

Project Summary

AMDAR (Aircraft Meteorological Data Relay)

Introduction

The AMDAR Programme for Kenya was a partnership between WMO, Kenya Meteorological Department (KMD) and Kenya Airways (KQ) for the establishment and operation of a meteorological observing programme facilitating the automated reporting of meteorological atmospheric information from a fleet of aircraft.

The programme used the aircraft's existing sensors, avionics and telecommunications system to gather, process and disseminate data that was used directly to improve the accuracy of weather forecasting services and applications. Information on the following parameters was collected at all phases of flight as standard: Altitude (pressure derived), Wind speed, Temperature and Wind direction.

Supported by:



Fund Manager:



Purpose

The main goal of the programme was to improve sector specific products and services in various economic sectors, (i.e., agriculture, health, DRR, climate change, etc.), in particular the aviation sector, and their use at the national, regional and international levels, through the increased availability and use of AMDAR data.

The goal (impact) was achieved through a range of activities aimed at:

- equipping the Kenya Airways (KQ) fleet with AMDAR capability to generate upper air data over Kenya and Africa and KQ making use of the resulting improved and new KMD services and products;
- enabling KMD to receive, process and utilise AMDAR data to improve their services and products;
- increasing AMDAR observations on the WMO Global Telecommunications System (GTS); and
- improving and optimising KQ flight operations procedures leading to reduced fuel use and reduced environmental impact.

Project activities and achievements

Upgraded capacity to process and integrate AMDAR data into existing data sets through the development of the in-house Kenya AMDAR Data Processing System (K-ADPS) at Kenya Meteorological Department. The K-ADPS consisting of 2 new servers and bespoke software is fully operational and is enabled to receive raw AMDAR data, process, perform quality control and transmit on the WMO GTS.

2017 Knowledge Sharing Visits by KMD and KQ to South African Airways and South Africa Weather Services (SAWS). The visits provided an opportunity for the KQ and KMD AMDAR teams to learn from the experiences of the public-private partnership between SAWS and SAA with regards to implementing the AMDAR program as well as to seek advice and get ideas on strategies and plans for implementing AMDAR, in particular co-identification and development of products and services.

2018 Naivasha Stakeholder Workshop for scoping and co-development of new products to support improved flight operations and for improvement of existing forecasts and products at KMD. There was a strong representation by KQ and KMD, as well as the Ministry of Environment and Forestry, Kenya Civil aviation Authority and Kenya Airports Authority. 18 key recommendations were identified to be further co-developed by working groups.

Analysis Report on the requirements of AMDAR Data use by KMD Forecast Systems and Applications and Improvement in KQ Flight Operations. Several products and applications were co-identified, including assimilation of AMDAR data into the operational WRF NWP model at KMD, development of an AMDAR and NWP

Supported by:

Fund Manager:



Products Display System, capacity building for KMD forecasters and ICT personnel in AMDAR data use and improvement of electronic communication between KQ and KMD.

Implementation Plan on AMDAR Data use by KMD Forecast Systems and Applications. The plan outlines 3 products/applications to be developed/upgraded based on the recommendations from the Analysis report, which includes:

1. Improvements to NWP System and Related Applications
2. AMDAR and NWP Products Display System
3. Enhancement of Aviation Information Sharing and Communications

2021 Mombasa AMDAR Implementation Training Workshop (8-10 March 2021). Over 30 KMD and KQ staff received theoretical training from regional and international experts. Training included: AMDAR data for NWP models and products, introduction to AMDAR aviation products, benefit to users, Integration of AMDAR data into existing KMD infrastructure and applications, including the Numerical Weather Prediction (NWP) system.

Monitoring and Evaluation Consultant was engaged to support the impact assessment of AMDAR data use and availability at KMD for improved forecasts and services and also at KQ to improve flight operational efficiency. The consultant developed a MEL plan and methodologies for data collection and assessment in order to measure results against the outcome and output indicators presented in the project logframe.

Successful upgrade, implementation and testing of AMDAR software in KQ Aircraft and provision of AMDAR data to KMD: 7 B737 aircrafts have been loaded with AMDAR software. At present 2 aircraft are operational and successfully reporting AMDAR data which is being processed to GTS. At present these aircraft are averaging 2/3 flights per day. The limited number of aircrafts are resulting in roughly 4500 new high quality upper air observations profiles per month (4449 for February 2021).

Conclusion

While the project did not meet all of its targets regarding the application of AMDAR software on all aircraft, and a limited number of AMDAR observations on the GTS, it did provide benefits to KQ and KMD through enhancements to institutional understanding of AMDAR availability and use. Namely, its potential to improve forecast accuracy with resultant downstream social and environmental benefits for participating organizations, countries, and regions. At the national level, AMDAR-enabled reporting allows public, private and civil society organizations to plan and

Supported by:

Fund Manager:



respond more reliably to impacts of weather-related events. In rural Africa alone, it is estimated that over 700 million poor people are negatively impacted by the lack of reliable weather information.

Thus, AMDAR-enabled weather reporting presents significant opportunities and benefits to:

	Accurate and frequent meteorological data reporting	Improved nowcasting and forecasting
Hydrological and Meteorological organisations	Provides low-cost, high-quality data 10 times cheaper than traditional methods	Reduces the forecast error of Numerical Weather Prediction models by 20%
Airports	Optimises departure and arrival management decision-making	On-line flight plan updating and altitude change procedures
Government (Disaster Risk Reduction)	Provides reliable data used in trend analysis, disaster prediction and management	Enables emergency management and response team to be put in place
Agricultural Sector	Enhances routine crop timing via climatology and ongoing soil moisture monitoring and phenology	Optimises timing of fertilizer application and pest and disease control Improves drought monitoring
Climatology and Environment Sector	Provides much needed data and insight into current climate trends in the data-sparse regions	
Utilities and Hydro		Provides timely demand forecasting across key consumer segments (e.g. agriculture)

Supported by:

Fund Manager:

