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Mitigating Flight-Structure Collision Risks: Contractual Compliance Strategies and Cross-Border Dispute Resolution

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This chapter explores the intersection of international air law and international construction contract law amid the proliferation of passenger drones and dense high-rise development around airports. Drawing on ICAO statistics, ADREP data and doctrinal writings by Breyer, Venoit, Klee, Godwin and others, it demonstrates that regulatory gaps increase collisions between aircraft and ground structures. A mixed methodology — comparative legal analysis and 3-D GIS modelling with QGIS/ArcGIS — identifies conflicts between the Chicago and Montreal Conventions and

FIDIC-based contract practice. The study confirms that embedding air-safety clauses into FIDIC standards, supported by a hybrid "ICAO + national rules" framework and a global automated height-monitoring system, would reduce incidents and foster sustainable aerotropolis growth.

The age of passenger drones is upon us, demanding a new approach to airspace safety. Collisions between aircraft and ground structures are not rare. For example, in Russia 66 aviation incidents caused by power-line collisions were recorded from 1991 to 2013. Many such incidents have been deadly: a 2011 Tu-134 crash into a transmission line killed 44 people. These cases illustrate the need to re-examine current rules and proactively devise safety measures.

International air law – based on the Chicago Convention (1944) and the Montreal Convention (1999), together with ICAO standards and recommended practices – provides the main regulatory framework for flight safety. At the same time, international construction law and especially international construction contract law (as embodied in FIDIC standard contracts) has grown important for cross-border projects. However, these two bodies of law have largely evolved separately, creating a gap at their interface. The proliferation of high-rise construction and 'aerotropolis' urban models intensifies this gap and threatens air safety.

Existing scholarship underscores the disconnect. Batalov (2020) examines the sources of international air law and emphasizes the role of ICAO standards, but does not address construction norms. Kudinov et al. (2020) identify gaps in Russia's international air service treaties, and Sipos (2023) surveys major international air law conventions. None of these works explicitly links aviation rules with construction law. The present study therefore asks whether incorporating air-safety obligations into international construction contracts (e.g. via FIDIC clauses) and/or adding building-related requirements into air law would mitigate collision risks.

The methodology combines comparative legal analysis of the Chicago and Montreal Conventions, ICAO regulations and FIDIC contract norms with 3D geospatial modeling. Using QGIS and ArcGIS, we created three-dimensional models of tall buildings and airport infrastructure to simulate their impact on

flight paths. We also analyzed data from ICAO's ADREP incident database and reports of real crashes to quantify how regulatory gaps correlate with collisions.

Findings indicate that the lack of unified international standards and divergent national rules significantly increases danger. ADREP data confirm that collisions with power lines and high-rise structures often result in disasters. The aerotropolis model (Charles et al., 2007; Freestone & Baker, 2011) boosts local economies but, without coordinated rules, each jurisdiction sets its own height limits – raising crash risks. In effect, this analysis highlights the urgent need to harmonize construction and aviation norms.

Based on these conclusions, several recommendations are proposed. First, embed mandatory air-safety clauses in FIDIC contracts, requiring contractors to assess and mitigate a project's effects on airspace. Second, adopt a hybrid legal model combining binding ICAO standards with adaptive national regulations tailored to local infrastructure and planning needs. Third, develop a global automated monitoring system for tall structures near airports – using drones and satellites to detect potential hazards in real time.

Together, these measures should substantially reduce aircraft-structure collisions and support sustainable aerotropolis development, balancing aviation safety with urban and economic interests.

Note on the publication of the main research results

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