



WORKING PAPER

**SEVENTH WORLDWIDE AIR TRANSPORT CONFERENCE
(ATCONF/7)**

Montréal, HQ, 16 to 20 November 2026

**Agenda Item 4: Emerging technologies, new business models and other associated aspects
4.1: Economic regulatory frameworks on emerging technologies**

**ENABLING SAFE AND SCALABLE UNMANNED AIRCRAFT SYSTEM
AND ADVANCED AIR MOBILITY OPERATIONS THROUGH
GLOBALLY HARMONIZED STANDARDS AND CRITERIA FOR
ENHANCED AIR CONNECTIVITY AND INCLUSIVE ECONOMIC
DEVELOPMENT**

(Presented by Indonesia)

EXECUTIVE SUMMARY

This paper highlights that Unmanned Aircraft Systems (UAS) and Advanced Air Mobility (AAM) are emerging as new dimensions of the air transport ecosystem with the potential to enhance connectivity, expand access to underserved communities and support inclusive economic development. As AAM moves from trials towards routine operations, its integration will require system-wide readiness, including airspace integration, infrastructure, safety oversight, information management and interoperability.

Regulatory fragmentation may increase compliance costs, constrain market access and hinder cross-border operations. Globally harmonized standards and criteria, progressively aligned with technological maturity and operational evidence, can provide a common foundation while preserving States' flexibility to address national circumstances. Economic viability, public acceptance and stakeholder confidence should also be considered in the development of the AAM ecosystem.

This paper highlights the value of operational evidence, regional cooperation and knowledge exchange in informing internationally relevant provisions. It proposes that the International Civil Aviation Organization (ICAO) and its Member States advance a progressive and evidence-based approach to AAM that supports interoperability, broader market access, enhanced air connectivity and inclusive economic development.

Action: The conference is invited to:

- a) encourage ICAO to facilitate the development of globally harmonized standards, criteria and guidance for AAM, progressively aligned with technological maturity, operational evidence and the need for interoperability;
- b) encourage Member States to share operational experience, regulatory approaches and evidence from trials, regulatory sandboxes and regional initiatives to support the development of internationally relevant provisions; and
- c) encourage continued international and regional cooperation to promote interoperable AAM operations, facilitate market access and economic viability, and support public confidence, enhanced air connectivity and inclusive economic development.

<i>Strategic Goals:</i>	This working paper relates to Strategic Goals: <i>The Economic Development of Air Transport Assures the Delivery of Economic Prosperity and Societal Well-Being for All; Aviation Delivers Seamless, Accessible and Reliable Mobility for All; and Every Flight is Safe and Secure.</i>
<i>Financial implications:</i>	None to ICAO at this stage
<i>References:</i>	Annex 6 – Operation of Aircraft, Part IV – International Operations – Remotely Piloted Aircraft Systems Annex 19 – Safety Management A42-WP/172 Revision No. 1 – <i>Asia-Pacific Reference Materials for Regulators to Facilitate Advanced Air Mobility</i> ICAO <i>Unmanned Aircraft Systems Traffic Management (UTM) – A Common Framework with Core Principles for Global Harmonization</i> . Edition 4

1. INTRODUCTION

1.1 The aviation sector is undergoing a significant transformation driven by rapid technological advancement, evolving operational concepts and changing mobility needs. Among these developments, unmanned aircraft systems (UAS) and advanced air mobility (AAM) are emerging as new dimensions of the air transport ecosystem, with the potential to support the movement of passengers and goods through innovative aircraft, new operational models and increasingly integrated physical and digital infrastructure. By complementing existing air transport networks, UAS and AAM could expand access to aviation and create new opportunities for connectivity, particularly for geographically dispersed and underserved communities.

1.2 As operations evolve from demonstrations towards routine and higher-volume services, the ability to integrate UAS and AAM safely with conventional aviation and other emerging airspace users will become increasingly important. This requires a holistic approach that considers UAS and AAM as part of the broader air transport and air navigation ecosystem rather than as standalone emerging technologies.

1.3 The emergence of these technologies also presents an opportunity to reconsider how aviation can contribute to connectivity and economic development. Improved access to air transportation can connect communities that are geographically dispersed or underserved by conventional transport infrastructure, while more flexible and efficient air mobility solutions may support economic activities, facilitate access to essential services, and strengthen the resilience of communities and supply chains.

1.4 For AAM to develop beyond isolated demonstrations and become a safe, scalable and interoperable component of the aviation system, a common and predictable regulatory environment will be essential. Differences in national requirements, operational approvals, safety methodologies, technical specifications, airspace access arrangements and information-sharing mechanisms could otherwise create barriers to interoperability and increase the complexity and cost of cross-border operations.

1.5 Accordingly, the development of globally harmonized standards and criteria, progressively aligned with the maturity of technologies and operational concepts, will be an important enabler for the safe and scalable development of AAM. Such harmonization should not imply a one-size-fits-all approach. Rather, it should establish common principles, performance expectations and interoperability requirements that allow States to facilitate AAM operations according to their respective national circumstances while maintaining a consistent level of safety and facilitating international interoperability.

1.6 As an archipelagic State with more than 17,000 islands, Indonesia considers that the development of AAM provides an opportunity for the International Civil Aviation Organization (ICAO) and its Member States to strengthen international cooperation and establish a common foundation for the future integration of AAM into the global aviation system, while ensuring that its benefits contribute to enhanced air connectivity and inclusive economic development.

2. DISCUSSION

2.1 Indonesia's experience in UAS operations provides a practical foundation for the progressive development of the UAS and AAM ecosystem. As of September 2026, Indonesia has issued 16,072 Remote Pilot Certificates, registered 9,200 UAS, and granted 2,370 operational approvals. Since 2019, Indonesia has also facilitated trials involving AAM and drone delivery, generating experience in flight authorization, airspace management and safety coordination.

2.2 Building on this experience, Indonesia has designated three regulatory sandbox locations at Budiarto Airport, Kertajati International Airport and Banyuwangi Airport. The sandboxes are intended to support testing, research, training, market assessment and industry collaboration under defined conditions. They provide a controlled environment to assess emerging operational concepts and generate evidence for the progressive development of regulatory and technical requirements.

2.3 The transition from trials to routine AAM operations requires a shift from technology readiness to system readiness. This encompasses aircraft certification and operational approval, safety oversight, airspace access, Air Traffic Management (ATM) integration, communications, navigation and surveillance (CNS), infrastructure, information management, cybersecurity, human capabilities and emergency arrangements. As operations increase in scale and complexity, these elements will need to evolve as an integrated ecosystem.

2.4 Effective integration will also require appropriate interfaces between AAM, UAS and the existing air navigation system. Increasingly diverse airspace users will require reliable arrangements for traffic coordination, information exchange, flight authorization, conformance monitoring and contingency management. Interoperability of systems and harmonization of procedures will therefore be important to support the progressive integration of emerging operations into the global air navigation system.

2.5 As AAM operations develop across jurisdictions, regulatory fragmentation could become a significant barrier to scalability. Divergent certification requirements, approval processes, safety methodologies and information-sharing arrangements may increase compliance costs, create regulatory uncertainty and complicate cross-border operations. Globally harmonized standards and criteria can provide a common foundation while allowing States sufficient flexibility to address national circumstances.

2.6 Harmonization should also contribute to market access and economic viability. Common and predictable requirements can reduce unnecessary duplication, facilitate investment and support the deployment of aircraft, infrastructure and services across multiple markets. This is particularly relevant to AAM business models, where commercial viability may depend on operational scale, network connectivity and access to more than one jurisdiction. ICAO's economic development objectives similarly emphasize connectivity, competitive business opportunities, market access and an economically viable aviation system.

2.7 At the same time, market development will depend on public acceptance and societal confidence. AAM operations, particularly in populated areas, may raise considerations relating to safety, noise, privacy, environmental impacts and equitable access. Transparent engagement with communities

and stakeholders, supported by demonstrable safety performance and appropriate safeguards, will therefore be important in building confidence and supporting the sustainable adoption of AAM.

2.8 The combined effect of these elements should ultimately be assessed against their contribution to enhanced air connectivity and inclusive economic development. AAM could complement existing transport networks by improving access to geographically dispersed and underserved communities and supporting the movement of passengers, goods and essential services. For archipelagic and geographically diverse States such as Indonesia, this potential is particularly relevant to healthcare, logistics, tourism, emergency response and other economic activities.

2.9 National regulatory sandboxes, operational demonstrations and regional cooperation can provide the evidence needed to support this development. Experience relating to safety performance, airspace integration, infrastructure, information exchange, operational economics and public acceptance can inform the progressive development of common principles and international provisions. This evidence-based approach can help avoid premature standardization while reducing the risk of divergent national frameworks. ICAO's innovation standardization approach similarly considers technological maturity and global suitability when determining the need and timing for international provisions.

2.10 In this context, ICAO has an important role in facilitating a common global foundation for the integration of AAM operations through international standards and guidance, capacity building and the exchange of operational experience. Continued international and regional cooperation may assist in translating national experience into globally relevant provisions and facilitate interoperability among States.

2.11 In this regard, the objective is to support a progressive pathway from national experimentation and operational evidence towards harmonized standards, interoperable systems, broader market access and sustainable AAM services. Such an approach would enable AAM to develop not as a separate aviation segment, but as an integrated component of the global air transport system that contributes to enhanced connectivity, economic opportunity and inclusive development.

3. CONCLUSION

3.1 The progressive development of AAM requires a common and predictable regulatory foundation. Globally harmonized standards and criteria, aligned with technological maturity and operational evidence, can facilitate system integration, interoperability and cross-border operations while allowing States to address national circumstances.

3.2 The integration of AAM operations into the air transport system should deliver tangible connectivity and economic benefits. Regulatory coherence can facilitate market access, investment and viable business models, while public confidence and stakeholder engagement are essential to sustainable adoption and inclusive access to AAM services.

3.3 Encourage ICAO to facilitate this transition through international standards and guidance, capacity building and cooperation among Member States. Building on national and regional experience, a progressive and evidence-based approach can support the integration of AAM into the global air transport system and contribute to enhanced connectivity and inclusive economic development.

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