



**AFRICAN AVIATION
TRANSFORMED**

CAPACITY BUILDING WORKSHOP ON AVIATION DATA

13 – 16 May – Dakar, Senegal



**Understanding
aviation data**





AFRICAN AVIATION IN FIGURES

World Population 2023
(million)



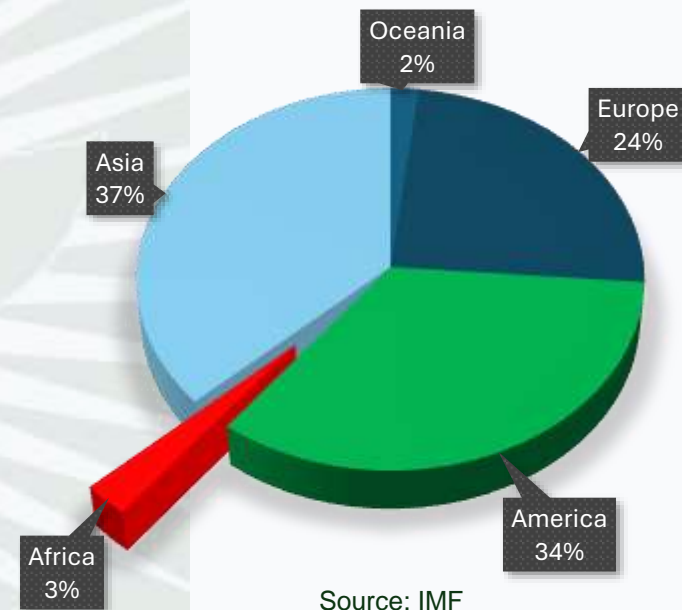
Source: Worldometer

GDP per Capita 2023
(\$US)



Source: IMF

World GDP 2023



Source: IMF



AFRICAN AVIATION IN FIGURES

5.7%

Annual growth in Africa
Forecasted in 2004 by
Boeing

COVID-19

The pandemic
hits global
aviation,
particularly
Africa

2006

2020

2023

2.3%

Contribution of
Africa in global
traffic

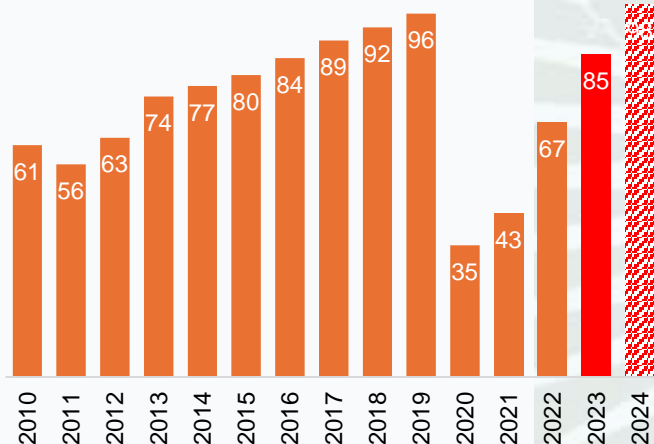
2.1%

Contribution of
Africa in global
traffic



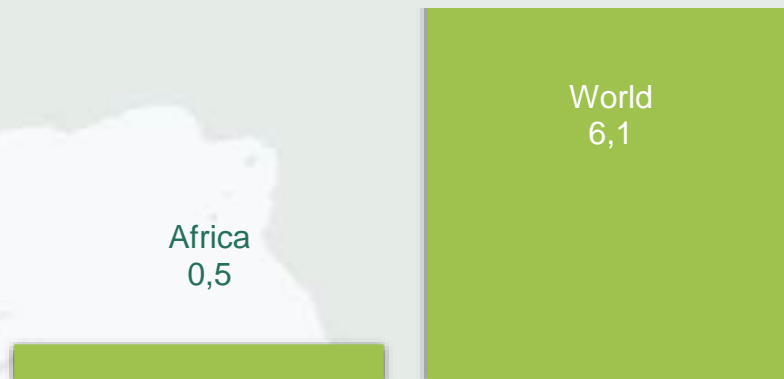
AFRICAN AVIATION IN FIGURES

African airlines Traffic
2010 – 2024
(Million PAX)



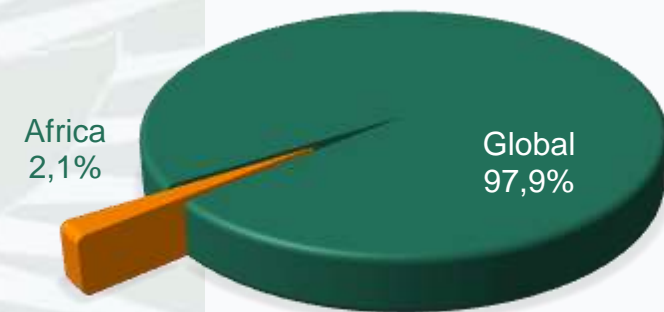
Source: AFRAA

Profit per passenger 2023
(\$US)



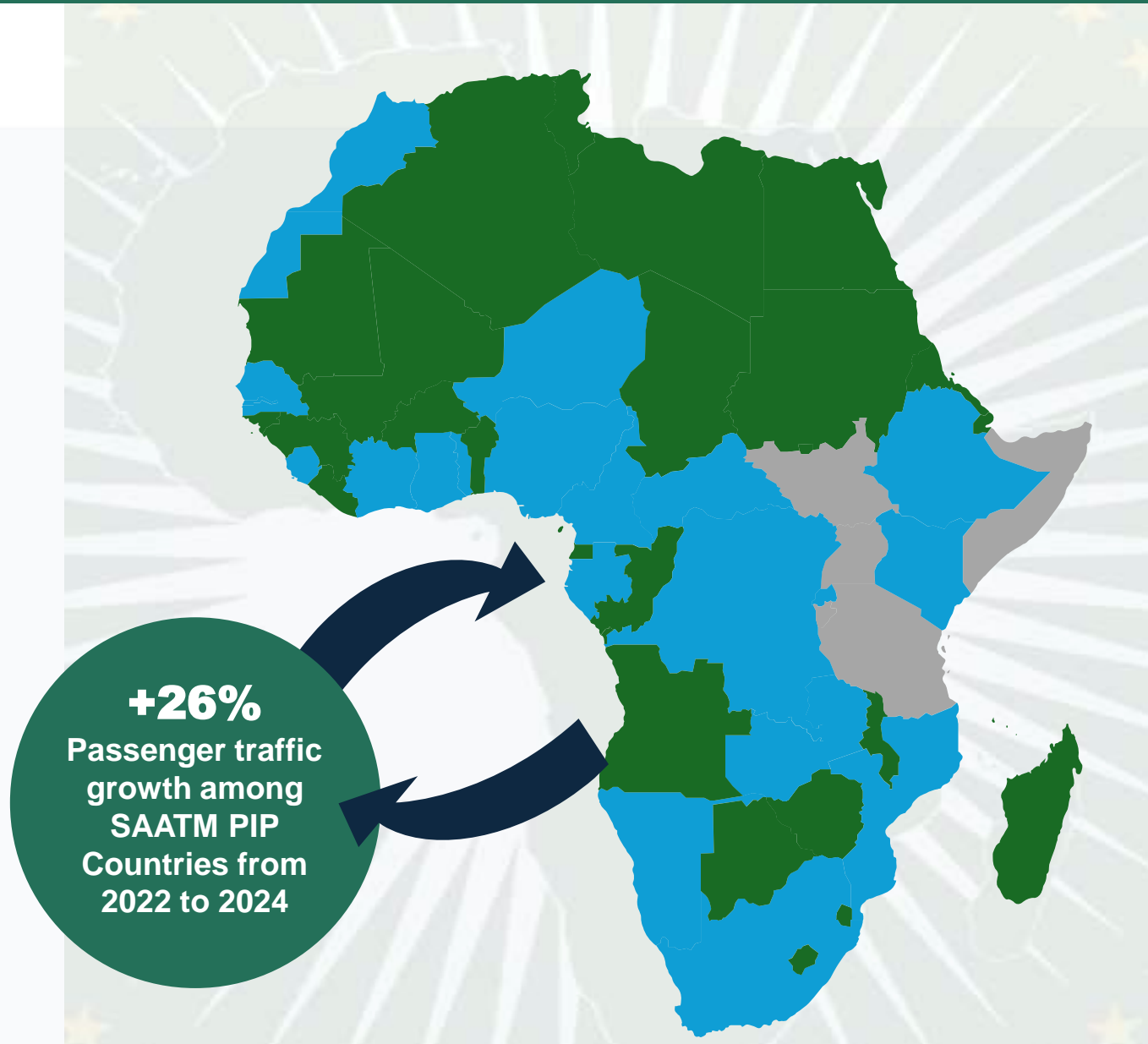
Source: IATA

African airlines
contribution 2023



Source: IATA

AFRICAN AVIATION IN FIGURES





AVIATION DATA

Aviation data refers to the collection, analysis, and utilization of information related to air travel, aircraft operations, airport activities, and regulatory compliance.

It encompasses a broad and dynamic field that underpins nearly every aspect of the air transportation industry. It consists of structured and unstructured information collected from various sources, including aircraft systems, air traffic control, airport operations, passenger records, and regulatory reports

Governments, airlines, airports, and aviation authorities rely on this data to enhance operational efficiency, ensure regulatory compliance, and support economic and environmental planning.

EVOLUTION OF THE USE OF DATA IN AVIATION



The evolution of data in aviation has moved from basic instruments and manual calculations to sophisticated digital systems and data analytics.

Early aviation relied on analogue instruments and manual flight planning, while modern aviation leverages digital data transfer, advanced algorithms, and interconnected networks.

Areas that have been impacted are various: safety & maintenance, operations, customer experience, crew management, cost management, inventory and revenue management, strategic planning, etc.



KEY SOURCES OF DATA IN AVIATION

Aviation data originates from multiple sources, each playing a crucial role in operational efficiency, regulatory compliance, safety monitoring, and industry advancements.

Among the key sources are:

- Aircraft Systems & Onboard Sensors.
- Air Traffic Control (ATC) & Surveillance Systems
- Meteorological Data Providers
- Airlines & Airports
- Passenger Behaviour & Market Research
- Regulatory & Government Agencies
- Etc.

Why is data crucial in modern aviation?



DATA DRIVEN AVIATION

A Shared Ecosystem

Data-driven decision-making isn't just a regulatory advantage; it's the cornerstone of a modern, efficient, and safe aviation ecosystem that benefits everyone. When data flows freely and insights are shared, the entire industry benefits.

➤ Airlines:

- Airlines rely on data to optimize flight routes and fleet, reduce fuel consumption, and improve on-time performance.
- Predictive analytics help forecast passenger demand, enabling better resource allocation and cost management.
- Flight data management helps enhance safety, enabling proactive maintenance and risk mitigation

➤ Airports:

- Airports utilize predictive analytics to optimize security processes, check-in counters, and baggage handling, reducing passenger wait times.
- AI-driven air traffic monitoring enables smarter gate assignments and runway sequencing, improving efficiency.
- Automated baggage tracking with RFID and AI logistics minimizes errors and enhances real-time tracking for passengers.



DATA DRIVEN AVIATION

➤ **Air Navigation Service Providers:**

- Air navigation service providers utilize aviation data to optimize airspace efficiency, reducing congestion and improving overall flight coordination.
- Implementing data-driven safety nets and alerts enhances operational safety and mitigates potential risks.
- Predictive maintenance strategies help optimize schedules for critical equipment, ensuring seamless performance and minimizing disruptions

➤ **Manufacturers:**

- Aircraft manufacturers leverage real-world aviation data to develop safer and more reliable aircraft designs, incorporating insights from operational trends and flight performance.
- Predictive maintenance recommendations are provided to operators, enabling proactive servicing and reducing unexpected mechanical failures.
- Continuous monitoring of aircraft performance allows manufacturers to identify areas for improvement, refining future models for efficiency and reliability.



DATA DRIVEN AVIATION

➤ **Governments:**

- Air navigation service providers utilize aviation data to optimize airspace efficiency, reducing congestion and improving overall flight coordination.
- By implementing data-driven safety nets and alerts, they enhance operational safety and mitigate potential risks.
- Predictive maintenance strategies help optimize schedules for critical equipment, ensuring seamless performance and minimizing disruptions



DATA DRIVEN AVIATION

**What about Civil Aviation
Authorities ?**



DATA FOR CAA'S

Enhanced Safety oversight

Data analysis enables proactive identification and mitigation of safety risks, surpassing reactive approaches.

- **Predictive Risk Analysis:** Identify patterns and trends that signal potential hazards before they lead to incidents.
- **Targeted audits and inspections:** Focus inspections, audits, and enforcement actions on areas of highest risk.
- **Continuous Monitoring of key safety indicators:** Track key safety indicators to detect emerging problems and assess the effectiveness of interventions.
- **Trend identification for proactive safety measures:** Analyzing data allows CAAs to identify safety trends and emerging risks, enabling them to take proactive measures to prevent accidents and incidents.



DATA FOR CAA's

Optimizing Regulatory Effectiveness

Data informs the development, refinement, and enforcement of regulations, ensuring they are evidence-based and proportionate to the risks.

- **Impact Assessment:** Evaluate the effectiveness of existing regulations in achieving their intended outcomes.
- **Gap Analysis:** Identify areas where regulatory coverage is lacking or needs strengthening.
- **Evidence-Based Rulemaking:** Develop new regulations based on solid data and analysis, rather than anecdotal evidence.
- **Harmonization Efforts:** Using data to identify areas where regulations can be aligned with international standards.

DATA FOR CAA's

Strategic Resource Allocation

Data-driven insights enable CAAs to allocate resources more efficiently, maximizing their impact on safety and efficiency.

- **Prioritize Inspections:** Focus inspection efforts on operators and areas with the highest risk profiles.
- **Target Training:** Direct training resources to address identified skill gaps and knowledge deficiencies.
- **Streamline Processes:** Identify and eliminate inefficiencies in administrative and regulatory processes.
- **Focus resources:** By identifying areas of highest risk, CAAs can allocate resources more efficiently, maximizing their impact on safety and efficiency.



DATA IN AVIATION

Any addition?

What are the current challenges in Data Collection and Submission?



CHALLENGES IN DATA GATHERING

➤ **Fragmentation Across Multiple Sources**

Aviation data comes from diverse entities using different formats, technologies, and reporting systems.

➤ **Resistance from Airlines and Airports to share data**

Many industry players hesitate to share operational data due to competitive concerns, financial interests, or regulatory scrutiny.

➤ **Limited Data Accessibility & Infrastructure Issues**

Some aeronautical data is difficult to access due to outdated storage systems or restricted access policies.

➤ **Lack of Unified Global Data-Sharing Agreements**

Aviation data governance differs across countries, meaning CAAs often face regulatory challenges when collecting information from international carriers.



CHALLENGES IN DATA GATHERING AND RELIABILITY

➤ **Manual data collection processes and human errors**

Many aviation records rely on manual entry, increasing the likelihood of mistakes. Incorrect reporting can lead to miscalculations.

➤ **Variability in data collection standards**

Airlines, airports, and civil aviation authorities use different metrics, formats, and collection processes, resulting in data inconsistencies.

➤ **Lack of automation**

Aviation data management systems rarely include AI-driven validation tools to automatically flag discrepancies, detect anomalies, or correct errors in real time.



CHALLENGES IN DATA GATHERING AND RELIABILITY

➤ **Outdated or incomplete historical data**

Long-term aviation data is necessary for trend analysis and forecasting, yet many databases contain gaps due to missing reports, poor record-keeping, or lack of digital archives

➤ **Challenges in ICAO statistic form submissions**

ICAO mandates the use of Statistic Forms to ensure standardized aviation data collection. However, airlines and airports frequently submit incomplete or delayed reports, making global aviation safety analysis difficult.

➤ **Data Fragmentation Across Multiple Sources**

Aviation data is collected by airlines, airports, air navigation service providers, and regulators, but these entities often use different formats and systems. The lack of standardization leads to data silos, making it difficult to compile accurate industry-wide insights

CHALLENGES IN DATA ANALYSIS AND DISSEMINATION

➤ **Lack of advanced analytical tools and expertise**

The technical capacity for aviation data analysis remains underdeveloped. Access to AI-driven analytics, predictive modelling, and automated risk assessment platforms is sometimes difficult.

➤ **Slow Dissemination of Safety & Performance Data**

Even when aviation data is collected, the dissemination process is inefficient, limiting how quickly stakeholders receive critical safety alerts and performance updates.

➤ **Infrastructure & Connectivity Limitations**

Aviation data analysis depends on strong digital infrastructure, yet many African states have limited access to real-time data processing tools, cloud storage, and aviation data networks.



DATA IN AVIATION

What challenges do you experience?

CONCLUSION



KEY TAKE AWAYS

Aviation data plays a crucial role in safety oversight, regulatory effectiveness, and industry operations. Reliable data improves risk management, resource allocation, and strategic planning across airlines, airports, and civil aviation authorities.

Using data for predictive analytics, operational efficiency, and safety monitoring ensures aviation stakeholders make informed, proactive decisions rather than relying on outdated practices or reactive responses.

The current challenges regarding aviation data include:

- **Data Fragmentation:** Multiple stakeholders use different systems, leading to inconsistencies.
- **Reliability Issues:** Manual reporting errors, outdated submission methods, and incomplete ICAO Statistic Forms.
- **Storage & Privacy Concerns:** Cybersecurity risks, regulatory compliance with international data protection laws, and accessibility challenges.
- **Data Analysis & Dissemination Barriers:** Limited analytical expertise, lack of real-time sharing mechanisms, and infrastructure constraints.



MOVING FORWARD

It is necessary to collectively strengthen data-related practices, by:

- Standardized data collection & Sharing: unified reporting frameworks and ICAO-compliant digital platforms for accuracy and transparency.
- Automated data processing: automated validation tools to enhance reliability and minimize errors.
- Secure & Scalable Storage Solutions: implementing cloud-based encrypted storage for cybersecurity and accessibility.
- Regional and global collaboration: strengthening partnerships to facilitate cross-border aviation data sharing and harmonization.
- Investments in digital infrastructure and analytics training: ensuring African aviation stakeholders have access to modern tools and expertise.

**Robust, accessible, and secure data will contribute to the development of aviation in Africa.
Strengthening collaboration, innovation, and regulatory frameworks will drive the industry forward.**

THANK YOU!
MERCI



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