and Innovation main objective policy is "To integrate Science, Technology, Scientific Research and Innovation in the context of the issues facing Rwanda."

4.6.17 Seychelles completed its TNA in 2018. For Seychelles to withstand dry periods, the Technology Action Plan details actions for the diffusion of rooftop rainwater harvesting and water-efficient appliances with the goal of implementing the two technologies in 25,000 households over a period of five years. Besides creating jobs, this will stabilize water security, reduce water restrictions and enable the selected households to save money on water bills. Another ambitious project based on the TNA is the implementation of waste-heat recovery technologies at the Roche Caiman power station. The project aims to install a total capacity of 12 MW in two stages: 5 MW in 2020 and an additional 7 MW

in 2028. From 2030, this will potentially lead to yearly reductions of 361,000 tons of CO_2 and avoid costs of $80 million.

4.6.18 Somalia jumped up the list maintained by the Regulatory Tracker of the International Telecommunication Union (ITU). While it had 16 points when the project began, in 2014, it had risen to 63 points out of a possible 100 by 2020. This ranking positions Somalia alongside regional peers that have much more mature markets. The core objective of the ICT department in Somalia is to ensure the smooth functioning of the ICT systems and processes to become an enabling tool for the all Ministry employees and the Somali public. The department provides a secure, safe and controlled environment where the Ministry can host its data applications and data storages.

4.6.19 South Africa has one of the largest ICT markets in Africa. It shows technological leadership in the mobile software field, security software as well as electronic banking services. As an increasingly important contributor to South Africa's GDP, the country's ICT and electronics sector is both sophisticated and developing. Several international corporates operate subsidiaries from South Africa, including IBM, Unisys, Microsoft, Intel, Systems Application Protocol (SAP), Dell, Novell and Compaq. It is seen as a regional hub and a supply base for neighbouring countries. South Africa's ICT products and services industry is penetrating the fast-growing African market. South African companies and locally based subsidiaries of international companies have supplied most of the new fixed and wireless telecoms networks established across the continent in recent years. The Government, via its programs and agencies will embark on an extensive skills development programme aimed at training one million young people by 2030 in robotics, artificial intelligence, coding, cloud computing and networking. Leading companies from the United States such as Microsoft are elevating South Africa into the lead group of countries for new product releases reflecting the growing importance of the market and the region. IBM opened a cloud data centre in Johannesburg in 2016 and will provide clients with a complete portfolio of cloud services. This is the result of close collaboration with South African and 100 per cent black-owned firm Gijima and Vodacom and is designed to support cloud adoption and customer demand across the continent. This again demonstrates the willingness of foreign companies to invest in this market and use the local skills force to penetrate the market and the region. Amazon Web Services has also opened a data centre in Cape Town. Cisco and Dell both have training academies within South Africa to assist with the development of skilled labour within this sector.

4.6.20 South Sudan started on its TNA process in 2020 as part of the TNA IV project. Energy generation and use, reforestation and transport are, among others, the sectors in which South Sudan wishes to develop strategies aimed at decreasing its level of CO_2 emissions.

4.6.21 Uganda launched a UNESCO three-year "Future Earth Capacity Programme" financed by the Swedish International Development and Cooperation Agency which aims at building and mobilising the necessary scientific and research capacity in Bolivia, Ethiopia, Kenya, Rwanda, Tanzania and Uganda. The UNESCO programme focuses on these countries in a bid to encourage full representation and participation of developing countries within the Future Earth Initiative and as an opportunity for involving local communities and sharing scientific, local and indigenous knowledge on sustainable development. Currently, Uganda's ICT is still underdeveloped.

4.6.22 The reform of the United Republic of Tanzania's STI system was launched in 2007 within the One UN programme. UNESCO heads the Innovation and Technology Thematic Area, also involving the World Bank and Finland, whose activities are spread across three Joint Programmes. Under the Joint Programme on Wealth Creation, Employment and Economic Empowerment, UNESCO coordinates the section on policies and plans of action for the explicit integration of STI into the economy.

4.6.23 The International Trade Administration has reported that the ICT sector saw growth following the establishment of a National ICT policy for regulating the telecom sector in Zambia. The telecom sector comprises public switched telephone network (PSTN), international voice, local loop, national voice, mobile, private data networks and internet operators. PSTN and international voice are monopolistic sub-sectors, however the national voice, local loop, mobile internet and private data networks are competitive sectors. The Zambian government supports and encourages networking of electronic services and applications by promoting e-commerce, e-agriculture, eHealth and e-education and trade promotion programs for goods and services. The government is working to establish additional government online services. The government is currently focused on upgrading 3G/4G platforms nationwide. In Q1 2021, MTN Zambia activated the 800 MHz 4G spectrum to expand coverage and build out VoLTE, which was recently released by Zambia's industry regulator ZICTA. Opportunities include provision of retail fibre optic, mobile and internet service providers, software development and ICT parks. In Q1 2021, the Ministry of Transport and Communication (MoTC) and ZICTA awarded Beeline Telecoms Limited an International Network and National Service License to become the fourth mobile operator in Zambia, in hopes of further expanding and promoting healthy competition within the telecommunication sector. Beeline had until the end of 2021 to commence operations, or their license may be revoked.

4.6.24 Zimbabwe is in the process of implementing several interventions to enhance ICT development and its impact for instance, mobile infrastructure roll out and optimisation to increase network coverage, data centre services expansion, optimisation of optic fibre backbone network, internet gateway upgrade and deployment of computers to schools especially in marginalised areas and internet connectivity.

5. PEST ANALYSIS (AFI-EUR)

5.1 The AFI-EUR region is the subset of African States in the EUR/NAT region, i.e. Algeria, Morocco and Tunisia.

5.2 Political Factors

5.2.1 The Algerian political system is of the presidential type since the constitutional reform of 2008. The president, elected by direct universal suffrage has broad prerogatives (government appointment, establishment and direction, political project, call for referendum, foreign policy, etc.). The Government is accountable to the President and there is a mechanism for parliamentary control. On 22 February 2019, a massive popular movement began against the candidacy of the acting president, Abdelaziz Buteflika, to a fifth term with the holding of demonstrations every Friday. On 11 March, President Buteflika announced his resignation from opting for a fifth mandate. On 19 March, Prime Minister Ahmed Ouyahia was replaced by Nourredin Bedoui, until then Minister of the Interior. Mobilization on the streets continued and on 2 April, Buteflika resigned from his position. On 9 April, Abdelkader Bensalah was appointed interim president, president of the Council of the Nation, the upper house of the Algerian Parliament. According to the provisions of the Constitution, Abdelkader Bensalah called for presidential elections. Abdelmajid Tebboune was the winner in the first round with 58 per cent of the votes cast. The new president took office on 19 December. The first steps taken by President Tebboune confirmed his willingness to promote a reformist agenda. The cabinet abounds with senior officials with vast experience.

5.2.2 The current political framework in Morocco is established by the Constitution adopted in 2011. The 2011 Constitution represents an important advance towards the parliamentary monarchy. The prime minister becomes head of government and must be part of the party with the most votes in the general elections; the position of the King as commander of the believers is maintained, but his normative

powers are limited to religious matters; an ambitious catalogue of fundamental rights and freedoms is established and the process of "advanced regionalization" is constitutionalized. Overall, it can be said that the new Constitution strengthens the position of the Government, although the Crown continues to enjoy certain executive powers. In April 2017, Morocco created a Constitutional Court (successor to the previous Constitutional Council) and a Superior Council of the Judiciary. King Mohamed VI appointed the twelve members of the Constitutional Court, chaired by Saïd Ihraï, as well as the twenty members of the new General Council of the Judicial Power, which replaces the previous Superior Council of the Magistracy and has as delegate president, the president of the Court of Cassation, Mustapha Fares.

5.2.3 Tunisia is advancing in its transition to democracy, after the Revolution that triggered the fall of the Ben Ali regime on 14 January 2011. After the constituent elections of October 2011, the first three years were dominated by the government of what was called a "troika" formed by the Islamists of Al Nahda, Al Takatul and the Congress for the Republic to which the interim president of the Republic, Moncef Marzuqi, belonged. It was a period troubled by the economic crisis and political and social polarization, during which Tunisia was also immersed in regional instability caused by the terrorist phenomenon. The strength of social agents and non-governmental organizations, especially those that work for women's rights, has been one of the distinctive features of the new Tunisian democracy. The death of the head of State, Béji Caïd Essebsi, 92, on 25 July 2019, a few months before the end of his term, brought forward the entire electoral cycle and was a real test of resistance for the young Tunisian democracy. In general, both Presidential and legislative elections were well organized by the Superior Independent Electoral Instance (ISIE). In the former, the professor of constitutional law, Kaïs Saïed, was elected new president, with 72 per cent and great support from young people in elections. The legislative elections were held on 6 October and had a 42 per cent turnout, resulting in a highly fragmented ARP led by Al Nahda as the largest parliamentary group. From that moment on, negotiations have taken place to try to form a government. Al Nahda's proposed candidate, Habib Jemli, was rejected by Parliament in early 2020. On 15 July 2020, the Prime Minister resigned due to problems related to an alleged conflict of interest. The President of the Republic commissioned the former Minister of the Interior, Hichem Mechichi, to form a government. The Assembly of People's Representatives gave its approval to Mechichi and his Government in the early hours of 2 September. Subsequently, some members of the Government have been dismissed. The appointment of the new holders of the affected portfolios has been done while other members of the Government have assumed on an interim basis the responsibilities of the ministries affected by the dismissals.

5.3 Economic Factors

5.3.1 Algeria's heavy dependence on oil prices represents the main challenge for the Algerian economy. Specifically, the hydro sector. Carbides accounts for 98 per cent of foreign exchange earnings and 60 per cent of State tax revenues, so that the economic growth profile of Algeria is highly conditioned by the evolution of the prices of pro products coming from natural resources such as gas or oil. In 2016, Algeria had to draw on its foreign exchange reserves and the Fund for the Regulation of Hydrocarbon Resources, to cope with the impact due to its public deficit and external deficit from the continuous fall in energy prices. Faced with this situation, in 2018, the implementation of import control measures was intensified and there was the suspension of imports to Algeria of 950 tariff positions. On 27 January 2019, the Algerian Government published an executive decree that put into effect the new additional safeguard tariffs (DAPS) that replaced the list of suspended imports. These DAPS were initially applied to 1,095 tariff positions. The Algerian authorities undertook to review these tariffs on a quarterly basis, open to a possible modification of the list of products and of the tariff rates. Since then, the decree has been modified twice and 2022, a new list of 2,608 goods subject to DAPS has been released. The government's intention is to protect national production to diversify its industry. According to the Ministry of Commerce, DAPS are temporary in nature and will be in effect for three to five years. Despite this, the measure could be prolonged or revised depending on the evolution of the market. The Algerian government has proposed to promote the growth of those sectors not dependent on hydrocarbons. The

Finance Act for 2020 estimates that these sectors may grow by 1.8 per cent in the same year. The industrial diversification of the country, to make it less dependent on hydrocarbons, is one of the main challenges of the Algerian economy Algerian. The country's top clients account for almost 53 per cent of exports: France, Italy, Spain, Turkey and the United States. According to the latest data available from the IMF (2018), the primary sector represents 14 per cent of total GDP and employs 30.9 per cent of the population active. The tourism sector represents, according to data from the Ministry of Tourism and Crafts in 2019, 1.4 per cent of the GDP.

5.3.2 The Moroccan government has started to rollout the economic recovery roadmap the King announced in July 2020. Beside reform of State-Owned Enterprises, the government has approved a law that sets technical and institutional frameworks in place for expanding social welfare to segments of the population vulnerable to falling into poverty. This includes universal access to public health services. The Mohammed VI Investment Fund, to support major investment projects as public-private partnerships and contribute to capitalizing Moroccan Small- and Medium-size Enterprises (SMEs), will also soon take form, as an official decree for it has also been approved. A development vision for the Kingdom, outlined by a commission established in December 2019, is expected to guide political debate around reforms that are due to take place in the run-up to the country's general elections, tentatively scheduled for September 2021. The shock of COVID-19 has pushed the Moroccan economy into its first recession since 1995. Economic output contracted by 15.1 per cent in the second quarter of 2020, primarily because of the lockdown but also of a sharp reduction in exports caused by the pandemic's disruption to global value chains and the collapse of receipts from tourism. The shock to supply and demand, triggered by the pandemic, has been compounded by the fall in agricultural production due to a severe drought. Although activity picked up in the third and fourth quarters of 2020, the government's preliminary estimates indicate that Morocco's real GDP contracted by 7 per cent in 2020, leading to an increase in unemployment from 9.2 per cent to 11.9 per cent. GDP growth is expected to accelerate to 4 per cent in 2021, the current account deficit is expected to stabilize below 4 per cent of the GDP as exports, and imports gain traction. The budget deficit is expected to fall only gradually as the authorities postpone fiscal consolidation until the economic recovery is well entrenched.

5.3.3 Tunisia has experienced a sharper decline in economic growth than most of its regional peers, having entered this crisis with slow growth and rising debt levels. GDP growth contracted by 8.8 per cent in 2020. Unemployment increased from 15 per cent prior to the pandemic to 17.8 per cent by the end of the first quarter of 2021. Moreover, it continues to affect women (24.9 per cent) and young people aged 15 to 24 (40.8 per cent) in particular. In 2020, extreme poverty measured using the international poverty line of living on $1.90 per day, remained below 1 per cent in Tunisia. However, poverty measured within the $3.20 per day bracket was estimated to have increased from 2.9 per cent to 3.7 per cent. Additionally, the percentage of the population described as being "vulnerable" to falling into poverty was expected to have increased as well. Using a threshold of $5.50 per person per day, the number of poor and of vulnerable together is expected to have increased from 16.7 per cent to 20.1 per cent of the country's total population of about 11.7 million (World Bank 2021, 2019).

5.4 Social Factors

5.4.1 The Algerian economy recovered partially in 2021 from the health and economic crises caused by the COVID-19 pandemic. Algeria's slow pace of vaccination suggests, however, that some containment measures could remain in place in the country until 2022. Starting with a Socio-Economic Recovery Plan, the country's authorities have announced a longstanding reform effort to shift the economy toward a sustainable private sector-led model, engage in a transition toward renewable energy, reduce severe imbalances in the country's macro economy and protect the population's livelihoods. Algeria is considered to have achieved universal primary education, with a 97 per cent primary net enrolment rate in 2015 (with gender parity) and has lifted higher education enrolment rates. The quality of education can still be improved upon, however, with Algeria ranking 71 out of 72 for the performance of

its student cohort of 15-year-olds in sciences, mathematics and reading in the 2015 Program for International Student Assessment (PISA). And, according to the World Bank's 2020 HCI, which provides a pre-pandemic baseline on the health and education of children, despite working toward improvement, Algeria's HCI value remained relatively unchanged at 0.53 between 2010 and 2020. While higher than average for lower middle-income countries, this is below the given average for the World Bank's Middle East and North Africa region.

5.4.2 In Tunisia, a new government was sworn in on 2 September 2020. Its Prime Minister, Hichem Mechichi, says his priority is to address the economic and social situation, rebalance public finances (through talks with lenders) and begin reforms to cut subsidies and programs sustaining organizations like state-owned enterprises. In April 2021, Tunisia provided international partners with draft reform programs, but the government has yet to present a comprehensive, detailed strategy to confront the country's deep economic and financial challenges, now reflected in unprecedented levels of budget deficit and public debt.

5.5 Technological Factors

5.5.1 Algeria is considered the largest market in North Africa and the largest in terms of land area in Africa. Currently, ICT development is the focus of governmental attention with economic and social development strategies and policies in the country. According to the ITU (2018), Algeria ranked as the third most dynamic country in terms of ICT deployment and as the most dynamic country for the implementation, deployment and use of new technologies in 2017. It has also been rated as the country that made the most substantial progress in ICT development.

5.5.2 The ICT sector in Morocco generates between 5 and 6 per cent of the GDP, of which telecommunications companies represent about half. However, technological developments coupled with strong political will and economic imperatives are pushing Morocco's ICT sector growth beyond the telecommunications subsector. "Incorporating digital solutions in business operations is not an option – it is a must to keep Moroccan companies at the forefront of regional and international standards," Lamiae Benmakhlouf, the managing director of Moroccan Information TechnoPark Company (MITC), is reported to have said.

6. PEST ANALYSIS (AFI-MID)

6.1 The AFI-MID region is the subset of African States in the MID region, i.e. Egypt, Libya and Sudan.

6.2 Political Factors

6.2.1 Sudan is in the Sahara desert. Hard climate conditions and lack of natural resources were always responsible for the poor life conditions. However, the country's political instability and internal conflict has increased the poverty. In September 1983, the then President of Sudan, Yaafar Mohammed Numeiri, created a federal State that included three federated States in South Sudan, but later dissolved them, sparking the start of the second civil war between Sudanese troops and the secessionist Sudan People's Liberation Army. The Sudanese government allowed the autonomy of the region after a peace agreement signed on 9 January 2005, in the Kenyan city of Naivasha. The separation of South Sudan, after a referendum agreed with Khartoum in 2011, meant for Sudan the loss of a large part of its population, a third of its territory and most of its public income, which came from the oil that is extracted in that area. Since then, the economic situation in Sudan has remained very complicated, with a chronic shortage of foreign exchange, a very high public deficit and inflation that exceeded 200 per cent in 2020. The overthrow on 11 April 2019 of the Omar Al Bachir regime, which for three decades plunged the

country into economic stagnation and international ostracism, paved the way for a political agreement between the Transitional Military Council (CMT) and the Forces of Freedom and Change (FLC) and the Constitutional Charter of 17 August. This is temporary in nature and should eventually lead to the drafting of a new Constitution and the holding of free elections after the transition period. Armed conflicts in Sudan's westernmost region of Darfur have subsided but many parts of the region remain precarious because of the proliferation of arms and banditry. Efforts to settle conflict in South Kordofan and Blue Nile remain deadlocked. The Transitional Government has engaged in peace negotiations with relevant armed groups and signed a peace deal on 3 October 2020 with the Sudan Revolution Front (SRF), expected to put an end to the long-standing conflicts that divert huge resources from much needed social programs and investments in human capital to military build-up. In December 2020, the mandate of the United Nations – African Union Hybrid Operation in Darfur (UNAMID) ended, starting the operation of the new United Nations Integrated Transition Assistance Mission in Sudan (UNITAMS) mission, which has an initial 12-month mandate to support the transitional government's efforts towards democratic governance, as well as to support the protection of human rights and peace in the country.

6.2.2 Nine years after the fall of Muammar Qaddafi, Libya continues to struggle to end its violent conflict and build State institutions. External actors have exacerbated Libya's problems by funnelling money and weapons to proxies that have put personal interests above those of the Libyan people. UN efforts to broker a lasting peace have not yet succeeded, overshadowed by competing peace conferences sponsored by various foreign governments. Meanwhile, Libya's borders remain porous, particularly in the southern Fezzan, facilitating an increase in trafficking and smuggling of illicit materials, including weapons. At the subnational level, many local conflicts reflect long-standing feuds between various factions, tribes and ethnic groups. Though Libya's national conflict has stalled in recent months, prospects for a political solution are complicated by the country's deep political and tribal divides.

6.2.3 Following in the wake of the Tunisian revolution, Egypt embarked on a wave of demonstrations on 25 January 2011, which, eighteen days later, ended with the resignation of Hosni Mubarak, who had ruled the country since 1981. In May and June 2012, Egyptians were called to the polls to elect the President of the Republic. A tight result finally gave the Muslim Brotherhood candidate, Mohamed Morsi, victory over General Ahmed Shafiq, Mubarak's former prime minister. The army intervened on 3 July, removing Mohamed Morsi and appointing the President of the Constitutional Court, Adli Mansur, as acting substitute. Presidential elections were held in May 2014, in which the former Defence Minister General Abdelfatah Al Sisi won the support of 93 per cent of the population against the leftist candidate Hamdin Sabahi. Since his arrival at the head of State, the president's objectives have been fundamentally: to end terrorism, which slows the return of tourism and investment, secondly, the economic relaunch of the country and thirdly, the recovery of the role of Egypt in the region. Despite the serious terrorist attacks that have taken place in recent years, the current general perception is of a marked improvement in the security situation in most of the country. The exception is the northern territories of the Sinai Peninsula, where the army faces the insurgency of the self-styled "Sinai Province" (Wilayat Sinai), a terrorist group that has sworn obedience to Daesh. In March 2018, new presidential elections took place in which President Sisi was re-elected, with a percentage of support of 97.08 per cent. Turnout was 41.05 per cent compared to 47.45 per cent in the 2014 presidential elections. In November 2018, the Sheikh II World Youth Forum was held in Sharm in which the president defended the freedom of religion and belief of Egyptians.

6.3 Economic Factors

6.3.1 Overall, the Libyan economy contracted by about 31 per cent in 2020. The precipitous fall in its hydrocarbon output damaged its external balance and fiscal position in 2020, filtering through to weaker government spending, reduced private consumption and lower imports. The economic collapse also had adverse effects on the non-hydrocarbon economy: water shortages were prevalent, with reports

of the sabotage of water wells. Power outages persisted throughout the year; only 13 of 27 power plants were functioning. As late as mid-December 2020, three months after ports had been reopened, the government was still urging consumers to stop queueing at gasoline stations. The heavy dependence of government finances on hydrocarbon revenues will likely persist until Libya creates a more diversified economy, a gargantuan task even for the advanced-economy oil and gas producers of the Gulf Cooperation Council that have accelerated their economic diversification efforts with ambitious Vision policies and programs in recent years. More strikingly, Libya's expenditure structure is highly rigid even as its hydrocarbon revenues are volatile: its wage bill, which has accounted for 61 per cent of total expenditures, makes it among the costliest and least cost-efficient public sectors in the world. Subsidies that cover the gamut of fuel, electricity, water, sewage and sanitation have amounted to 16 per cent of total expenditures in 2020.

6.3.2 The secession of South Sudan induced multiple economic shocks in Sudan. The biggest one being the loss of the oil revenue that accounted for more than half of Sudan's government revenue and 95 per cent of its exports. This has reduced economic growth and resulted in double-digit consumer price inflation.

6.3.3 Egypt's recent macroeconomic and structural reforms stabilized the economy and have allowed the country to enter the COVID-19 pandemic with improving fiscal and external accounts. However, the adverse repercussions of the pandemic have since undermined this recent progress, shedding light on longstanding challenges. These include sluggish private sector activity and job-creation, especially in the formal sector, underperforming non-oil exports FDI, elevated government debt-to-GDP ratio (despite its significant reduction in recent years), below-potential revenue mobilization and an unfavourable budget structure with limited allocations to key sectors, such as health and education. International reserves remain relatively ample, at $40.1 billion at end-January 2021, although still below their pre-crisis peak of $45.5 billion. External accounts were still bolstered by remittances, rebounding foreign portfolio inflows and external financing, notably from the IMF, Eurobond issuances and an innovative Green bond. Growth is forecast to decline from 3.6 per cent in the financial year 2019/2020 to 2.3 per cent in the financial year 2020/2021, in light of the ongoing effect of the pandemic, especially the renewed surge in COVID-19 cases since end-2020. The slowing of economic activity is expected to have adverse social implications.

6.4 Social Factors

6.4.1 The three African countries of the MID region share common borders and geographically located at the crossroads of sub-Saharan Africa and the Middle East.

6.5 Technological Factors

6.5.1 During the first phase of the Spanish-funded project on capacity building in STI Policy in Africa, UNESCO provided policy advice in the process of reformulating Sudan's national STI policy and that the government, in collaboration with UNESCO, organized an international workshop to examine the draft policy and to discuss with the concerned policy makers and scientists the way forward. The recommendations adopted by the workshop were used by the government to finalize the national STI policy.

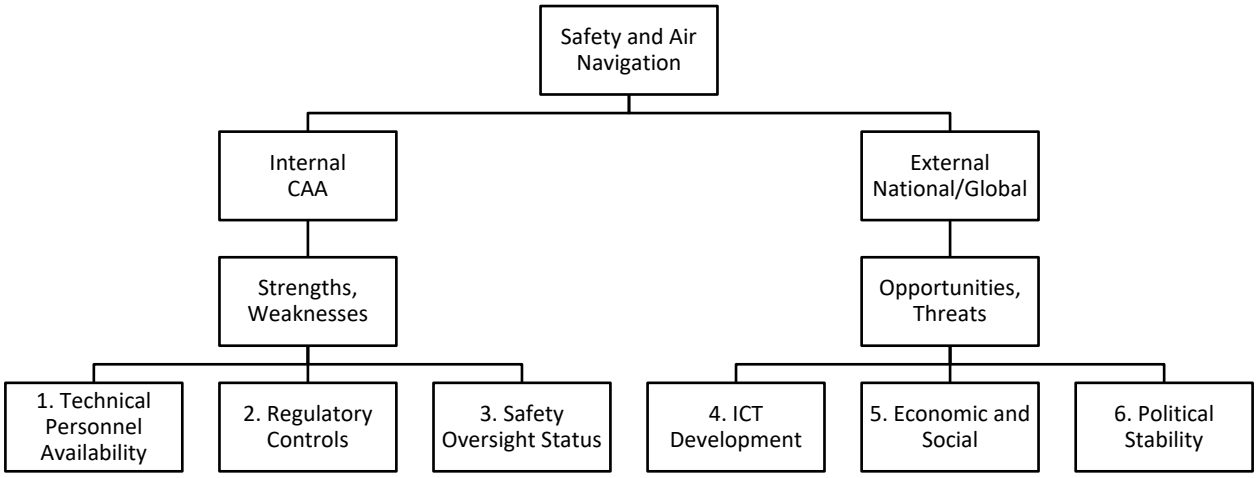
6.5.2 In Libya, there is a predominance of foreign labour in scientific and technical positions. Al-Fatah University at Tripoli, founded in 1973, has faculties of science, engineering, agriculture, medicine, pharmacy, veterinary medicine, nuclear engineering and petroleum and mining engineering. The University of Garyounis at Benghazi, founded in 1955, has faculties of science and engineering. Bright Star University of Technology at Marsa al-Brega, founded in 1981, has faculties of basic engineering science, electrical and electronic engineering, mechanical and production engineering,

chemical engineering and petroleum engineering. Al-Arab Medical University at Benghazi was founded in 1984. Sebha University has faculties of science, agriculture, medicine and engineering. A posts and telecommunications institute is at Tripoli. Libya is also highly interested in nuclear power. A 10-MW research reactor is located at Tajura. From 1987 to 1997, Libya had 493 technicians per million people engaged in research and development.

6.5.3 In Egypt, research and development in the public sector include 11 research centres and institutes affiliated to the Ministry of Scientific Research and 14 research centres, institutes and entities affiliated to other ministries. Female researchers account for 41 per cent of the total number of researchers. The majority of researchers (75 per cent) hold a doctorate degree, while the researchers with a master's degree represent 18 per cent. Researchers with a bachelor's degree account for 7 per cent of the total number of full-time researchers. The centres with the largest number of researchers is the Agricultural Research Centre affiliated to the Ministry of Agriculture, as it embraces 41 per cent of the total number of researchers in the public sector, followed by the National Research Centre affiliated to the Ministry of Scientific Research, which represents 20 per cent of the total number of researchers.

7. SWOT METHODOLOGY

7.1 Contents and Criteria: The SWOT analysis will help to match resources and capabilities in the Safety and Air Navigation domains. As such, it is instrumental in strategic thinking and decision-making. The following diagram shows how the current SWOT analysis fits into the safety and air navigation domain. It presents some of the variables that need to be taken into consideration when planning the SWOT analysis.



7.2 The following paragraph describes the criteria used to conduct the SWOT analysis. It also includes an explanation as to why that variable has been chosen:

a) External Factors: These factors are at the national or international level and define the opportunities and threats to the State safety oversight system. These factors have been discussed in the PEST analysis and will be summarized as opportunities and threats in the SWOT analysis summary table.

b) Internal Factors: The internal factors capture the strengths and weakness of the State safety oversight system. The information is sourced from the latest data on Integrated

Safety Trend Analysis and Reporting System (iSTARS). Internal Factors also include information obtained from questionnaire sent to States on the available number of inspectors, information received from ATOs and a review of previous work done on ATOs by AATO. The State safety oversight system is analysed by the following variables:

1) Safety Oversight Index (SOI): analyses the level of implementation in three functional areas:

   — Operations, which includes the areas of personnel licensing and training (PEL), aircraft operations (OPS) and airworthiness of aircraft (AIR);

   — Air navigation, which includes the areas of air navigation services (ANS) and aerodromes and ground aids (AGA); and

   — Support, which includes the areas of primary aviation legislation and civil aviation regulations (LEG), civil aviation organization (ORG) and aircraft accident and incident investigation (AIG).

   A State is given a target effective implementation score which is calculated based on a global linear regression of traffic versus effective implementation of all ICAO Member States. The SOI is the ratio between the target effective implementation (EI) and the actual EI. A State with an SOI greater than 1 would be considered to have sufficient regulatory controls in place to cover its existing traffic volume. A State with an SOI of less than 1 would be considered to have an insufficient oversight system taking into consideration its traffic volume.

2) State Safety Briefing: This variable provides an overview of different State safety indicators such as the level of EI of Universal Safety Oversight Audit Programme (USOAP) Protocol Questions (PQs), number of significant safety concerns (SSCs), aerodrome certification and PBN percentage implementation level.

3) Global Aviation Training: This variable indicates the number of ICAO Global Aviation Training Academies per region. It also details the number of courses delivered.

4) Staff Needs: Ratio of inspectors compared to other similar countries. This variable compares each State's number of safety oversight inspectors with those of other States that have similar operating environments. This benchmarking information can be used as a starting point to determine the adequacy of the State's inspector resources. The number of inspectors in a State is most closely correlated with the number of operators, aircraft models and aerodromes. Other factors can affect the number of inspectors (such as the geographical size of the State) could not be considered in this benchmarking tool.

8. SAFETY OVERSIGHT INDEX (SOI) ANALYSIS

8.1 Safety indices provide a risk-based prioritization of operational, air navigation and support-related USOAP areas. In each of the three functional areas, a State is given a target effective

implementation score which is calculated based on a global linear regression of traffic versus effective implementation of all ICAO Member States.

8.2 A State with an SOI greater than 1 would be considered to have sufficient regulatory controls in place to cover its existing traffic volume. A State with an SOI of less than 1 would be considered to have an insufficient oversight system taking into consideration its traffic volume.

8.3 The new GASP is no more considering State Safety Oversight Index. The analysis based on SSI has therefore been removed from this final report.

9. STATE SAFETY BRIEFING (WACAF)

9.1 Overall Performance

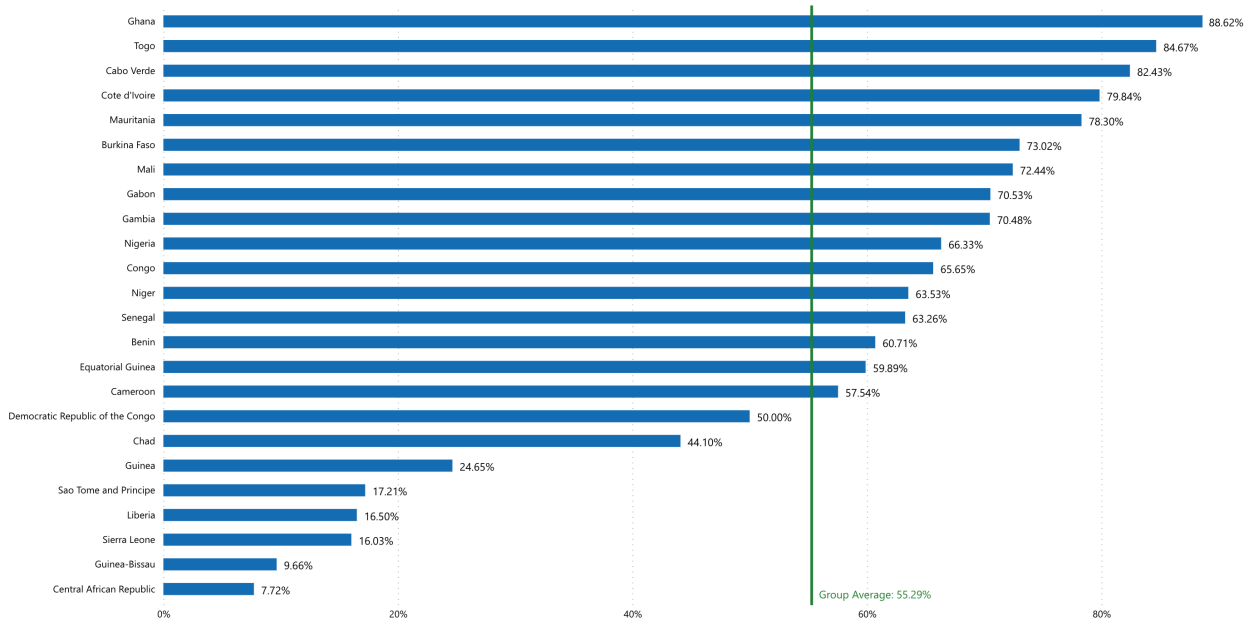
9.1.1 All of the 24 States in the WACAF region have received a USOAP Continuous Monitoring Approach (CMA) audit. The average EI score of these States on the USOAP CMA online framework (OLF) as at 25 February 2023 is 55.4 per cent, which is below the world average of 67.6 per cent. Nine States (37.5 per cent) have reached the world average of 67.6 per cent. However, for the purpose of data analysis, the data in iSTARS 4.0 as at 25 February 2023 is used.

9.1.2 Five States (20.83 per cent) have achieved the current GASP target of 75 per cent EI. Out of these States:

a) four have an EI in the range [75%; 85%)[1]; and

b) one has an EI in the range [85%; 95%),

9.1.3 Out of the 24 States, 10 States fall below 60 per cent of EI and six States below 30 per cent, as per the chart below.



[1] A figure is included in the range if it is preceded or followed by bracket, i.e. '[' or ']'. If a figure is preceded or followed by a parenthesis, i.e. '(' or ')', it is not included in the range.

Figure 1: USOAP Group Results (WACAF). Source: iSTARS 4.0, as at 25.02.2023.

9.2 Performance in CE-4, CE-6, CE-7 and CE-8

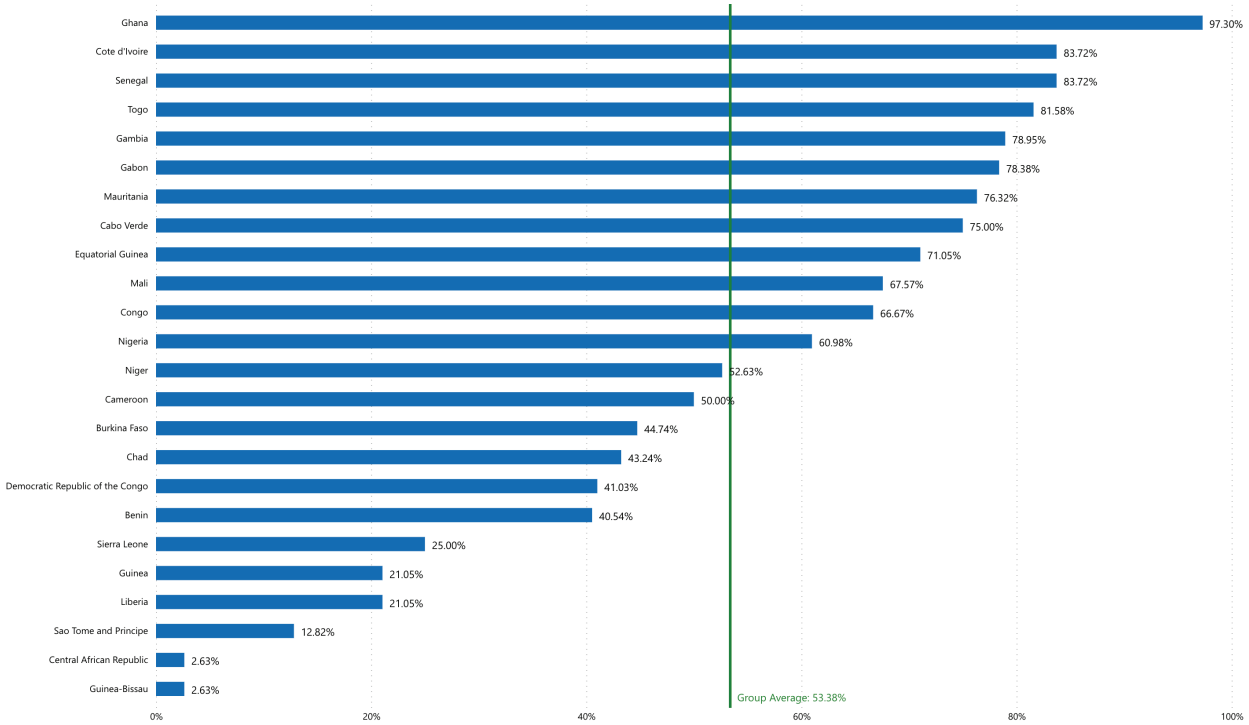


Figure 2: WACAF EI Scores for CE-4

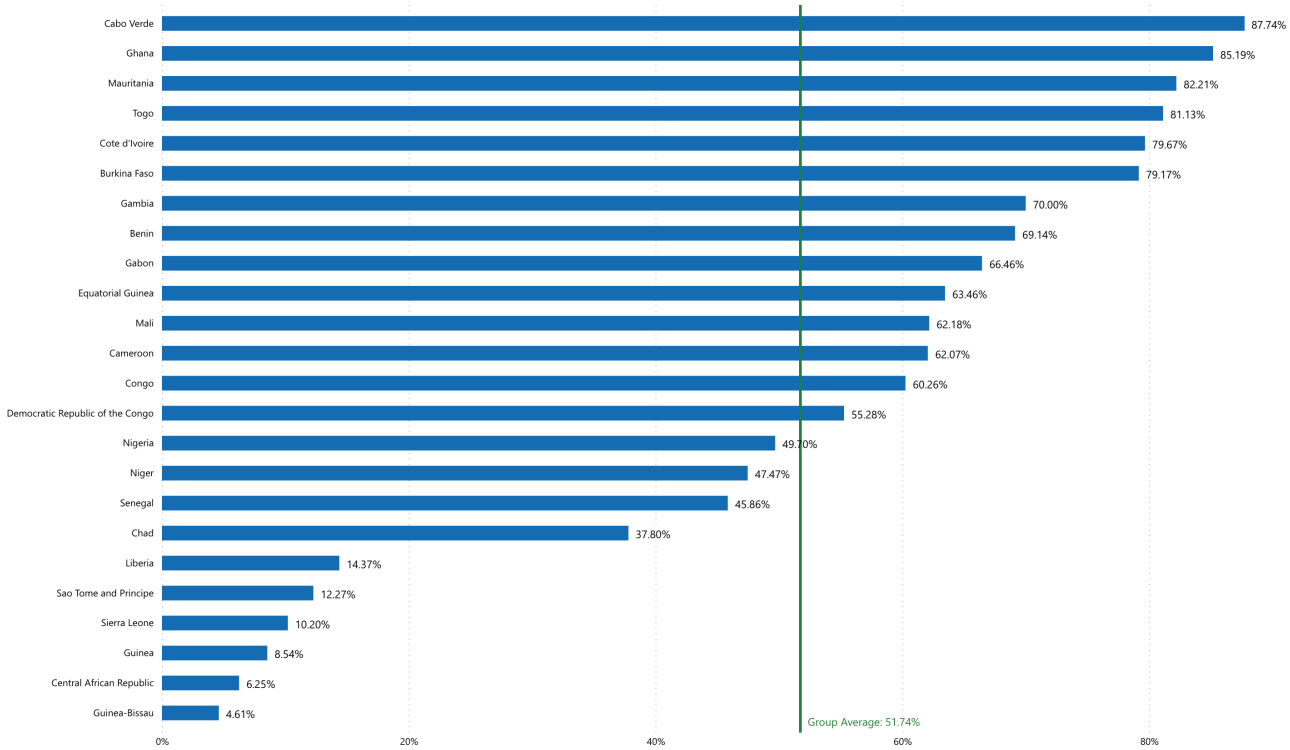


Figure 3: WACAF EI Scores for CE-6

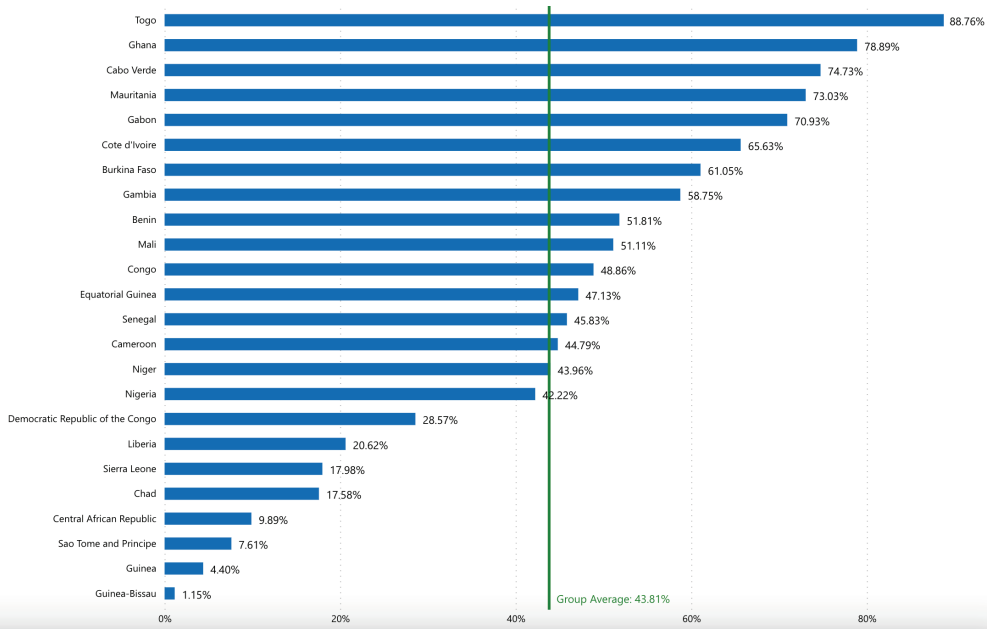


Figure 4: WACAF EI Scores for CE-7

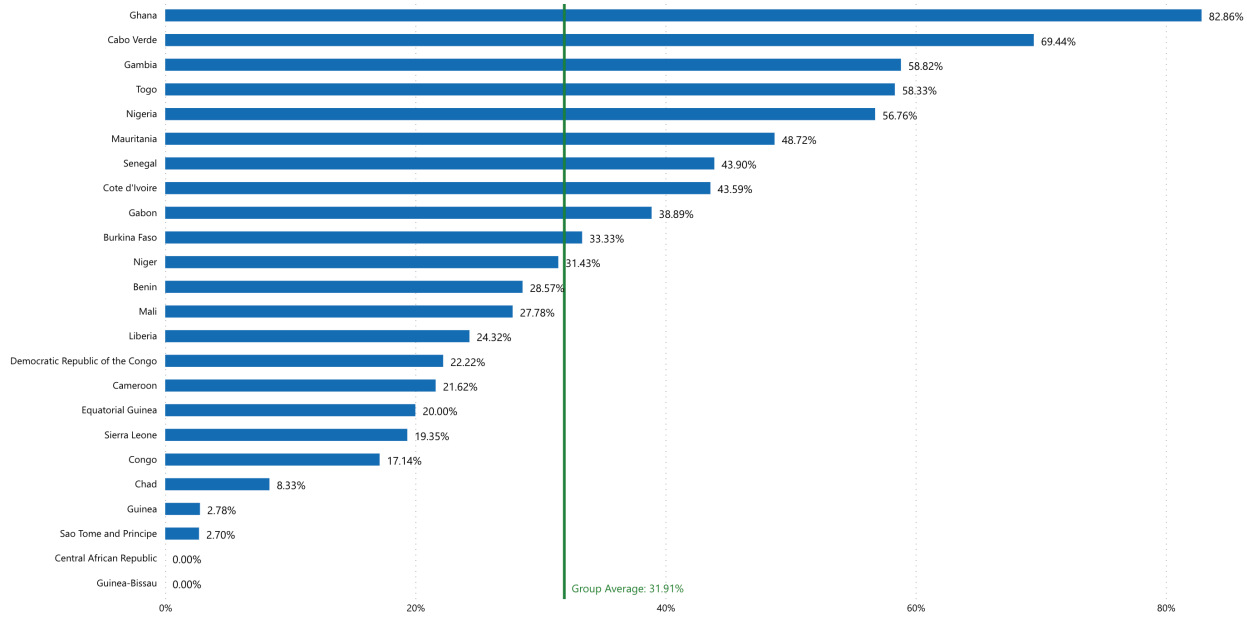


Figure 5: WACAF EI Scores for CE-8

9.3 USOAP Results by Audit Area and Critical Element

9.3.1 A review of the 10 WACAF States with an EI below the target of 60 per cent shows that the highest number of protocol findings occur in:

a) licensing, certification, authorization and approval obligations (CE-6) in the areas of OPS, ANS, AGA, PEL, in that order;

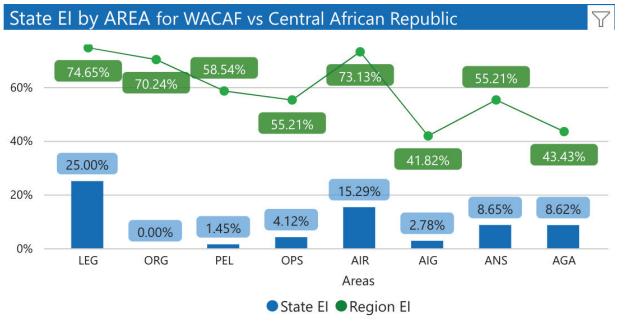
b) technical personnel qualification and training (CE-4), where the area of ANS is particularly weak in all States, and to a lesser extent in the area of OPS;

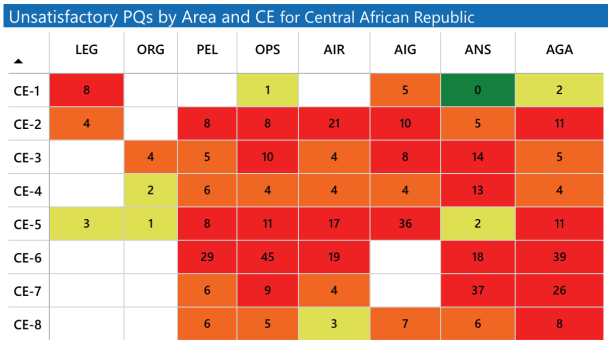
c) surveillance obligations (CE-7) in the area of ANS;

d) State civil aviation system and safety oversight functions (CE-3) in the area of ANS; and

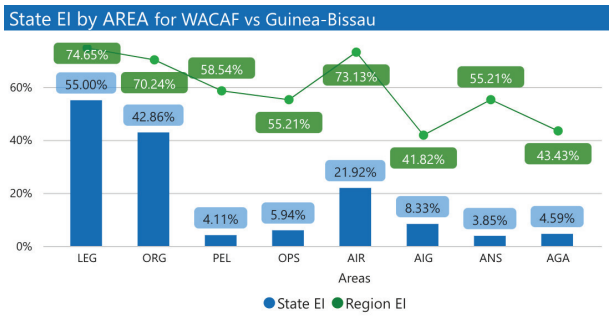
e) technical guidance, tools and the provision of safety-critical information (CE-5) and CE-6 in the area of AIR, albeit to a lesser extent.

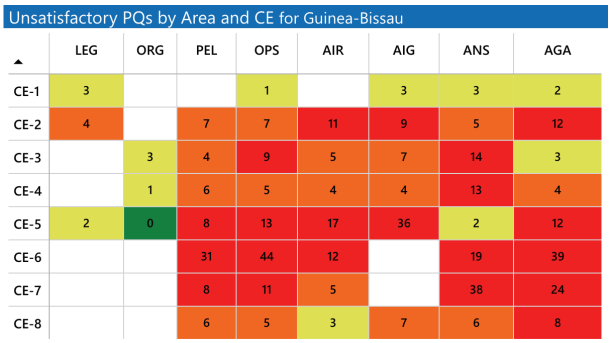
9.3.2 The USOAP results by audit area and critical element for the region's six worst-performing States are provided below (source: iSTARS 4.0, as at 25 February 2023).



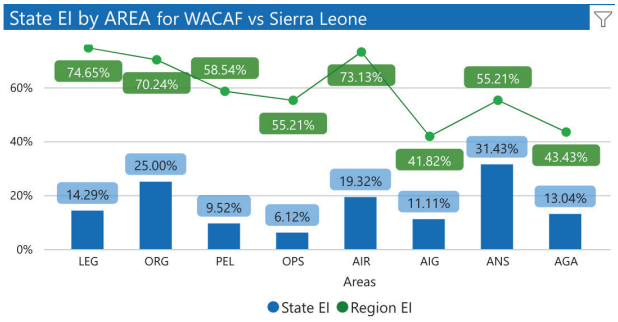


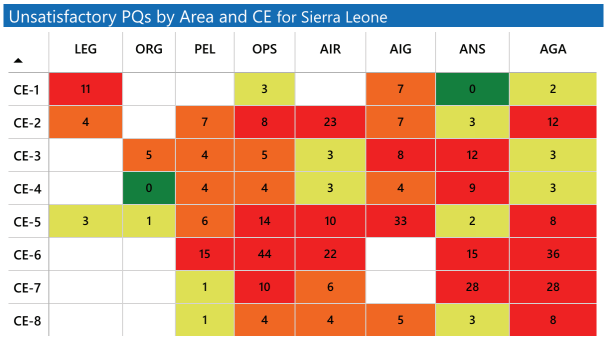
Central African Republic: 7.72%, no area or CE above 60%



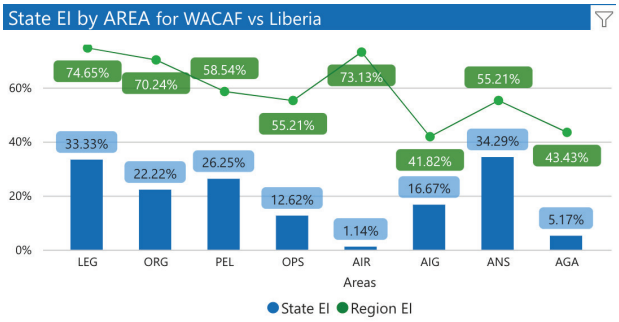


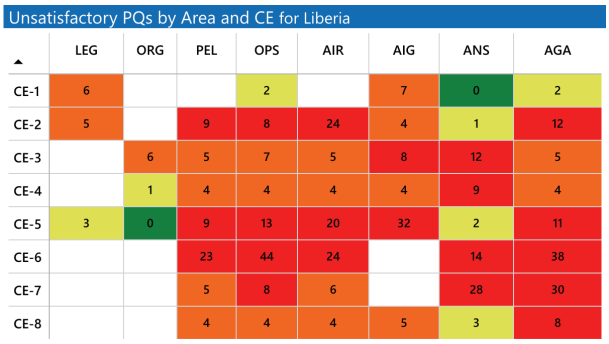
Guinea-Bissau: 9.66%, no area or CE above 60%



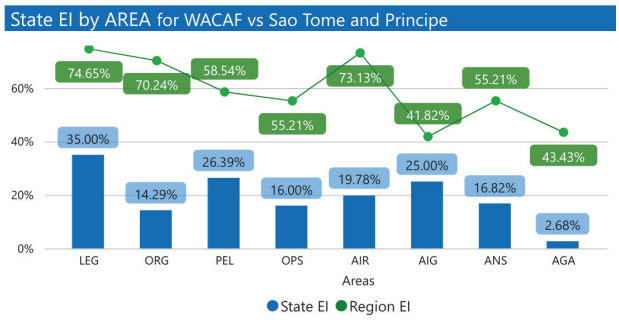


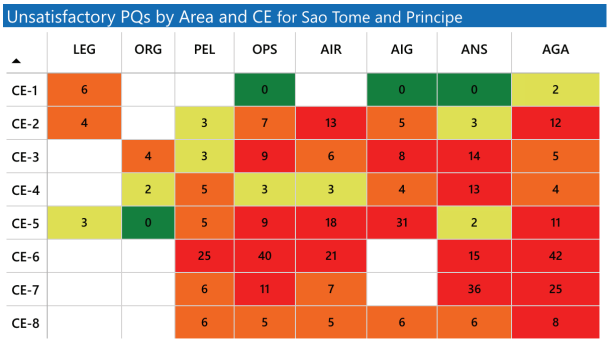
Sierra Leone: 16.03%, no area or CE above 60%



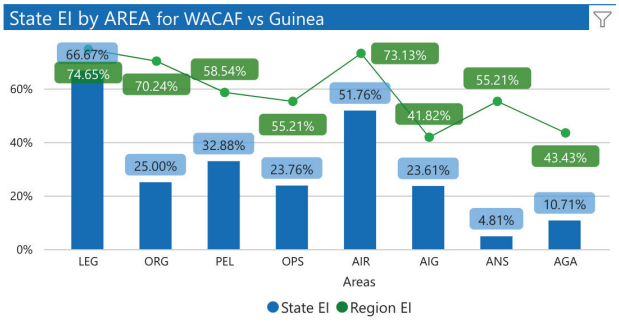


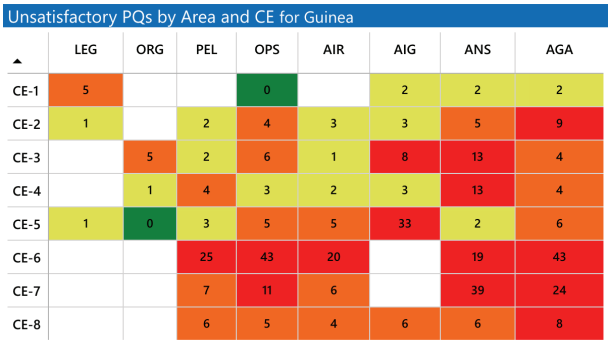
Liberia: 16.5%, no area or CE above 60%





Sao Tome and Principe: 17.21%, no area and one CE above 60%

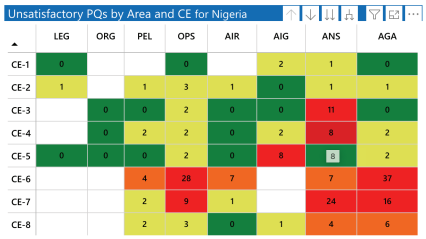


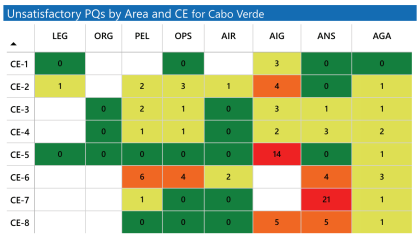


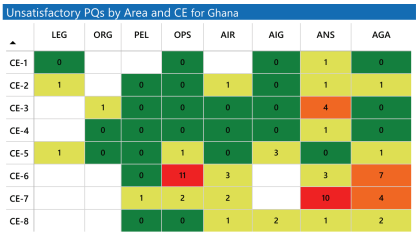
Guinea: 24.65%, one area and no CE above 60%

9.3.3 Conclusions of a review of some States with relatively high levels of EI do not depart from the above observations. Analysis of States with relatively much higher levels of EI, including Cabo Verde, Ghana and Nigeria, shows concerns in CE-6 in the areas of OPS, ANS, AGA and PEL, in that order. For instance, in Nigeria, CE-4 in the area of ANS and CE-7 and CE-8 in the area of ANS are also of concern. It is important to emphasise that there is a direct correlation between the EI in CE-4 and the EI in the critical elements of implementation (CE-6, CE-7 and CE-8). Challenges with training of technical personnel has often led to poor implementation of safety oversight. The USOAP audit results by audit area and critical element for these States are provided below.

9.3.4 The USOAP results by audit area and critical element for the three above-mentioned States are provided below (source: ICAO OLF, as at 26 February 2023). Note that their challenges are more with OPS, ANS and AGA.







Nigeria: 66.3% Cabo Verde: 82.4% Ghana: 89.6%

9.4 PBN Implementation, SSCs and SSP Implementation

9.4.1 The implementation of Performance-based Navigation (PBN) is presently the global aviation community's highest air navigation priority. The PBN concept offers significant benefits, including improved safety through more straight-in instrument approaches with vertical guidance, increased airspace capacity, increased airport accessibility, more efficient operations, reduced infrastructure costs and reduced environmental impact.

9.4.2 The implementation target was set at 100 per cent by 2016. Five States are yet to achieve the 100 per cent target, namely Cabo Verde, Cameroon, Democratic Republic of the Congo, Nigeria and Sao Tome and Principe.

9.4.3 No State has an SSC.

9.4.4 The States are at various stages of State Safety Programme (SSP) Foundation and Implementation Levels.

9.4.5 The percentages per State are given in the table below. The figures may not be up to date as per the OLF and are for comparative analysis only (source: iSTARS 4.0, 2023).

State	PBN Implementation (%)	SSP Foundation (%)	SSP Implementation Level
Benin	100.00	78.85	3
Burkina Faso	100.00	69.11	2
Cabo Verde	-	93.87	2
Cameroon	80.00	87.27	2
Central African Republic	100.00	15.23	0
Chad	100.00	65.05	0
Congo	100.00	64.39	3
Côte d'Ivoire	100.00	61.83	3
Democratic Republic of the Congo	77.78	24.71	1
Equatorial Guinea	100.00	63.22	1
Gabon	100.00	70.50	3
Gambia	100.00	81.78	3
Ghana	100.00	85.61	2
Guinea	100.00	82.51	0
Guinea-Bissau	100.00	8.88	0
Liberia	100.00	50.19	0
Mali	100.00	65.27	3
Mauritania	100.00	63.67	3
Niger	100.00	79.23	1
Nigeria	90.91	94.62	3
Sao Tome and Principe	-	33.97	0
Senegal	100.00	80.97	1
Sierra Leone	100.00	23.92	1
Togo	100.00	90.70	3

10. STATE SAFETY BRIEFING (ESAF)

10.1 Overall Performance

10.1.1 Out of the 24 States in the ESAF region, two (Somalia and South Sudan) have not yet received a USOAP CMA audit. The average EI score of the audited States on the USOAP CMA OLF as at 25 February 2023 is 55.97 per cent, which is below the world average of 67.6 per cent. Seven States (29.16 per cent) have reached the world average of 67.6 per cent. However, for the purpose of data analysis, the data in iSTARS 4.0 as at 25 February 2023 is used.

10.1.2 Six States (25 per cent) have achieved the current GASP target of 75 per cent EI. Out of these States:

a) four have an EI in the range [75%; 85%); and

b) two have an EI in the range [85%; 95%).

10.1.3 Out of the 22 audited States, 12 States fall below 60 per cent of EI and two States below 30 per cent, as per the chart below.

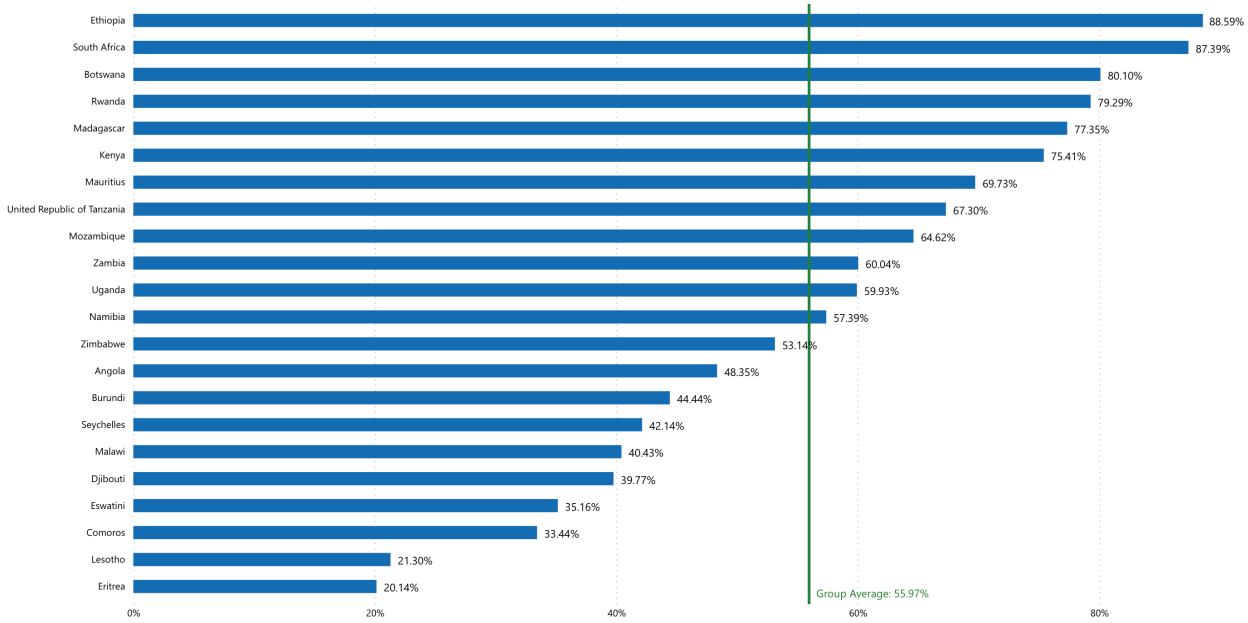


Figure 6: USOAP Group Results (ESAF)

10.2 Performance in CE-4, CE-6, CE-7 and CE-8

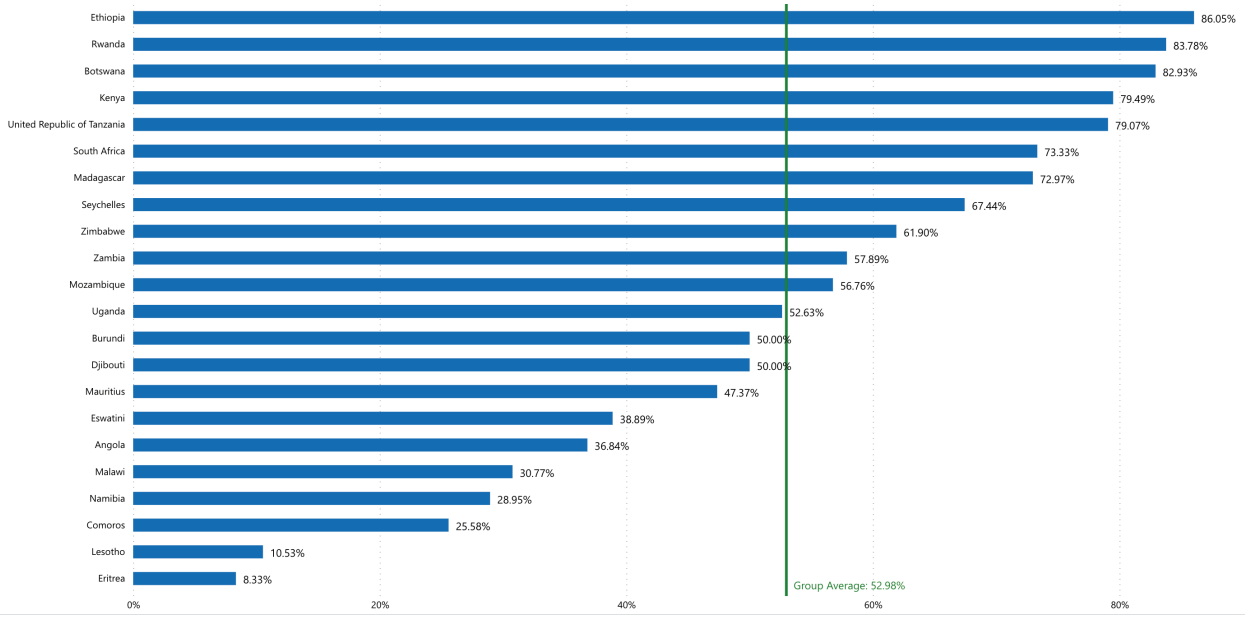


Figure 7: ESAF EI Scores for CE-4

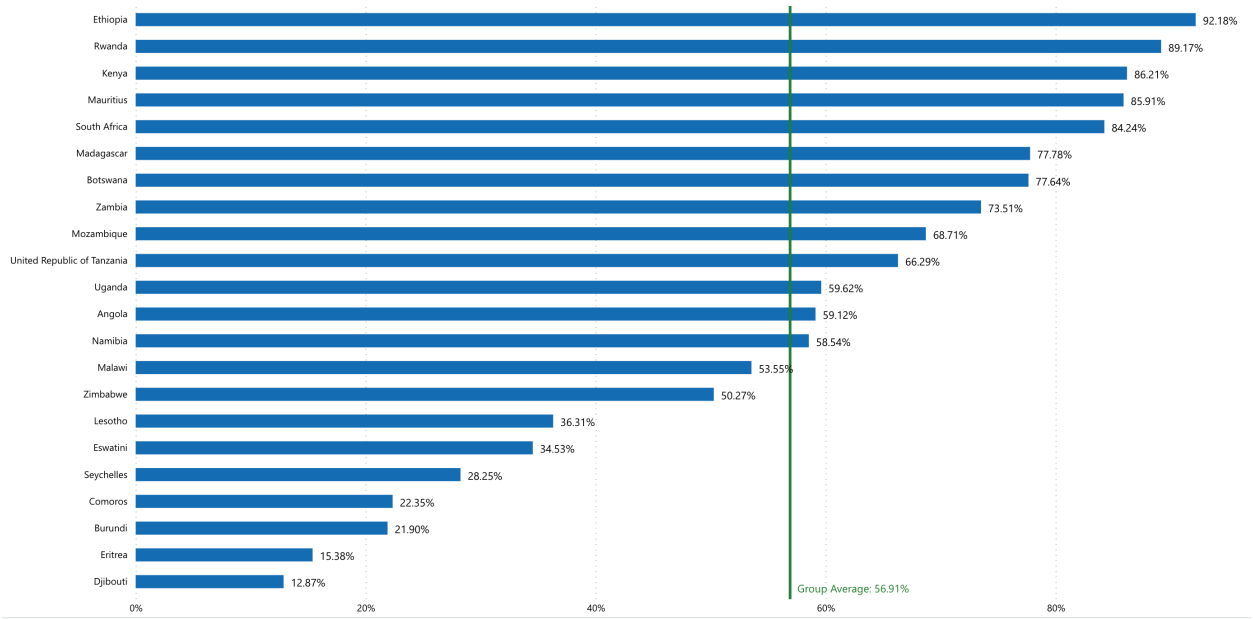


Figure 8: ESAF EI Scores for CE-6

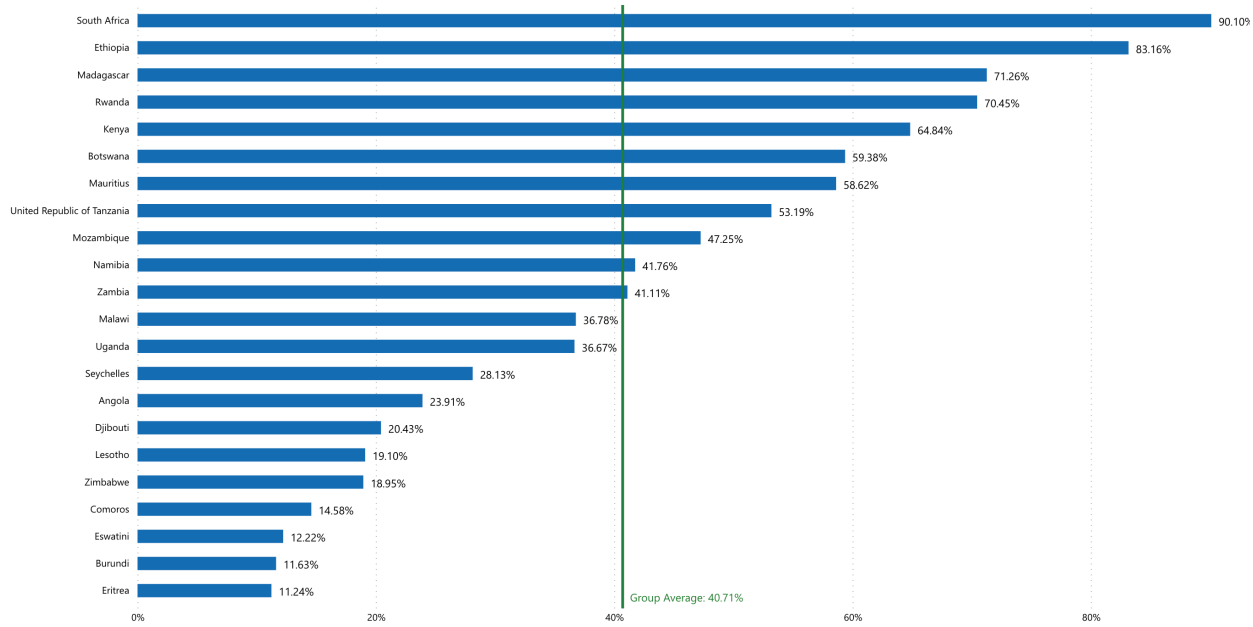


Figure 9: ESAF EI Scores for CE-7

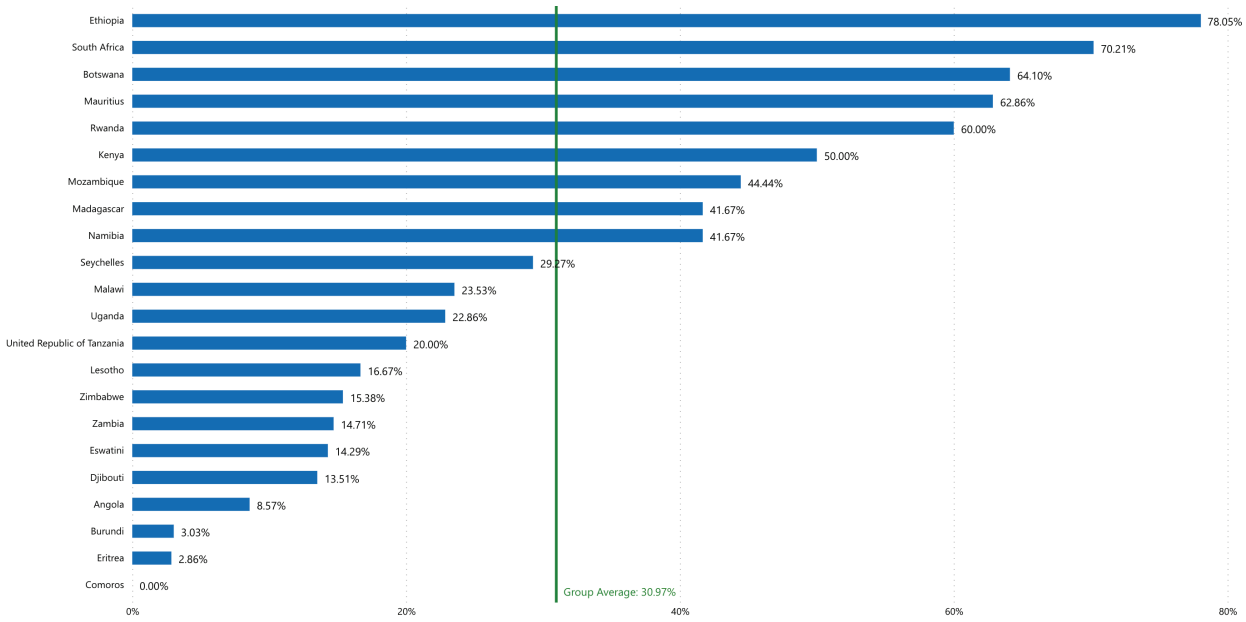


Figure 10: ESAF EI Scores for CE-8

10.3 USOAP Results by Audit Area and Critical Element

10.3.1 A review of six ESAF States with an EI below the target 60 per cent shows that the highest number of protocol findings occur in:

a) CE-6 in the areas of OPS, AGA, ANS and PEL, in that order;

b) CE-4 in the area of ANS, which is particularly weak in all States;

c) CE-7 in the areas of ANS and AGA;

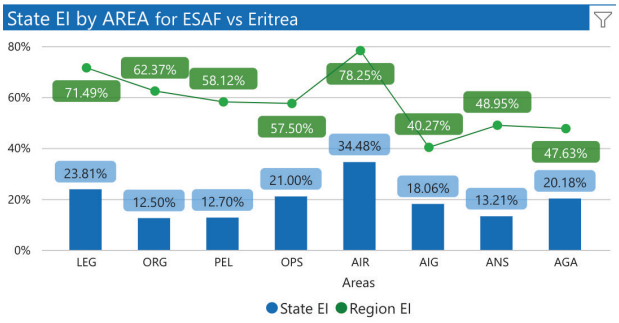
d) CE-3 in the area of ANS;

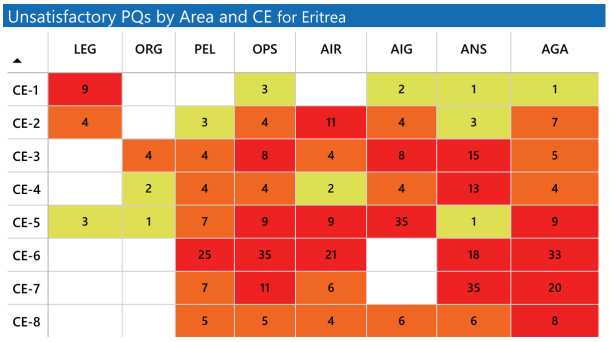
e) CE-6 in the area of AIR, albeit to a lesser extent; and

f) CE-8 in all areas.

10.3.2 It is curious that finding concerns in CE-4 in the area of OPS is not particularly high in these States, yet there are high concerns in certification obligations. This could be due lack of adequate OJT.

10.3.3 The USOAP results by audit area and critical element for the region's six worst-performing States are provided below (source: iSTARS 4.0, as at 25 February 2023).

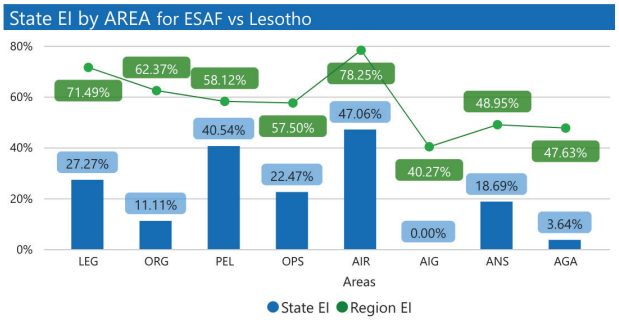


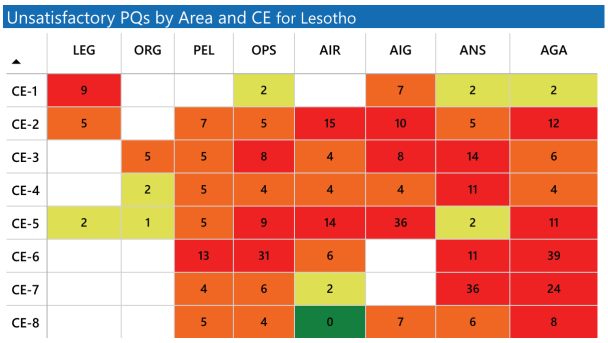


Unsatisfactory PQs by Area and CE for Eritrea

	LEG	ORG	PEL	OPS	AIR	AIG	ANS	AGA
CE-1	9			3		2	1	1
CE-2	4		3	4	11	4	3	7
CE-3		4	4	8	4	8	15	5
CE-4		2	4	4	2	4	13	4
CE-5	3	1	7	9	9	35	1	9
CE-6			25	35	21		18	33
CE-7			7	11	6		35	20
CE-8			5	5	4	6	6	8

Eritrea: 20.14%, no area or CE above 60%

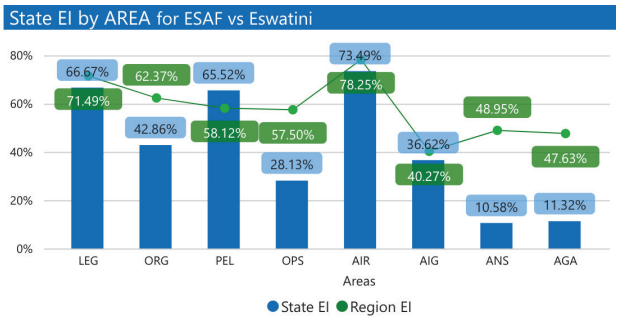


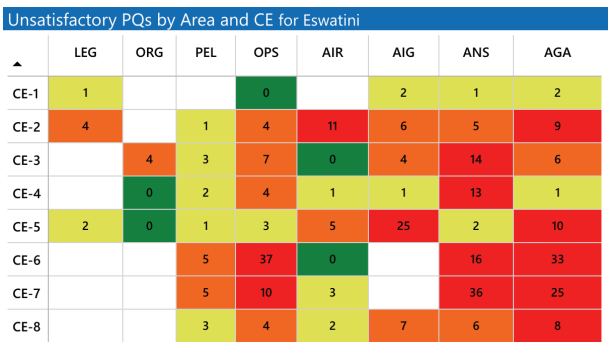


Unsatisfactory PQs by Area and CE for Lesotho

	LEG	ORG	PEL	OPS	AIR	AIG	ANS	AGA
CE-1	9			2		7	2	2
CE-2	5		7	5	15	10	5	12
CE-3		5	5	8	4	8	14	6
CE-4		2	5	4	4	4	11	4
CE-5	2	1	5	9	14	36	2	11
CE-6			13	31	6		11	39
CE-7			4	6	2		36	24
CE-8			5	4	0	7	6	8

Lesotho: 21.30%, no area or CE above 60%

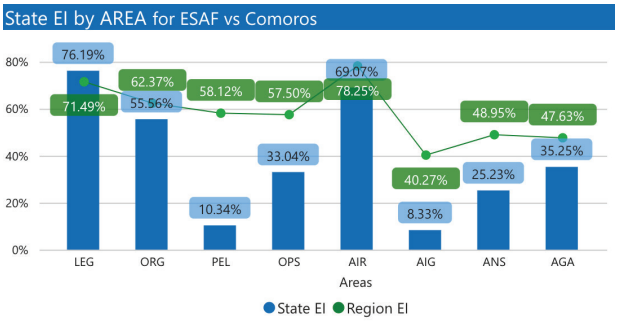


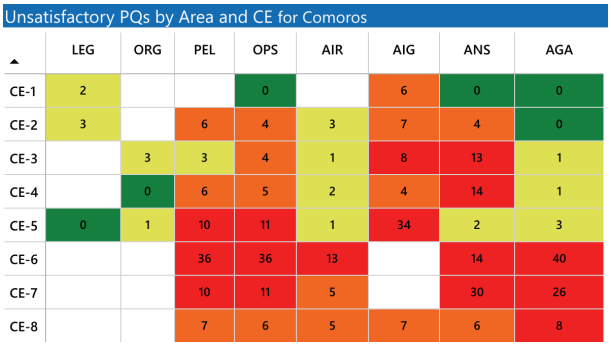


Unsatisfactory PQs by Area and CE for Eswatini

	LEG	ORG	PEL	OPS	AIR	AIG	ANS	AGA
CE-1	1			0		2	1	2
CE-2	4		1	4	11	6	5	9
CE-3		4	3	7	0	4	14	6
CE-4		0	2	4	1	1	13	1
CE-5	2	0	1	3	5	25	2	10
CE-6			5	37	0		16	33
CE-7			5	10	3		36	25
CE-8			3	4	2	7	6	8

Eswatini: 35.16%, three areas and one CE above 60%

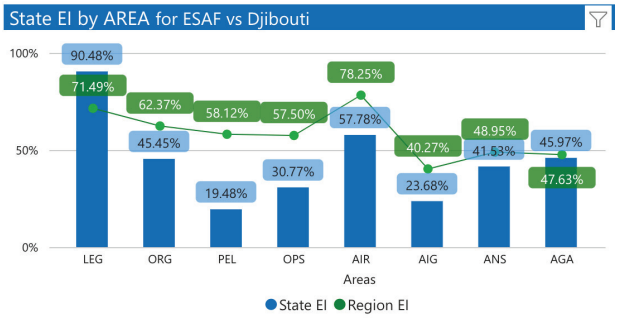




Unsatisfactory PQs by Area and CE for Comoros

	LEG	ORG	PEL	OPS	AIR	AIG	ANS	AGA
CE-1	2			0		6	0	0
CE-2	3		6	4	3	7	4	0
CE-3		3	3	4	1	8	13	1
CE-4		0	6	5	2	4	14	1
CE-5	0	1	10	11	1	34	2	3
CE-6			36	36	13		14	40
CE-7			10	11	5		30	26
CE-8			7	6	5	7	6	8

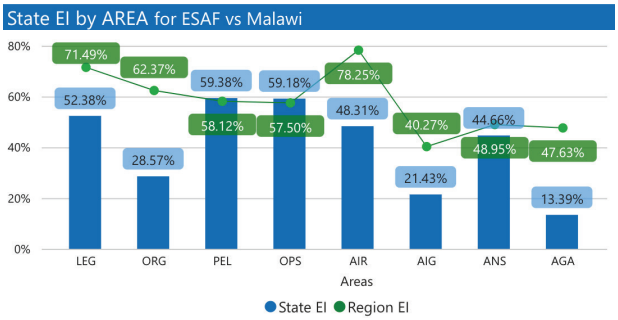
Comoros: 33.44%, two areas and two CEs above 60%



Unsatisfactory PQs by Area and CE for Djibouti

	LEG	ORG	PEL	OPS	AIR	AIG	ANS	AGA
CE-1	1			0		3	1	0
CE-2	1		5	4	2	5	2	0
CE-3		3	1	5	3	7	7	2
CE-4		1	4	2	2	3	7	1
CE-5	0	2	6	2	3	34	0	0
CE-6			32	44	21		14	38
CE-7			8	10	4		34	18
CE-8			6	5	3	6	4	8

Djibouti: 39.77%, one area and two CEs above 60%

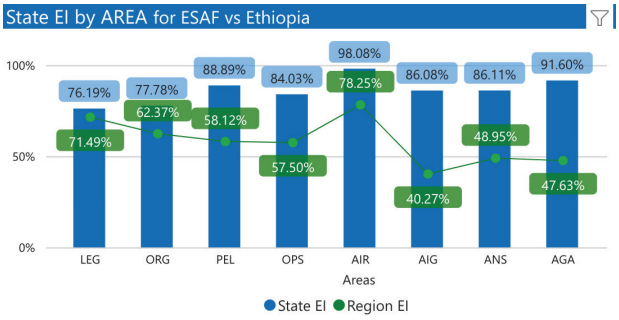


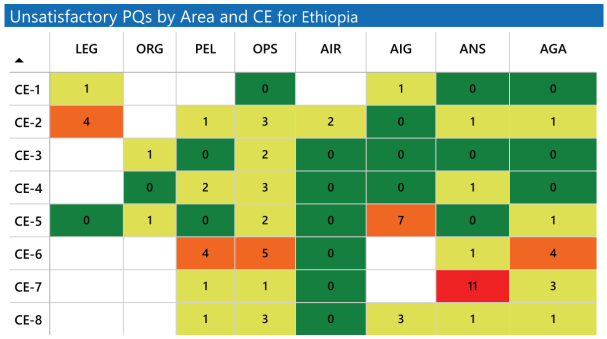
Unsatisfactory PQs by Area and CE for Malawi

	LEG	ORG	PEL	OPS	AIR	AIG	ANS	AGA
CE-1	6			2		4	0	1
CE-2	3		4	4	10	5	4	10
CE-3		4	2	2	6	5	10	7
CE-4		1	3	1	3	4	10	5
CE-5	1	0	1	6	16	31	2	10
CE-6			8	14	7		6	37
CE-7			4	8	3		21	19
CE-8			4	3	1	6	4	8

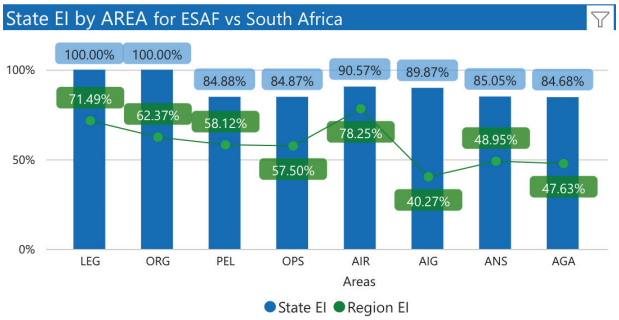
Malawi: 40.43%, one area and no CE above 60%

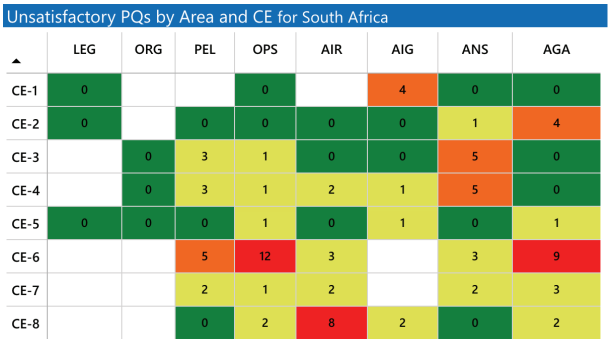
10.3.4 Conclusions of a review of some States with high levels of EI do not depart from the above observations. The following States with relatively much higher EI buttress this argument. Rwanda for instance has a high EI of 80.1 per cent, but still has challenges, especially in AIG, ANS and AGA, whilst Madagascar has challenges in the critical elements of implementation (CE-6, CE-7 and CE-8) in almost all areas. The USOAP audit results by audit area and critical element are provided below for States with a higher EI (source: iSTARS 4.0, as at 25 February 2023).



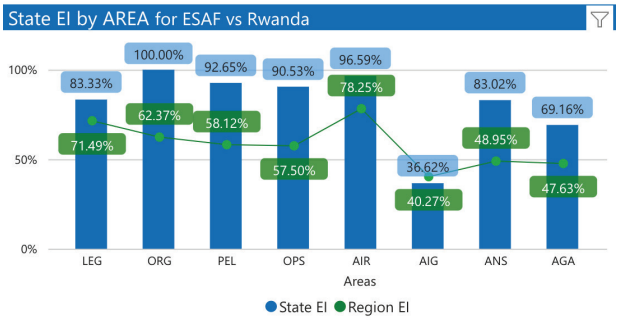


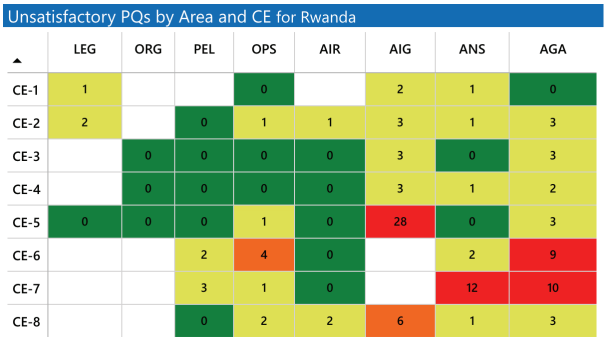
Ethiopia: 88.59%, all areas and CEs above 60%



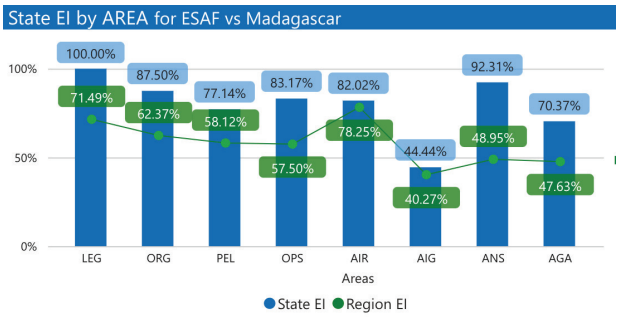


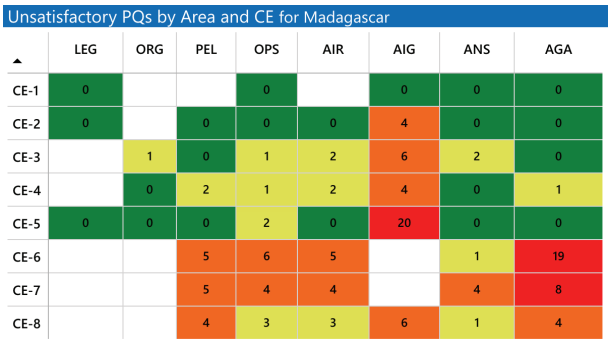
South Africa: 87.39%, all areas and CEs above 60%





Rwanda: 80.10%, seven 7 areas and all CEs above 60%





Madagascar: 77.35%, seven areas and seven CEs above 60%

10.4 PBN Implementation, SSCs and SSP Implementation

10.4.1 The PBN implementation target was set at 100 per cent by 2016. Seven States are yet to achieve the 100 per cent target, i.e. Angola, Burundi, Eswatini, Madagascar, South Africa, Zambia and Zimbabwe. Somalia and South Sudan have not been assessed.

10.4.2 No State has an SSC.

10.4.3 The States are at various stages of SSP Foundation and Implementation Levels.

10.4.4 The percentages per State are given in the table below (source: iSTARS).

State	PBN Implementation (%)	SSP Foundation (%)	SSP Implementation Level
Angola	75.00	39.61	1
Botswana	100.00	45.04	2
Burundi	-	20.36	1
Comoros	100.00	30.77	1
Djibouti	100.00	26.36	1
Eritrea	100.00	75.48	0
Eswatini	-	29.57	1
Ethiopia	100.00	85.99	2
Kenya	100.00	77.69	3
Lesotho	100.00	16.36	0
Madagascar	75.00	59.85	3
Malawi	100.00	46.33	0
Mauritius	100.00	96.33	3
Mozambique	100.00	40.30	1
Namibia	100.00	65.00	3
Rwanda	100.00	69.30	4
Seychelles	100.00	72.36	1
Somalia			
South Africa	92.86	95.13	3
South Sudan			
Uganda	100.00	73.54	2
United Republic of Tanzania	100.00	68.32	3
Zambia	75.00	53.78	3
Zimbabwe	-	66.03	2

11. STATE SAFETY BRIEFING (AFI-EUR)

11.1 Overall Performance

11.1.1 All of the three AFI-EUR States have received a USOAP CMA audit. The average EI score of these States on the OLF is 59.68 per cent[2]. None of them has reached the world average of 67.6 per cent.

11.1.2 No State has achieved the current GASP target of 75 per cent EI, and two States fall below 60 per cent as per the table below.

State	EI (%)
Algeria	57.56
Morocco	64.77
Tunisia	56.71

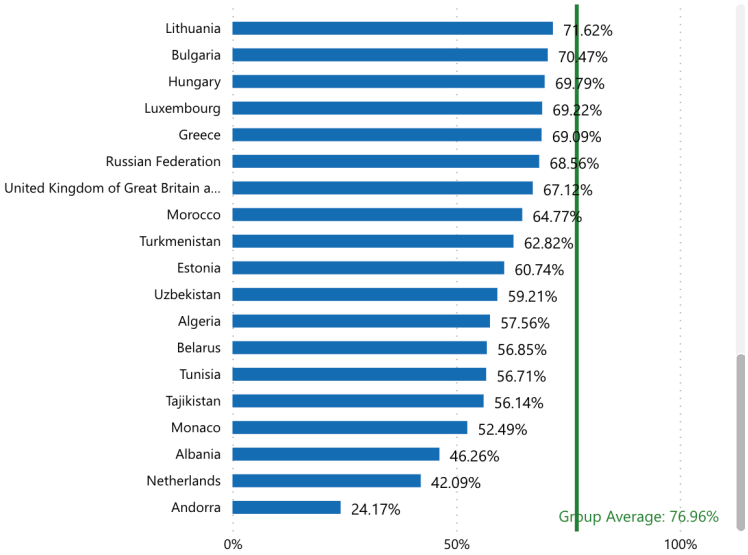


Figure 11: USOAP Group Results (AFI-EUR States in EUR/NAT context)

11.2 Performance in CE-4, CE-6, CE-7 and CE-8

11.2.1 The table below shows the level of EI (in per cent) of the AFI-EUR States for Critical Elements 4, 6, 7 and 8.

State	CE-4	CE-6	CE-7	CE-8
Algeria	10.26	60.32	66.35	45.95
Morocco	65.12	60.75	62.11	57.14
Tunisia	38.64	53.26	38.54	40.48

11.3 USOAP Results by Audit Area and Critical Element

11.3.1 A review of the three AFI-EUR States shows that the highest number of protocol findings occur in:

[2] For comparison, the average EI of the EUR region is 76.96 per cent.

a) CE-6 in the areas of AGA, OPS and PEL, in that order;

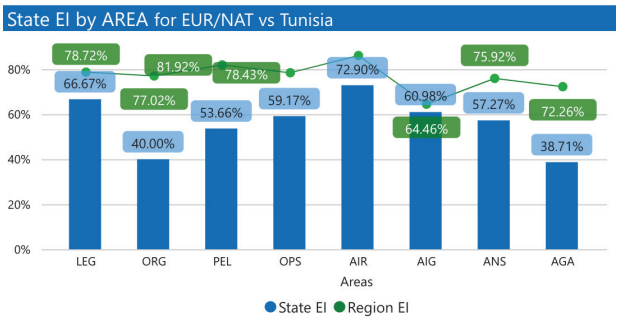
b) CE-4 in the area of ANS, which is particularly weak in all States, and to a lesser extent in the area of OPS;

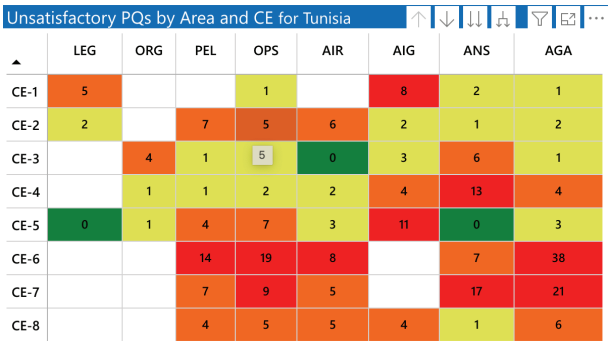
c) CE-7 in the area of ANS and AGA;

d) CE-3 in the area of ANS; and

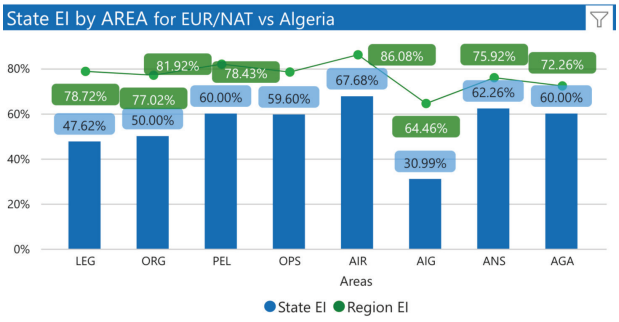
e) CE-5 in the areas of AIG and OPS, albeit to a lesser extent.

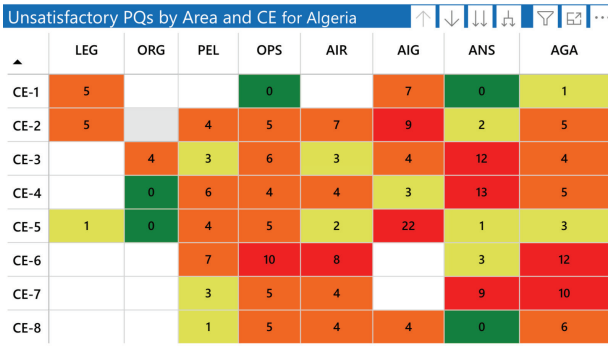
11.3.2 The USOAP results by audit area and critical element are provided below (source: iSTARS 4.0, as at 26 February 2023).



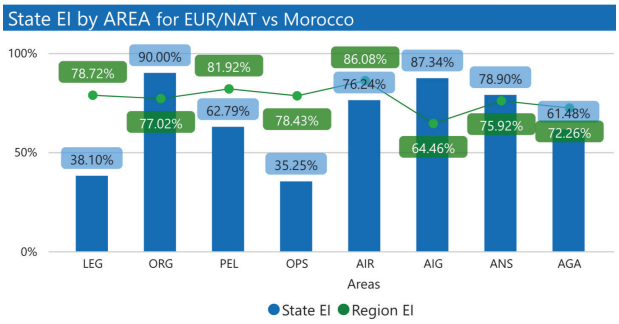


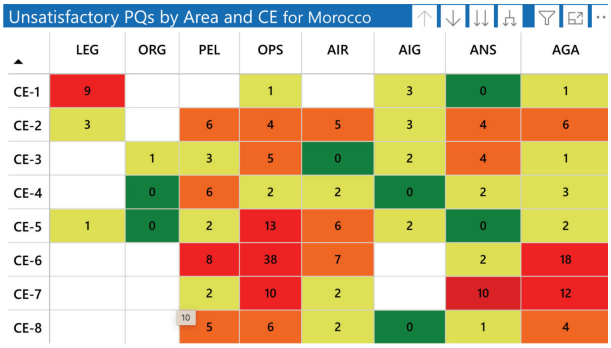
Tunisia: 56.71%, three areas and three CEs above 60%





Algeria: 57.56%, five areas and three CEs above 60%





Morocco: 64.77%, six areas and six CEs above 60%

11.4 PBN Implementation, SSCs and SSP Implementation

11.4.1 The PBN implementation target was set at 100 per cent by 2016. None of the States has achieved this target, as Algeria is at 5.71 per cent and Morocco at 58.33 per cent, while Tunisia has no PBN implementation yet.

11.4.2 No State has an SSC.

11.4.3 The States are at various stages of SSP Foundation and Implementation Levels.

11.4.4 The percentages per State are given in the table below (source: iSTARS 4.0, as at 28 February 2023).

State	PBN Implementation (%)	SSP Foundation (%)	SSP Implementation Level
Algeria	5.71	45.42	0
Morocco	58.33	73.41	2
Tunisia	-	70.99	0

12. STATE SAFETY BRIEFING (AFI-MID)

12.1 Overall Performance

12.1.1 All of the three AFI-MID States have received a USOAP CMA audit. The average EI of these States on the OLF is 64.82 per cent[3]. Two States have reached the world average of 67.6 per cent.

12.1.2 One State has achieved the current GASP target of 75 per cent EI, and one State falls below 60 per cent as per the table below.

State	EI (%)
Egypt	83.13
Libya	37.36
Sudan	73.96

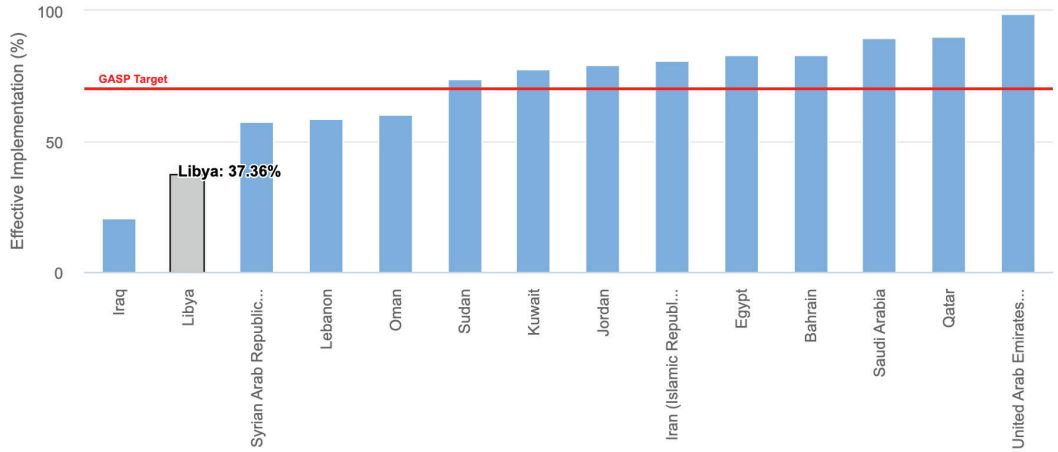


Figure 12: USOAP Group Results (AFI-MID States in MID context)

[3] For comparison, the average EI of the MID region in which the three States are located is 74.71 per cent.

12.2 **Performance in CE-4, CE-6, CE-7 and CE-8**

12.2.1 The table below shows the level of EI (in per cent) of the AFI-MID States for Critical Elements 4, 6, 7 and 8.

State	CE-4	CE-6	CE-7	CE-8
Egypt	70.33	84.13	70.83	69.05
Libya	15.38	31.33	27.78	16.67
Sudan	49.95	84.47	51.65	36.11

12.3 **USOAP Results by Audit Area and Critical Element**

12.3.1 A review of the three AFI-MID States shows that the highest number of protocol findings occur in:

a) CE-6 in the areas of OPS, AGA and ANS, in that order;

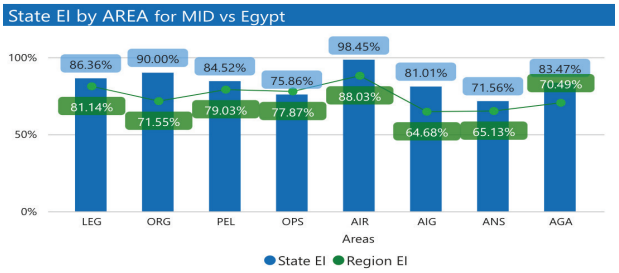
b) CE-4 in the area of ANS, which in particularly weak in all States;

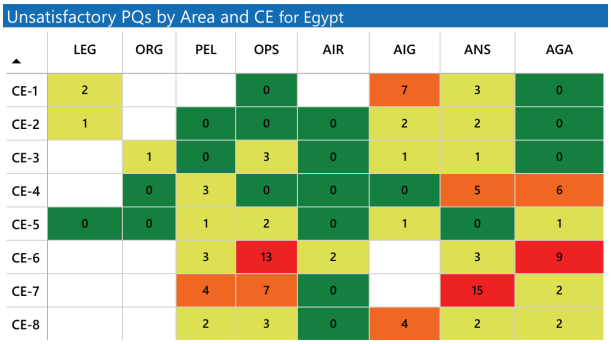
c) CE-7 in the areas of ANS and AGA;

d) CE-3 in the area of ANS; and

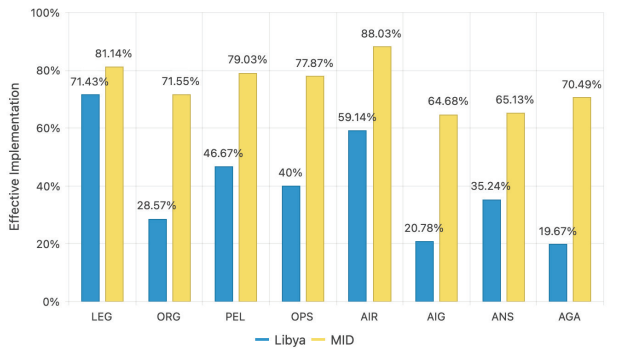
e) CE-5 in the areas of AIG and ANS, albeit to a lesser extent.

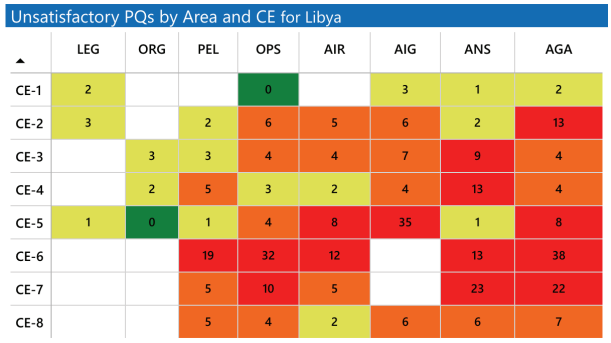
12.3.2 The USOAP results by audit area and critical element are provided below (source: iSTARS 4.0, as at 28 February 2023).



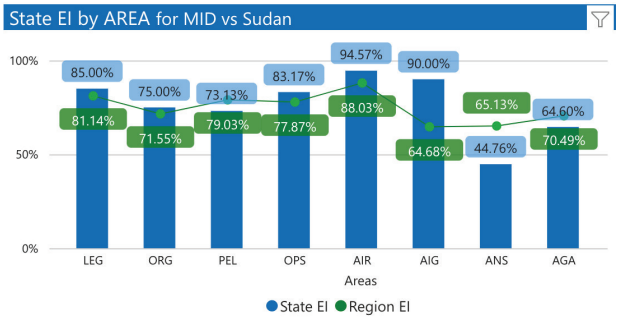


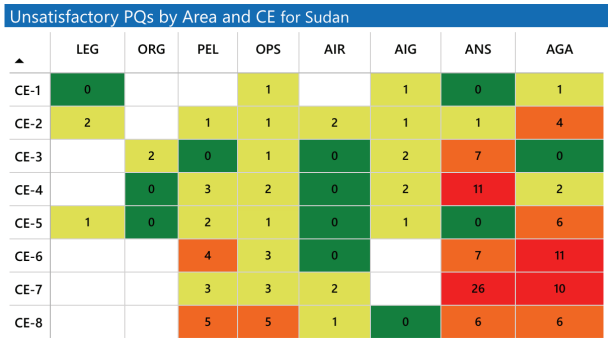
Egypt: 83.13%, all areas and seven CEs above 60%





Libya: 37.36 %, one area and one CE above 60%





Sudan: 73.96%, seven areas and five CEs above 60%

12.4 PBN Implementation, SSCs and SSP Implementation

12.4.1 The PBN implementation target was set at 100 per cent by 2016. Egypt and Sudan have achieved this target, while Libya has no PBN implementation yet.

12.4.2 No State has an SSC.

12.4.3 The States are at various stages of SSP Foundation and Implementation Levels.

12.4.4 The percentages per State are given in the table below (source: iSTARS 4.0, as at 28 February 2023).

State	PBN Implementation (%)	SSP Foundation (%)	SSP Implementation Level
Egypt	100.00	91.54	2
Libya	-	79.25	2
Sudan	100.00	73.28	3

13. SAFETY PARTNER PROGRAMMES

13.1 The Federal Aviation Administration (FAA) rates States through their International Aviation Safety Assessment (IASA) programme. The FAA does not allow air carriers from Category 2 States to operate to the United States. In the AFI region, one State is rated Category 2, i.e. Ghana.

13.2 The European Commission can decide to ban certain airlines from operating in European airspace, if they are found to be unsafe and/or they are not sufficiently overseen by their authorities. In the AFI region, 15 States have operational restrictions with regard to European airspace: Angola, Comoros, Congo, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Gabon, Liberia, Libya, Nigeria, Sao Tome and Principe, Sierra Leone, Sudan and Zimbabwe.

14. STAFF NEEDS ASSESSMENT

14.1 Data on “Staff needs assessment” was compiled by the previous consultant based on a questionnaire sent out to AFI States. The responses have been incomplete in some instances and no responses were received from AFI-MID or AFI-EUR States. The results of the assessment are summarized as follows:

Number of Responses

ESAF	Number	%
Response provided	5	21
Response pending	19	79
WACAF		
Response provided	19	79
Response pending	5	21
Total	48	100

Data Completeness

ESAF	Number	%
Data complete	1	20
Data missing	4	80
WACAF		
Data complete	9	47
Data missing	10	53
Total	24	100

14.2 The data from the respondents is relatively low and partially incomplete. For instance, the Democratic Republic of the Congo, Seychelles and Somalia provided data on current numbers for staff in some areas, but not on corresponding required numbers; other States only provided data for some areas. The data is nonetheless extrapolated to estimate a ballpark figure for the AFI region.

14.3 The following assumptions were made for the calculations:

a) if a State did not provide the current staff number for a given area, but the required number, the current number is zero; and

b) if a State did not provide the required staff number for a given area, both the required and current numbers are ignored during all calculations, i.e. they are not taken into account in the region's total staff number, in the extrapolations or in the gaps (the required number cannot be assumed to be zero if there is staff present, and including the current staff in the total number would lead to an incorrect gap as there is no corresponding required number).

14.4 **Analysis**

14.4.1 The table below shows the areas with the lowest and highest staff sizes and staffing gaps by Strategic Objective.

Strategic Objective	Lowest Staff Size	Highest Staff Size	Lowest Staffing Gap	Highest Staffing Gap
Safety (A)	AIG	ANS	PEL	AGA
Air Navigation Capacity and Efficiency (B)	PANS-OPS[4]	AOP[5]	AIM/CHART[6]	AOP
Security and Facilitation (C)	FAL[7]	SEC[8]	SEC	FAL
Economic Development of Air Transport (D) and Environmental Protection (E)	ENV[9]	AT[10]	LEG	AT

14.4.2 The details of the individual responses to the initial survey are provided in the following sections and grouped by Strategic Objective.

[4] Procedures for Air Navigation Services — Aircraft Operations
[5] Aerodrome Operational Planning
[6] Aeronautical Information Management/Aeronautical Charts
[7] Facilitation
[8] Aviation security
[9] Environment
[10] Air transport

14.5 **Strategic Objective A**

WACAF	PEL			OPS			AIR			AIG		
	Current	Required	Gap	Current	Required		Current	Required	Gap	Current	Required	Gap
Benin	1	2	1	6	3	(3)	5	3	(2)	8	5	(3)
Burkina Faso	1	2	1	3	4	1	2	3	1	-	1	1
Cabo Verde	2	2	-	1	2	1	3	5	2	2	4	2
Cameroon	6	5	(1)	12	8	(4)	14	7	(7)	3	4	1
Central African Republic	2	2	-	5	4	(1)	5	5	-	-	4	4
Chad	3	3	-	3	9	6	3	7	4			
Congo	5	10	5	4	8	4	8	12	4	5	11	6
Côte d'Ivoire	3	7	4	5	5	-	4	7	3	2	4	2
Democratic Republic of the Congo	8	25	17	14	40	26	9	28	19	-	15	15
Equatorial Guinea												
Gabon	4	5	1	4	5	1	7	8	1	-	4	4
Gambia	4	4	-	3	3	-	6	6	-	-	-	-
Ghana	4	3	(1)	13	14	1	12	12	-	1	40	39
Guinea												
Guinea-Bissau	3	3	-	1	3	2	2	3	1	2	3	1
Liberia	1	3	2	2	6	4	4	4	-	-	-	-
Mali	3	3	-	3	4	1	4	3	(1)	1	1	-
Mauritania												
Niger												
Nigeria												
Sao Tome and Principe												
Senegal	4	7	3	6	4	(2)	6	9	3	8	3	(5)
Sierra Leone	3	5	2	5	10	5	5	10	5	1	4	3
Togo	4	4	-	6	6	-	4	4	-	6	10	4
Total	61	95	34	96	138	42	103	136	33	39	113	74
Extrapolation	81	127	45	128	184	56	137	181	44	55	160	104

WACAF	ANS												
	ATM/ SAR		PANS-OPS		AIM/ CHART		CNS[11]		MET[12]		ANS Total		
	Current	Required	Current	Required	Current	Required	Current	Required	Current	Required	Current	Required	Gap
Benin	1	1	1	1	1	1	1	1	1	1	5	5	-
Burkina Faso	1	2	1	1	1	1	2	1	-	1	5	6	1
Cabo Verde	-	-	1	1	-	-	-	1	-	-	1	2	1
Cameroon	3	3	-	-	3	3	4	4	3	4	13	14	1
Central African Republic	-	4	5	10	6	5	6	5	-	2	17	26	9
Chad	1	1	1	1	1	1	1	1	1	1	5	5	-
Congo	3	4	-	2	4	4	1	3	-	3	8	16	8
Côte d'Ivoire	3	2	2	3	2	3	3	3	2	2	12	13	1
Democratic Republic of the Congo	-	20	-	5	-	10	-	15	-	4	-	54	54
Equatorial Guinea													
Gabon	3	3	1	2	5	7	2	2	1	2	12	16	4
Gambia	-		2				-		2	2	4	2	(2)
Ghana	2	2	2	1	2	2	1	2	1	2	8	9	1
Guinea													
Guinea-Bissau	1	1	-	1	1	1	-	1	1	1	3	5	2
Liberia		1		1	1	2	2	2		1	3	7	4
Mali	3	3	1	2	1	2	1	2	1	1	7	10	3
Mauritania													
Niger													
Nigeria													
Sao Tome and Principe													
Senegal	5	3	2	1	2	1	2	2	2	2	13	9	(4)
Sierra Leone	1	2	1	1	1	1	2	2	2	2	7	8	1
Togo	4	2	3	1	1	1	1	1	1	1	10	6	(4)
Total	31	54	23	34	32	45	29	48	18	32	133	213	80
Extrapolation	41	76	31	48	45	64	39	68	24	43	180	298	118

[11] Communications, navigation and surveillance
[12] Aeronautical meteorology

WACAF	AGA										
	Civil Engineering		Electrical Engineering		Operations		RFF/Wildlife Management		AGA Total		
	Current	Required	Current	Required	Current	Required	Current	Required	Current	Required	Gap
Benin	1	1	1	1	1	1	1	1	4	4	-
Burkina Faso	1	1	1	1	1	1	-	1	3	4	1
Cabo Verde	1	1	1	1	1	1	-	-	3	3	-
Cameroon	3	2	1	2	2	2	2	2	8	8	-
Central African Republic	1	3	-	4	2	5	-	4	3	16	13
Chad											
Congo	2	3	2	2	-	3	2	4	6	12	6
Côte d'Ivoire	2	3	2	2	-	2	1	2	5	9	4
Democratic Republic of the Congo	-	10	-	10	-	10	-	5	-	35	35
Equatorial Guinea											
Gabon	3	3	1	2	1	2	1	2	6	9	3
Gambia	-		-		4	4	-		4	4	-
Ghana	1	1	1	1	1	1	1	1	4	4	-
Guinea											
Guinea-Bissau	2	1	-	1	-	1	-	1	2	4	2
Liberia	1	1	1	1					2	2	-
Mali	2	3	1	2	1	2	1	2	5	9	4
Mauritania											
Niger											
Nigeria											
Sao Tome and Principe											
Senegal	1	1	2	1	3	3	1	1	7	6	(1)
Sierra Leone	2	2	-	1	1	1	-	1	3	5	2
Togo	2	1	-	1	3	2	-	1	5	5	-
Total	25	37	14	33	21	41	10	28	70	139	69
Extrapolation	38	56	21	50	32	62	16	45	106	211	105

ESAF	PEL			OPS			AIR			AIG		
	Current	Required	Gap	Current	Required	Gap	Current	Required	Gap	Current	Required	Gap
Angola												
Botswana												
Burundi												
Comoros	2	4	2	4	6	2	2	4	2			
Djibouti												
Eritrea												
Eswatini												
Ethiopia												
Kenya												
Lesotho												
Madagascar												
Malawi												
Mauritius												
Mozambique	8	11	3	4	8	4	7	12	5	4	6	2
Namibia												
Rwanda												
Seychelles[13]	1	2	1	18								
Somalia	2	6	4	5	9	4	2	4	2	1	4	3
South Africa												
South Sudan												
Uganda	5	6	1	7	11	4	9	17	8	1	4	3
United Republic of Tanzania												
Zambia												
Zimbabwe												
Total	18	29	11	20	34	14	20	37	17	6	14	8
Extrapolation	86	139	53	120	204	84	120	222	102	48	112	64

[13] The value for current staff in OPS is not included in the total due to the missing number of required staff.

ESAF	ANS												
	ATM/SAR		PANS-OPS		AIM/ CHART		CNS		MET		ANS Total		
	Current	Required	Current	Required	Current	Required	Current	Required	Current	Required	Current	Required	Gap
Angola													
Botswana													
Burundi													
Comoros	1	1	-	1	-	2	-	1	-	1	1	6	5
Djibouti													
Eritrea													
Eswatini													
Ethiopia													
Kenya													
Lesotho													
Madagascar													
Malawi													
Mauritius													
Mozambique	4	4	1	2	4	4	2	2	1	2	12	14	2
Namibia													
Rwanda													
Seychelles													
Somalia	1	1	-	1	1	1	1	1	1	1	4	5	1
South Africa													
South Sudan													
Uganda	3	3			1	1	1	1	1	2	6	7	1
United Republic of Tanzania													
Zambia													
Zimbabwe													
Total	9	9	1	4	6	8	4	5	3	6	23	32	9
Extrapolation	54	54	8	32	36	48	24	30	18	36	140	200	60

ESAF	AGA										
	Civil Engineering		Electrical Engineering		Operations		RFF/Wildlife Management		AGA Total		
	Current	Required	Current	Required	Current	Required	Current	Required	Current	Required	Gap
Angola											
Botswana											
Burundi											
Comoros	1	2	-	1	1	1	1	1	3	5	2
Djibouti											
Eritrea											
Eswatini											
Ethiopia											
Kenya											
Lesotho											
Madagascar											
Malawi											
Mauritius											
Mozambique	4	4	-	2	-	2	-	2	4	10	6
Namibia											
Rwanda											
Seychelles											
Somalia	2	4					24	60	26	64	38
South Africa											
South Sudan											
Uganda	1	2	1	1	2	3	-		4	6	2
United Republic of Tanzania											
Zambia											
Zimbabwe											
Total	8	12	1	4	3	6	25	63	37	85	48
Extrapolation	48	72	8	32	24	48	150	504	230	656	426

14.6 **Strategic Objective B**

WACAF	ATM[14]/SAR[15]			PANS-OPS			AIM/Chart			CNS			MET			AOP		
	Current	Required	Gap	Current	Required	Gap	Current	Required	Gap	Current	Required	Gap	Current	Required	Gap	Current	Required	Gap
Benin	4	1	(3)	2	1	(1)	5	1	(4)	1	1	-	2	1	(1)	4	4	-
Burkina Faso	1	2	1	1	1	-	1	1	-	2	1	(1)	-	1	1	3	4	1
Cabo Verde	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-	3	3	-
Cameroon	3	3	-	-	-	-	3	3	-	4	4	-	3	4	1	8	8	-
Central African Republic	11	5	(6)	5	10	5	6	5	(1)	6	5	(1)	-	2	2	3	16	13
Chad	1	1	-	1	1	-	1	1	-	1	1	-	1	1	-			
Congo	3	4	1	-	2	2	4	4	-	1	3	2	-	3	3	6	12	6
Côte d'Ivoire	3	2	(1)	2	3	1	2	3	1	3	3	-	2	2	-	5	9	4
Democratic Republic of the Congo	-	20	20	-	5	5	-	10	10	-	15	15	-	4	4	-	35	35
Equatorial Guinea																		
Gabon	3	3	-	1	2	1	5	7	2	2	2	-	1	2	1	6	9	3
Gambia																4	4	-
Ghana	3	2	(1)	2	1	(1)	2	2	-	1	2	1	1	2	1	4	4	-
Guinea																		
Guinea-Bissau	1	2	1	-	1	1	1	1	-	-	1	1	1	1	-	2	4	2
Liberia							1	2	1	2	2	-			-	2	2	-
Mali	3	3	-	1	2	1	1	2	1	1	2	1	1	1	-	5	9	4
Mauritania																		
Niger																		
Nigeria																		
Sao Tome and Principe																		
Senegal																7	6	(1)
Sierra Leone	1	2	1	1	1	-	1	1	-	2	2	-	2	2	-	3	5	2
Togo	5	2	(3)	4	1	(3)	3	1	(2)	3	1	(2)	2	1	(1)	5	5	-
Total	42	52	10	21	32	11	36	44	8	29	45	16	16	27	11	70	139	69
Extrapolation	67	83	16	34	51	18	54	66	12	44	68	24	26	43	18	99	196	97

[14] Air Traffic Management
[15] Search and Rescue

ESAF	ATM/SAR			PANS-OPS			AIM/Chart			CNS			MET			AOP		
	Current	Required	Gap	Current	Required	Gap	Current	Required	Gap	Current	Required	Gap	Current	Required	Gap	Current	Required	Gap
Angola																		
Botswana																		
Burundi																		
Comoros	1	2	1	-	1	1	-	2	2	1	2	1	1	2	1	3	5	2
Djibouti																		
Eritrea																		
Eswatini																		
Ethiopia																		
Kenya																		
Lesotho																		
Madagascar																		
Malawi																		
Mauritius																		
Mozambique	6	6	-	1	2	1	4	4	-	2	2	-	1	2	1	4	10	6
Namibia																		
Rwanda			-															
Seychelles	5	10	5	2	2	-												
Somalia[16]	40			-	1	1	31			20			26			26	64	38
South Africa																		
South Sudan																		
Uganda	8	10	2	4	4	-	8	8	-	7	7	-	1	2	1	4	6	2
United Republic of Tanzania																		
Zambia																		
Zimbabwe																		
Total	20	28	8	7	10	3	12	14	2	10	11	1	3	6	3	37	85	48
Extrapolation	120	168	48	34	48	14	96	112	16	80	88	8	24	48	24	222	510	288

[16] The values for current staff in ATM/SAR, AIM/CHART, CNS and MET are not included in the totals due to the missing number of required staff.

14.7 **Strategic Objective C**

WACAF	Security			Facilitation		
	Current	Required	Gap	Current	Required	Gap
Benin	7	7	-	-	4	4
Burkina Faso	2	7	5	-	3	3
Cabo Verde	1	2	1	1	1	-
Cameroon	7	15	8	3	10	7
Central African Republic	20	5	(15)	1	5	4
Chad	4	7	3	1	5	4
Congo	12	20	8	12	20	8
Côte d'Ivoire	6	6	-	2	2	-
Democratic Republic of the Congo[17]	30			-	5	5
Equatorial Guinea						
Gabon	4	4	-	2	2	-
Gambia	7	10	3	7	10	3
Ghana	4	12	8	2	3	1
Guinea						
Guinea-Bissau	5	4	(1)	2	5	3
Liberia						
Mali	5	8	3	-	-	-
Mauritania						
Niger						
Nigeria	30	40	10	15	33	18
Sao Tome and Principe						
Senegal	9	9	-	3	3	-
Sierra Leone	8	8	-	3	3	-
Togo	11	7	(4)			
Total	142	171	29	54	114	60
Extrapolation	200	241	41	72	152	80

ESAF	Security			Facilitation		
	Current	Required	Gap	Current	Required	Gap
Angola						
Botswana						
Burundi						
Comoros	4	6	2	1	3	2
Djibouti						
Eritrea						
Eswatini						
Ethiopia						
Kenya						
Lesotho						
Madagascar						
Malawi						
Mauritius						
Mozambique	7	8	1	1	2	1
Namibia						
Rwanda						
Seychelles	8	8	-	8	8	-
Somalia	2	6	4	1	1	-
South Africa						
South Sudan						
Uganda	6	8	2	6	8	2
United Republic of Tanzania						
Zambia						
Zimbabwe						
Total	27	36	9	17	22	5
Extrapolation	130	173	43	82	106	24

[17] The value for current staff in Security is not included in the total due to the missing number of required staff.

14.8 **Strategic Objective D**

WACAF	Legal Experts			AT Experts		
	Current	Required	Gap	Current	Required	Gap
Benin	3	3	-	1	3	2
Burkina Faso	1	2	1	2	2	-
Cabo Verde	3	3	-	2	3	1
Cameroon	5	5	-	9	9	-
Central African Republic	7	4	(3)	1	6	5
Chad						
Congo	6	10	4	6	14	8
Côte d'Ivoire	6	5	(1)	2	4	2
Democratic Republic of the Congo	2	4	2	3	7	4
Equatorial Guinea						
Gabon	3	4	1	1	2	1
Gambia	2	2	-	5	6	1
Ghana	2	4	2	2	3	1
Guinea						
Guinea-Bissau	5	3	(2)	2	2	-
Liberia	-	1	1	7	10	3
Mali	1	2	1	1	2	1
Mauritania						
Niger						
Nigeria	22	22	-	19	30	11
Sao Tome and Principe						-
Senegal	1	2	1	4	2	(2)
Sierra Leone	2	1	(1)	5	5	-
Togo	4	4	-	2	5	3
Total	75	81	6	74	115	41
Extrapolation	100	108	8	99	153	55

ESAF	Legal Experts			AT Experts		
	Current	Required	Gap	Current	Required	Gap
Angola						
Botswana						
Burundi						
Comoros	-	2	2	1	2	1
Djibouti						
Eritrea						
Eswatini						
Ethiopia						
Kenya						
Lesotho						
Madagascar						
Malawi						
Mauritius						
Mozambique	3	3	-	5	5	-
Namibia						
Rwanda						
Seychelles	1	2	1	6	8	2
Somalia	1	4	3	5	7	2
South Africa						
South Sudan						
Uganda	6	6	-	11	13	2
United Republic of Tanzania						
Zambia						
Zimbabwe						
Total	11	17	6	28	35	7
Extrapolation	53	82	29	134	168	34

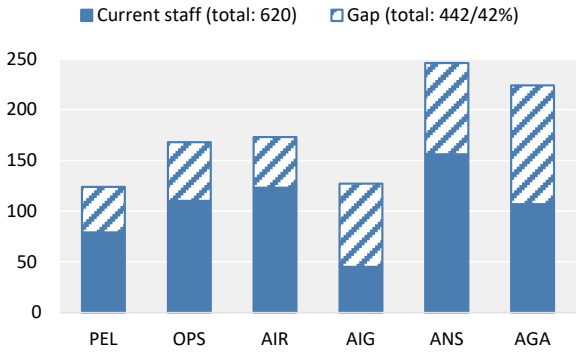
14.9 **Strategic Objective E**

WACAF	Current	Required	Gap
Benin	1	3	2
Burkina Faso	2	2	-
Cabo Verde	-	1	1
Cameroon	2	2	-
Central African Republic	-	2	2
Chad			
Congo	1	3	2
Côte d'Ivoire	1	2	1
Democratic Republic of the Congo	-	5	5
Equatorial Guinea			
Gabon	1	2	1
Gambia			
Ghana	1	1	-
Guinea			
Guinea-Bissau	1	1	-
Liberia			
Mali	-	1	1
Mauritania			
Niger			
Nigeria	7	17	10
Sao Tome and Principe			
Senegal			
Sierra Leone	-	1	1
Togo	5	4	(1)
Total	22	47	25
Extrapolation	35	75	40

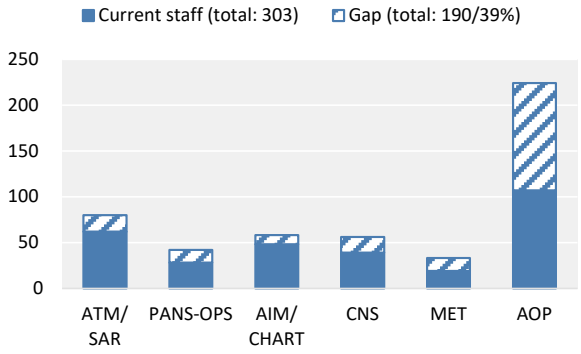
ESAF	Current	Required	Gap
Angola			
Botswana			
Burundi			
Comoros			
Djibouti			
Eritrea			
Eswatini			
Ethiopia			
Kenya			
Lesotho			
Madagascar			
Malawi			
Mauritius			
Mozambique	1	1	-
Namibia			
Rwanda			
Seychelles	4	4	-
Somalia	1	1	-
South Africa			
South Sudan			
Uganda	-	-	-
United Republic of Tanzania			
Zambia			
Zimbabwe			
Total	6	6	-
Extrapolation	36	36	-

14.10 **Summary and Conclusions**

14.10.1 The following charts show the combined figures for the AFI region by Strategic Objective.



Strategic Objective A



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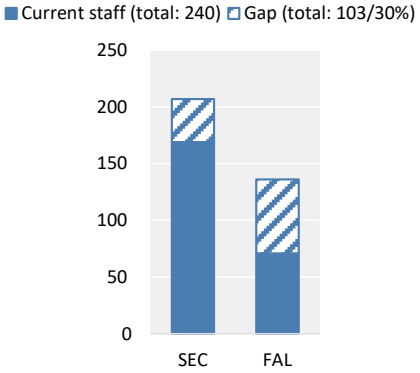

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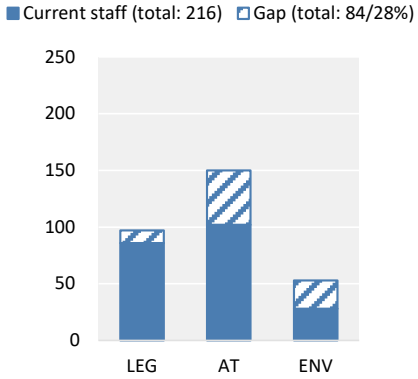

Strategic Objectives D and E

Extrapolated Values

14.10.2 The table below shows the extrapolated current staff levels and gaps by Strategic Objective (SO) and region.

	SO-A						SO-B	SO-C		SO-D		SO-E
WACAF	PEL	OPS	AIR	AIG	ANS	AGA	Total	SEC	FAL	LEG	AT	ENV
Current	81	128	137	55	180	106	324	200	72	100	99	35
Gap	45	56	44	104	118	105	185	41	80	8	55	40
ESAF												
Current	86	120	120	48	140	230	576	130	82	53	134	36
Gap	53	84	102	64	60	426	398	43	24	29	34	-
Total												
Current	167	248	257	103	320	336	900	330	154	153	233	71
Gap	98	140	146	168	178	531	583	84	104	37	89	40

14.10.3 Based on the extrapolated gaps, the strategy towards increasing the number of technical personnel should therefore be prioritized as follows in the given orders:

a) Strategic Objective A: AGA, ANS, AIG, AIR, OPS and PEL;

b) Strategic Objective B: AOP, ATM/SAR, MET, CNS, PANS-OPS and AIM/CHART;

c) Strategic Objective C: FAL and SEC; and

d) Strategic Objectives D and E: AT, ENV and LEG.

14.10.4 To validate this conclusion, an online version of the questionnaire should be developed as part of a database to collect and be continuously updated by States and analysed automatically via dashboards created in the database.

14.10.5 Such a database analysis will help identify the probable causes behind the gaps by area, e.g. lack of qualified personnel in the market, lack of resources to recruit, poor retention, not competitive salaries, etc., and possible solutions to address these gaps by domain.

14.10.6 For the existing technical personnel, the database will help identify the gaps in terms of expertise, training (by level) in specific areas, including SSP and SMS.

15. TRAINING ORGANISATIONS ASSESSMENT

15.1 The work done by the previous consultant sort to gather information on Approved Training Organizations (ATOs) in the AFI region, courses developed/offered and list of instructors. Further reading shows that the AATO has already carried out an extensive exercise contained in a report “African Aviation Training Roadmap – 2019” with recommendations for specific actions. No further work was done in that direction in this report.

15.2 Most of the actions required in the roadmap have not been verified in this report, except that the recommendation to “Develop a Database” has not been done due financial challenges.

15.3 Summary of the African Aviation Training Roadmap

15.3.1 The role of personnel qualification and training is recognized to be crucial to reach the safety and security targets and thus endow States with necessary tools to build solid Human Resource capacity to sustain the industry growth.

15.3.2 During its 16th meeting, which was held in Montréal, Canada, on 26 November 2015, the steering committee of the AFI Plan decided that "AATO is to continue, with the support of ICAO and partners such as Singapore, EASA, FAA etc., the development of the Training Roadmap for Africa and report on progress at the next SC meeting" (SC16/Rec12).

15.3.3 AATO conducted two training needs surveys in 2014 and 2015. Additionally, results of similar surveys from Singapore Aviation Academy and East African School of Aviation were used to prepare the aviation training roadmap. In developing the Roadmap, the first meeting was held at EASA. This meeting identified an itinerary of aviation courses, including basic, specialisation and advanced. The meeting also identified the immediate, medium and long-term areas of aviation training interventions in line with the TNA.

15.3.4 The draft roadmap was presented to the AFI Plan steering committee during its 18th meeting held in Montréal, Canada, on 30 November 2016. The steering committee "requested the organization to coordinate its review with the AFI Plan Secretariat, GAT, AFCAC and Partners, for finalization and submission to the SC/19 meeting in May 2017" (SC18/Rec06a). The 11th AATO Council decided that the draft roadmap be shared with aviation training stakeholders.

15.3.5 AATO collaborated with the ICAO ESAF Office to convene a stakeholder meeting back-to-back with the 4th ICAO Global Aviation Training Symposium in Addis Ababa on 10 April 2017.

15.3.6 The meeting adopted a model for roadmap development and other concepts such as the one proposed by FAA.

15.3.7 The *African Aviation Training Roadmap* is a strategic document that outlines the human resource requirements for States to achieve their national objectives in air transportation. The outcomes of the roadmap are related to the resolution of performance problems identified in State's audit reports or expected performance problems identified through gap analysis. It also identifies national education and training institutions that contribute to meeting training needs by naming existing programs offered by ATOs and eventually other institutions that offer aviation training.

15.3.8 Chapter 8 of the (draft) report defines the key outputs; key actions; timelines; resources; and actors in the roadmap implementation. The actions categorized into three different time spans, i.e. short term (1 to 5 years), medium term (5 to 10 years) and long term (10 to 20 years).

15.3.9 The report also contains important data in its annexes, i.e. a list of training organizations in Africa (Appendix A), a list of standardized training packages (STPs), ICAO Training Packages (ITPs) and other standardized courses (Appendix B), actual training needs (Appendix C) and an instructors database (Appendix D).

15.3.10 It was recommended in the "Actions" to develop a database by Dec 2019.

16. SWOT/PEST ANALYSIS SUMMARY

16.1 WACAF

Strengths	Weaknesses
d) No SSC e) 5/24 States achieved GASP Target of 75% EI f) 9/24 States reached world average of 67.6% EI g) 19/24 States at 100% PBN Implementation	a) 10/24 States below 60% EI b) 6/24 States below 30% EI c) Weak performance in CE-6 in OPS, ANS and PEL d) 0/24 States State achieved SSP Implementation Level 4 e) Staffing gaps in SO-A (AGA, ANS, AIG, OPS, AIR, PEL), SO-B (AOP, CNS, ATM/SAR, PANS-OPS, MET, AIM/CHART), SO-C (FAL, SEC) and SO-D and E (AT, ENV, LEG) f) Unsatisfactory aerodrome certification g) Most CAAs underfunded and under-resourced
Opportunities	**Threats**
a) GSI courses available for CE-6 in OPS, PEL and AIR b) COVID-19 pandemic threat has reduced and economies opening up c) High mobile telephone penetration d) Exceptional natural mineral resources[18] among some States e) Great production of industrial crops and food among some States f) Demographic dividend expected by 2035, when young and growing labour force will have fewer children	a) No GSI courses available for CE-6 in ANS, CE-7 and CE-8[19] b) Political instability and uncertainty, particularly in West Africa c) Longest road transportation times for travel between countries and some of the highest travel costs per kilometre in the world d) High rate of unemployment, poverty and limited spending capacity e) Low national GDPs f) Rising public debts (Congo, Gabon, Ghana, Guinea-Bissau, Sierra Leone and Togo have a debt-to-GDP ratio of over 70%) and deteriorating exchange rate of national currencies g) Insufficient supply of reliable and affordable power (electricity) h) Limited ICT deployment in several States i) Limited and expensive broadband internet connectivity j) COVID-19 pandemic depressed the economies of all States in 2020, leading to GDP growth contraction

[18] E.g. cobalt, copper, gold, diamonds, hydropower potential, significant arable land and immense biodiversity.
[19] Resolution of safety concerns

16.2 **ESAF**

Strengths	Weaknesses
a) No SSC b) 6/24 States achieved GASP Target of 75% EI c) 7/24 States reached world average of 67.6% EI d) 15/24 States at 100% PBN Implementation e) 1/24 States achieved SSP Implementation Level 4 f) Strong RSOO, which enables harmonized procedures and regulations g) Well established regional ATOs (ATNS, EASA), which enables ease of training of aviation staff	a) 12/24 States below 60% EI b) 2/24 States below 30% EI c) Weak performance in CE-6 in OPS, ANS and PEL d) 1/24 States achieved SSP Implementation Level 4 e) Staffing gaps in SO-A (AGA, ANS, AIG, OPS, AIR and PEL), SO-B (AOP, CNS, ATM/SAR, PANS-OPS, MET, AIM/CHART), SO-C (FAL, SEC) and SO-D and E (AT, ENV, LEG) f) Unsatisfactory aerodrome certification g) Most CAAs underfunded and under-resourced
Opportunities	**Threats**
a) GSI courses available for CE-6 in OPS, PEL and AIR b) COVID-19 pandemic threat has reduced and economies opening up c) High mobile telephone penetration d) Strong conscious strides in ICT among some States e) Increasing development of renewable energy f) Several States have ongoing TNAs supported by international organisations g) Exceptional natural mineral resources[19] among States h) Great production of industrial crops and food among some States i) Demographic dividend expected by 2035, when young and growing labour force will have fewer children	a) No GSI courses available for CE-6 in ANS, CE-7 and CE-8 b) Political instability and uncertainty among several States c) High rate of unemployment, poverty and limited spending capacity d) Low national GDPs e) Drought, locust infestation, floods natural challenges in the region f) Rising public debts (Angola, Eritrea, Kenya, Mozambique, South Africa and Zambia have a debt-to-GDP ratio of more than 70%) and deteriorating exchange rate of national currencies g) Insufficient supply of reliable and affordable power (electricity) h) Limited ICT deployment in several States i) Limited and expensive broadband internet connectivity j) COVID-19 pandemic depressed the economies of all States in 2020, leading to GDP growth contraction k) Too many unapproved ATOs in the region: risk of inadequately trained personnel, lack of harmonised syllabus

16.3 **AFI-EUR**

Strengths	Weaknesses
a) No SSC b) 2/3 States achieved target of 60% EI	a) 0/3 States achieved GASP Target of 75% EI b) 1/3 States below target of 60% EI c) 0/3 States at 100% PBN Implementation d) Weak performance in CE-6 in AGA, OPS and PEL e) 0/24 States achieved SSP Implementation Level 4 f) No data for staffing gaps in SO-A, SO-B, SO-C and SO-D in AGA, ANS, AIG, OPS, AIR and PEL
Opportunities	**Threats**
a) GSI courses available for CE-6 in OPS, PEL and AIR b) COVID-19 pandemic threat has reduced and economies opening up c) High mobile telephone penetration d) 2/3 States are oil producers e) 3/3 States are high tourism destinations f) Exceptional natural mineral resources[20] g) Relative stability among the States h) Modest national GDP i) Relative sufficient supply of reliable and affordable power (electricity) j) Good ICT development k) Great production of industrial crops and food among the States[21] l) Demographic dividend expected by 2035, when young and growing labour force will have fewer children	a) No GSI courses available for CE-6 in ANS, CE-7 and CE-8 b) Limited and expensive broadband internet connectivity c) COVID-19 pandemic depressed the economies of all States in 2020, leading to GDP growth contraction

[20] E.g.: iron, zinc, lead, copper, fluorine, silver, manganese, salt, cobalt and gold in Morocco; phosphates, petroleum, zinc, lead and iron ore in Tunisia; and iron, zinc, lead, copper, fluorine, silver, manganese, salt, cobalt and gold in Morocco

[21] Wheat and barley, olives, dates and fresh citrus fruits; potatoes, oats, grapes and figs

16.4 **AFI-MID**

Strengths	Weaknesses
a) No SSC b) 1/3 States achieved GASP Target of 75% EI c) 2/3 States achieved target of 60% EI d) 2/3 States achieved 100% PBN Implementation	a) 1/3 States below target of 60% EI b) Weak performance in CE-6 in OPS, AGA and ANS, in that order c) 0/3 States achieved SSP Implementation Level 4 d) No data for staffing gaps in SO-A, SO-B, SO-C and SO-D in AGA, ANS, AIG, OPS, AIR and PEL e) Sudan and Libya expected to have funding challenges for the CAA
Opportunities	**Threats**
a) GSI courses available for CE-6 in OPS, PEL and AIR b) COVID-19 pandemic threat has reduced and economies opening up c) High mobile telephone penetration d) Exceptional natural mineral resources[22] e) Great production of industrial crops and food among some States[23] f) Demographic dividend expected by 2035, when young and growing labour force will have fewer children	a) No GSI courses available for CE-6 in ANS, CE-7 and CE-8 b) Political instability and uncertainty in Libya and Sudan c) High rate of unemployment, poverty and limited spending capacity in Libya and Sudan d) Low national GDP for Libya and Sudan e) Insufficient supply of reliable and affordable power (electricity) in Libya and Sudan f) Limited ICT deployment Libya and Sudan g) Limited and expensive broadband internet connectivity h) COVID-19 pandemic depressed the economies of all States in 2020, leading to GDP growth contraction

[22] E.g. petroleum and deposits of gold, iron ore, silver, copper, tungsten, mica, chromium ore and zinc in Sudan; gold, copper, silver, zinc, platinum and several other precious and base metals in Egypt; and clay, cement, salt and limestone in Libya.

[23] E.g. potatoes, cotton, fresh fruit, primarily citrus peanuts (groundnuts), sesame, Gum Arabic, sorghum, sugarcane, wheat, barley, olives, dates, citrus, vegetables, peanuts, soybeans and cattle