

**61ST CONFERENCE OF
DIRECTORS GENERAL OF CIVIL AVIATION
ASIA AND PACIFIC REGION**

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AGENDA ITEM 3: AVIATION SAFETY

**UTILIZATION OF ARTIFICIAL INTELLIGENCE TO
STRENGTHEN AVIATION SAFETY OVERSIGHT SYSTEM AND
PASSENGER EXPERIENCE**

(Presented by Bangladesh)

SUMMARY

This paper examines how Artificial Intelligence (AI) can be utilized to strengthen the aviation safety oversight systems of civil aviation authorities and to enhance the passenger experience across the Asia and Pacific Region. It reviews global trends in AI adoption in civil aviation, presents practical applications of AI in risk-based safety surveillance, predictive safety analytics and airport/airline passenger facilitation and discusses the associated challenges of data governance, cybersecurity, algorithmic transparency, workforce capacity and financing, particularly for developing States. Drawing on Bangladesh's ongoing digital transformation of its civil aviation sector, including practical lessons from the deployment of automated border-control e-gates, the paper puts forward a set of recommendations for regional cooperation, capacity-building and a harmonized, risk-based regulatory approach to AI.

UTILIZATION OF ARTIFICIAL INTELLIGENCE TO STRENGTHEN AVIATION SAFETY OVERSIGHT SYSTEM AND PASSENGER EXPERIENCE

1. INTRODUCTION

1.1 Aviation in the Asia and Pacific Region continues to grow rapidly, and traffic is expected to expand significantly over the next decade. This growth places increasing demands on civil aviation authorities (CAAs) to perform safety oversight, surveillance and certification functions with greater efficiency, while airports and airlines are simultaneously expected to deliver faster, safer and more seamless passenger journeys. Traditional, largely manual approaches to oversight and passenger processing are increasingly challenged by this scale and pace of growth.

1.2 Artificial Intelligence (AI), including machine learning, computer vision and natural language processing, is being adopted across the aviation industry at a fast pace. The global AI in aviation market was valued at approximately USD 7.45 billion in 2025 and is projected to grow at a compound annual growth rate of around 19-20 per cent over the following decade, with flight operations, air traffic management and passenger services among the fastest-growing areas of application. This reflects a broader recognition that AI can help States and industry do more with limited resources, provided it is implemented responsibly.

1.3 The purpose of this paper is to examine practical opportunities for the use of AI to strengthen aviation safety oversight systems and to enhance the passenger experience, to highlight the associated risks and implementation challenges and to share Bangladesh's perspective and proposals, drawn in part from its own ongoing digital transformation experience, for consideration by the Conference.

2. DISCUSSION

2.1 Machine learning is currently the leading AI technology applied in aviation, valued for its ability to detect patterns in large volumes of operational and safety data, while flight operations, air traffic management and airport/passenger services are among the largest and fastest-growing areas of application. Asia-Pacific States are increasingly exposed to these technologies through airline, airport and air navigation service provider partnerships with global technology vendors, even where the State's own regulatory or oversight capacity has not yet caught up.

AI in support of safety oversight.

2.2 AI offers several practical applications that can directly strengthen a CAA's safety oversight system, including:

- a) Predictive safety analytics – mining flight data monitoring (FDM), mandatory occurrence reports and Safety Management System (SMS) databases to identify emerging risk trends before they result in an incident or accident;
- b) Risk-based surveillance – using AI-derived risk scores for operators, aerodromes and service providers to prioritize inspections and allocate limited inspector resources more effectively;
- c) Computer-vision applications – automated detection of runway incursions, foreign object debris (FOD), apron/ramp safety deviations and wildlife hazards using existing airport camera networks;
- d) Air traffic management decision-support – conflict prediction, traffic-flow optimization and workload-balancing tools that assist air traffic controllers; and
- e) Fatigue risk management – AI-assisted rostering and fatigue-modelling tools for flight crew and air traffic controllers.

AI in support of passenger experience

- 2.3 AI is equally being used to enhance the end-to-end passenger journey, including:
- a) Biometric, single-token identity processing (such as “One ID” style journeys) that allow a passenger to move through check-in, security and boarding using a single facial or biometric verification, reducing processing time and queuing;
 - b) AI-powered virtual assistants and chatbots providing passengers with real-time flight information, self-service rebooking and personalized travel notifications;
 - c) Predictive queue and resource management, whereby airports forecast passenger flow and dynamically allocate check-in counters, security lanes and staff;
 - d) AI-based baggage tracking and mishandling prediction; and
 - e) Automated disruption management, including AI tools that identify flexible passengers on high-demand flights and proactively rebook them

Bangladesh context and lessons learned

2.4 Bangladesh has begun a phased digital transformation of its safety and facilitation systems, having installed 44 biometric e-gates across the country’s airports and land ports (26 at Hazrat Shahjalal International Airport). As these e-gates currently verify only biometric passport data and are not yet integrated with visa and flight-manifest information, this shows that AI/automation investments deliver their full benefit only when paired with integrated data-sharing arrangements, systems engineering, staff training and change management built in from the design stage.

2.5 A number of Bangladeshi air operators are also leveraging AI to enhance the efficiency and reliability of their operational and maintenance functions. AI-enabled systems are being used to analyze aircraft health data, predict component failures, optimize maintenance schedules, and support the execution of Aircraft Maintenance Programmes through predictive and condition-based maintenance. In addition, AI supports Operational Control System functions by improving flight planning, fuel management, crew scheduling, and disruption management, while advanced data analytics enable continuous monitoring of operational performance, safety indicators, and aircraft systems, facilitating proactive decision-making and improved operational resilience.

The case for regional cooperation.

2.6 The development of Artificial Intelligence (AI) systems for aviation safety oversight requires substantial investment in digital infrastructure, data management systems, and specialized human resources. According to ICAO, more than 70% of APAC States are developing countries with varying levels of technological maturity and limited resources. Through regional cooperation mechanisms such as the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG), States can share AI platforms, jointly develop common toolkits, and reduce duplication of investment, thereby making AI adoption more affordable and accessible.

2.7 The aviation sector faces a significant shortage of skilled professionals in data analytics, AI, and cybersecurity. The global aviation industry is projected to require over 1.3 million new aviation professionals by 2043, including specialists in emerging technologies and digital systems. By establishing regional cooperation frameworks, States can share expertise, develop common training programmes and exchange safety data and lessons learned. It can improve predictive safety oversight, identify emerging risks earlier, and strengthen the implementation of the principles of SSP and SMS throughout the Asia and Pacific Region.

BANGLADESH'S PROPOSALS: REGULATORY REFORM AND ASIA-PACIFIC REGIONAL CAPACITY BUILDING.

2.8 Recognizing that the growing use of AI by aircraft operators, aerodromes, air navigation service providers and other aviation service providers is outpacing the regulatory frameworks of many civil aviation authorities, Bangladesh proposes that the Conference consider the following recommendations to regulate operators' utilization of AI and to build the regional regulatory capacity needed to oversee it:

- a) Require civil aviation authorities to establish a mandatory approval and certification framework under which operators must obtain regulatory approval before deploying AI-enabled systems in safety-critical or passenger-facing functions, based on a phased, risk-based classification of AI autonomy such as EASA's staged AI roadmap (Level 1 human assistance/augmentation, Level 2 human-AI collaboration, Level 3 advanced automation);
- b) Mandate that operators embed documented AI governance arrangements within their SMS, including human-in-the-loop oversight of safety-critical decisions, ongoing performance monitoring of AI models, data-quality assurance and periodic revalidation prior to continued use;
- c) Establish a regional Aviation Working Group specialized in AI, or an equivalent mechanism under RASG, to develop harmonized regulatory standards, model approval/certification criteria and inspector checklists for auditing operators' use of AI in safety oversight and passenger facilitation;
- d) Build regulatory capacity within civil aviation authorities of the Asia and Pacific Region through the extension of ICAO TRAINAIR PLUS so that inspectors are equipped to test, understand and audit operators' AI systems before and after approval;
- e) Promote common regional data standards and data-sharing arrangements between regulators and operators to enable cross-border regulatory oversight, benchmarking and audit of operators' AI systems at a regional scale; and
- f) Encourage States to require operators to embed AI regulatory compliance and data-integration planning into new airport and air navigation infrastructure projects at the design stage, rather than retrofitting these requirements afterwards.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to:

- a) note the information and analysis presented in this paper on the regulation of operators' utilization of Artificial Intelligence to strengthen aviation safety oversight systems and passenger experience;
- b) encourage Member States to establish a mandatory, phased and risk-based regulatory framework requiring operators to obtain approval for and to maintain documented AI-enabled governance systems;
- c) request the ICAO APAC Office to consider establishing a regional Aviation Working Group specialized in AI to develop harmonized regulatory standards and certification/approval criteria the oversight of operators' use of AI; and
- d) encourage States and ICAO to extend existing technical cooperation and training mechanisms to build the regulatory capacity of civil aviation authorities of developing States to approve, oversee and audit operators' use of AI.

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