ATConf/7-WP/220
19/11/26

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

DRAFT REPORT

(7 pages)

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4.1.1 DOCUMENTATION

4.1.1.1 In WP/8, the Secretariat examined how emerging technologies and cleaner aviation energies were reshaping air transport markets, business models and infrastructure needs. It highlighted the need for responsive and internationally harmonized economic regulatory frameworks to facilitate new entrants, investment and innovation, while ensuring equitable opportunities for States. The paper invited the Conference to recommend that States establish enabling economic frameworks and strengthen coordination across relevant authorities, and that the International Civil Aviation Organization (ICAO) continue monitoring and analysing developments and supporting States through capacity-building, technical assistance and knowledge-sharing.

4.1.1.2 WP/84, presented by Brazil and the Civil Air Navigation Services Organisation (CANSO) and supported by 18 LACAC[1] Member States, highlighted the strategic role of Air Navigation Services Providers (ANSPs), not only as operational infrastructure, but primarily as an economic enabler for new airspace users and operating models, particularly through Air Traffic Management/Unmanned Aircraft System Traffic Management (ATM/UTM) interoperability and their progressive integration. Drawing on Brazil's experience, the paper emphasized the importance of ANSP participation, well-defined interfaces with UTM service providers, clear institutional responsibilities and coordinated investment in shared infrastructure, while protecting existing aviation users. It requested the Conference to recognize ANSP modernization and ATM/UTM/Urban Air Mobility (UAM) integration as essential economic enablers, request ICAO to consider the proposed principles in developing policy guidance and encourage States to incorporate these enablers into national aviation and infrastructure plans.

4.1.1.3 WP/87, presented by Brazil and supported by 18 LACAC[2] Member States, highlighted the economic regulatory questions raised by future international Advanced Air Mobility (AAM) services, including market access, authorization models, infrastructure access and the application of air services agreements (ASAs). It questioned whether existing frameworks, largely based on a patchwork of bilateral agreements, would provide sufficient flexibility or could constrain opportunities and increase costs. The paper requested the Conference to recommend an ICAO assessment of these implications, through the Air Transport Regulation Panel (ATRP) in coordination with the AAM Study Group and other relevant bodies, collect and disseminate national experiences, and report on possible policy options to support the coherent and progressive development of international AAM markets.

4.1.1.4 WP/150, presented by Chile and endorsed by 18 LACAC[3] Member States, described how Chile's advisory working group supports the phased introduction of AAM through public-private collaboration while preserving the authority of regulators. It invited the Conference to encourage States to consider similar bodies and ICAO to facilitate exchanges through existing mechanisms.

4.1.1.5 WP/59, presented by Indonesia, highlighted the potential of unmanned aircraft systems (UAS) and AAM to enhance connectivity, particularly for geographically dispersed and underserved

[1] Belize, Bolivia (Plurinational State of), Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela (Bolivarian Republic of).
[2] Belize, Bolivia (Plurinational State of), Chile, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Uruguay and Venezuela (Bolivarian Republic of).
[3] Argentina, Belize, Bolivia (Plurinational State of), Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Uruguay, and Venezuela (Bolivarian Republic of).

communities. The paper noted that the transition from trials to routine operations required system-wide readiness and that regulatory fragmentation could increase compliance costs and hinder interoperability, market access and cross-border operations. Drawing on Indonesia's experience with UAS operations and regulatory sandboxes, it advocated a progressive, evidence-based approach to developing globally harmonized standards and guidance, while allowing flexibility for national circumstances. The paper requested the Conference to encourage ICAO to facilitate this work and Member States to share experience and strengthen international and regional cooperation.

4.1.1.6 WP/135, presented by Ireland on behalf of the European Union and the European Civil Aviation Conference (ECAC), addressed the regulatory and economic implications of integrating AAM and space transport operations (STO) into the aviation system. It highlighted questions concerning the applicability of existing economic frameworks and ASAs, as well as the allocation and recovery of costs associated with new operations and infrastructure. The paper emphasized the need for international consistency while allowing appropriate regulatory flexibility to support innovation. It requested the Conference to encourage ICAO to explore these issues, building on existing provisions, to support the safe, efficient and harmonized integration of AAM and STO.

4.1.1.7 WP/45, presented by Japan, highlighted the importance of globally harmonized standards for aircraft certification, operations, licensing and vertiports, particularly with the aim of realizing the economic benefits of AAM. Drawing on Japan's experience at Expo 2025 Osaka, the paper requested the Conference to recognize the importance of global cooperation and encourage ICAO to accelerate the development of harmonized standards, guidance and regulatory frameworks that support the safe and sustainable development of AAM and the economic development of air transport.

4.1.1.8 WP/106, presented by Oman, outlined a national approach to the introduction of AAM, comprising of a regulatory framework, a national UTM platform and a regulatory sandbox for controlled operations. The paper highlighted the value of sandbox trials and stakeholder engagement in generating evidence to inform regulation, infrastructure and economic policies. It requested the Conference to encourage States to incorporate AAM into their national aviation strategies and invite ICAO to develop guidance on its economic and policy dimensions and facilitate the exchange of experience among States.

4.1.1.9 WP/51, presented by Thailand, examined the adequacy of existing economic policies and cost-recovery mechanisms for digital air navigation services, noting that traditional flight-based charges may not reflect services used by a broader range of stakeholders. The paper invited the Conference to consider cost allocation, non-discriminatory access and the avoidance of double-charging, and to invite ICAO to consider whether its policies and guidance in *ICAO's Policies on Charges for Airports and Air Navigation Services* (Doc 9082) and the *Manual on Air Navigation Services Economics* (Doc 9161) should be updated to address digital infrastructure and information services.

4.1.1.10 WP/163, presented by Venezuela and supported by 17 LACAC[4] Member States, noted the progress made in developing technical frameworks for unmanned aircraft and AAM, while highlighting the need for a corresponding global effort on economic regulation to support legal certainty and economic predictability. The paper noted that the lack of standardized global economic guidance could lead to regulatory fragmentation, distort international trade and increase the cost of scaling up operations and technologies globally. It addressed issues related to market access, commercial licensing and the pricing of vertiports and unmanned traffic management services. The paper invited the Conference to recommend the

[4] Belize, Bolivia (Plurinational State of), Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay and Uruguay.

establishment of an ICAO working group to develop a manual on the economic regulation of emerging technologies and to urge States to exchange regulatory best practices.

4.1.1.11 WP/172, presented by Venezuela (Bolivarian Republic of) and supported by 17 LACAC Member States, highlighted differences in States' institutional, technological and economic readiness to adopt emerging technologies. The paper noted that a uniform approach could widen existing gaps. Instead, it proposed a voluntary framework for progressive implementation, including capacity assessment, pilot projects, regulatory and operational integration, and international interoperability. The paper invited the Conference to recommend that ICAO develop guidance based on national readiness and capacities, promote cooperation and training, particularly for developing States, and preserve interoperability, fair competition and equal opportunities among States.

4.1.2 **DISCUSSION**

4.1.2.1 The Conference recognized the potential of emerging technologies, including UAS and AAM, to enhance connectivity, improve access to essential services and support economic development and social well-being, particularly in developing States. However, delegations noted that their integration should reflect national circumstances, readiness and capacity, while maintaining safety, security and effective oversight. Caution was expressed against promoting particular technologies or prescribing investment incentives, which remained matters for States.

4.1.2.2 Many delegates emphasized the need to adapt economic regulatory frameworks in a timely manner to avoid delaying innovation and its socio-economic benefits, while at the same time cautioning that premature standardization or prescriptive economic regulation could constrain competition, innovation and commercial development. They highlighted the importance of first assessing the flexibility of existing policies and guidance, particularly regarding market access, operating authorization arrangements, infrastructure access and the applicability of air services agreements to international AAM operations.

4.1.2.3 Several delegates emphasized that further ICAO work should build on existing bodies and avoid duplication. It was recalled that an ATRP working group was already tasked with examining AAM economic regulation and invited States to provide specific business models, and operational experience to inform its work. They also informed on the ongoing activities of the AAM Study Group and AEP-ANSEP, in particular on the development of guidance on cost-recovery framework for the provision of services to UAS, AAM and commercial space operations. In this regard, any additional work undertaken should remain within ICAO's mandate and existing resources.

4.1.2.4 The Conference highlighted the strategic role of air navigation service providers and the need for coordinated planning for interoperable ATM and UTM systems. Many delegates stressed early stakeholder engagement, clear institutional responsibilities and infrastructure investment informed by expected demand and commercial viability. Attention was given to protecting the safety, capacity and efficiency of existing operations and ensuring that new entrants contributed fairly to shared infrastructure and services. The importance of human oversight, workforce development and meaningful engagement with operational personnel and their representatives was also noted.

4.1.2.5 ICAO was seen as well placed to support States in strengthening coordination among relevant authorities and facilitate information-sharing and exchanges of experience on advisory arrangements, regulatory sandboxes and pilot projects through existing mechanisms. Support was also expressed for ICAO to provide technical assistance and capacity-building to help States introduce AAM, including practical support on regulatory sandboxes, infrastructure planning and public-private

partnerships. The Conference also supported using existing ICAO mechanisms to share lessons from pilot projects and national experience with regulatory and cross-sectoral coordination arrangements.

4.1.2.6 The Conference noted Information Papers WP/107 by Colombia, supported by 17 LACAC Member States, WP/178 by Italy, WP/148 by Kazakhstan, WP/165 by Colombia, supported by 17 LACAC Member States and WP/187 by Kazakhstan.

4.1.3 CONCLUSION

4.1.3.1 As a result of the documentation considered and ensuing discussion on economic regulatory frameworks for emerging technologies under Agenda Item 4.1, the Conference concluded that:

a) emerging technologies have strong potential to enhance the contribution of air transport to economic development and social well-being by strengthening connectivity, improving access to essential services and supporting trade, investment and employment, with particular opportunities for developing States;

b) the technical, operational and regulatory challenges associated with new technologies, operations and business models should be addressed in a timely manner, taking into account differences in national readiness and capacity in order to avoid widening existing gaps among States;

c) the introduction of AAM requires coordinated planning, including by leveraging national and regional cooperation, for the progressive integration of conventional and unmanned traffic management and for infrastructure investment based on expected demand and commercial viability.

d) ICAO, through its relevant panels like ATRP, AEP-ANSEP and other relevant bodies, should continue assessing whether current policies are sufficiently flexible to accommodate current and future technological developments and the introduction of new entrants, including guidance on cost-recovery for the provision of services to UAS, AAM and commercial space operations; and

e) ICAO should support progressive implementation through technical assistance and capacity-building on regulatory sandboxes, infrastructure planning and public-private partnerships, and use existing mechanisms to share lessons from pilot projects and national experience.

4.1.4 RECOMMENDATION

Recommendation 4/1 — Economic regulatory frameworks on emerging technologies

The Conference recommends that:

a) States, in cooperation with relevant stakeholders, should adopt a coordinated and phased approach to the introduction of emerging technologies and new entrants, taking into account national circumstances, regulatory readiness, infrastructure requirements and operational capabilities;

b) States should strengthen national and regional cooperation in planning for the progressive integration of AAM and UAS into existing aviation systems, including air traffic management, and ensure that related infrastructure development is guided by assessments of expected demand, operational requirements and commercial viability;

c) ICAO, through its relevant panels, including ATRP, AEP-ANSEP, and other expert groups, should continue to assess the adequacy and flexibility of existing policies and guidance to accommodate emerging technologies, new operations and business models, including consideration of appropriate cost-recovery frameworks for services provision to UAS, AAM and commercial space operations; and

d) ICAO, in cooperation with relevant international and regional organizations and industry stakeholders, should support States, particularly developing States, in the progressive implementation of emerging technologies through technical assistance, capacity-building and the exchange of experience and best practices, including on regulatory sandboxes, infrastructure planning, public-private partnerships and lessons learned from pilot projects.

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