

LEGAL REVIEW OF COMMERCIAL AIRCRAFT AVIATION SAFETY STANDARDIZATION AND THE LEGAL LIABILITY ASPECTS OF AIRBUS AND BOEING MANUFACTURERS

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Abstrak

Keselamatan penerbangan merupakan pilar utama dalam industri transportasi udara komersial, terutama bagi Indonesia yang memiliki karakteristik geografis kepulauan dan tantangan cuaca ekstrem. Penelitian ini bertujuan untuk mengevaluasi efektivitas standardisasi keselamatan penerbangan komersial di Indonesia serta mengidentifikasi celah implementasi regulasi domestik terhadap standar internasional. Metode yang digunakan pada penelitian ini adalah yuridis normatif dengan pendekatan kualitatif, melalui analisis data sekunder berupa regulasi penerbangan (CASR), laporan investigasi kecelakaan, dan studi literatur terkait pengawasan kelaikudaraan. Hasil penelitian menunjukkan bahwa meskipun regulasi keselamatan penerbangan di Indonesia secara umum telah mengadopsi standar ICAO (International Civil Aviation Organization), masih terdapat tantangan signifikan dalam konsistensi audit kelaikan pesawat, manajemen kelelahan (fatigue) kru udara, dan keterbatasan infrastruktur navigasi di wilayah terpencil. Penelitian ini merekomendasikan perlunya percepatan digitalisasi sistem pengawasan kelaikudaraan, penerapan pemeliharaan prediktif berbasis teknologi, serta penguatan budaya keselamatan kerja (just culture) bagi seluruh operator maskapai. Optimasi langkah-langkah ini diharapkan dapat menekan angka kecelakaan pesawat dan meningkatkan kredibilitas keselamatan penerbangan komersial Indonesia di tingkat global

Kata Kunci: Keselamatan Penerbangan, Pesawat Komersial, Standardisasi, Casr, Kelaikudaraan.

Abstract

Aviation safety represents a critical cornerstone of the commercial air transportation industry, particularly in Indonesia, an archipelagic nation characterized by complex geographical constraints and volatile meteorological conditions. This study evaluates the efficacy of commercial aviation safety standardization in Indonesia while identifying implementation disparities between domestic regulations and international benchmarks. Employing normative legal and qualitative research methodologies, the study analyzes secondary data, including Civil Aviation Safety Regulations CASR, official accident investigation reports, and relevant literature on airworthiness oversight. The findings indicate that although Indonesian aviation safety regulations broadly align with International Civil Aviation Organization ICAO standards, significant operational challenges persist regarding the consistency of airworthiness audits, crew fatigue management, and navigational infrastructure limitations in remote regions. Consequently, this study underscores the necessity of accelerating the digitalization of airworthiness oversight, adopting technology driven predictive maintenance, and institutionalizing a just culture framework among airline operators. Enhancing these measures is anticipated to mitigate aircraft accident risks and elevate the global credibility of Indonesia's commercial aviation sector

Keywords: Aviation Safety, Commercial Aircraft, Standardization, Casr, Airworthiness.

INTRODUCTION

An aircraft is defined as any machine or device capable of flight within the atmosphere through lift generated by the reaction of the air excluding reactions against the Earth's surface used for aviation purposes [Law Number 1 of 2009 concerning Aviation,

Article 1, Point 3]. Airlines operate commercial aircraft to provide scheduled, fare-based transportation for passengers and cargo within the civil aviation industry. These aircraft are designed with a focus on economic efficiency and high safety standards to serve various public routes under strict safety oversight.

The global commercial aircraft manufacturing sector is currently dominated by the world's two largest producers: Europe-based Airbus and US-based Boeing. Market competition between these corporate giants is fierce; Airbus leads in aircraft delivery volume, while Boeing strives to surpass its rival in securing new orders.

Both manufacturers possess unique characteristics that distinguish their technological approaches and product visual identities. Airbus, headquartered in Toulouse, France, pioneered fly-by-wire technology to create lighter, more efficient aircraft and implemented sidestick controls that limit pilot maneuvers to ensure automated safety. Boeing, based in Arlington, Virginia, USA, upholds a tradition of structural reliability by utilizing conventional yoke control systems that provide direct physical feedback to the pilot. Physical differences are also evident in exterior designs: Airbus aircraft tend to feature rounded nose profiles and cockpit window angles, whereas Boeing products display sharper nose shapes and window angles.

Current conditions in the aviation industry reveal a drastic shift in public perception regarding Boeing; the company has transformed from a symbol of engineering reliability into a source of global concern. The deep public trust of the past reflected in the slogan "If it's not Boeing, I ain't going" has now been eroded by a series of systemic failures in the company's culture.

The demand for air transport services in Indonesia is projected to continue rising significantly alongside the growth of public prosperity; therefore, the state is obligated to ensure legal protection and safety.

The 1944 Chicago Convention categorizes aircraft into two groups: civil aircraft and state aircraft. Furthermore, the Convention classifies civil aircraft operations into scheduled air transport services and non-scheduled flights [Articles 5 and 6 of the 1944 Chicago Convention on International Civil Aviation]. During the 2010 ICAO High-level Safety Conference (HLSC/2010), the development of an Annex dedicated to Safety Management was proposed.

RESEARCH METHODS

Research Design

This study relying on a qualitative method that leverages the researcher's expertise, skills, and knowledge; in other words, the researcher's credibility is paramount. Classified as doctrinal research a type of legal research involving the design and development of something based on the ideas of specific thinkers, which serve as the researcher's frame of reference.

Furthermore, the researcher employs a descriptive research method aimed at explaining specific variables (through in-depth analysis). A variable is any entity or phenomenon identified by the researcher for study in order to gather information and subsequently draw conclusions.

Object of Research

The author identifies the legal framework governing the aviation industry and commercial aviation safety particularly regarding operations involving commercial Airbus or Boeing aircraft and evaluates the application of said law within the context of the specific cases under review, in accordance with Law Number 1 of 2009 concerning Aviation.

Research Instrument

A key requirement is that the researcher must be actively engaged and fully comprehend the research problem. Data collection must be conducted systematically and

meticulously, going beyond mere presence at the research site or brief conversations with participants. The researcher's engagement must be of high quality, characterized by a deep understanding of the context and an interaction duration sufficient to gain a comprehensive picture of the research setting.

Data Analysis Technique

The data analysis technique employed in this study which examines the factors determining the selection of Airbus and Boeing commercial aircraft, with a focus on safety aspects and the aviation industry involves a meticulous and transparent research process that emphasizes the legal implications of the subject matter.

Relevant legal documents will be analyzed, ranging from international regulations concerning aircraft and aviation to aviation laws, related regulations, and pertinent ministerial decrees. This analysis will assist the author in identifying the legal framework governing the aviation industry and commercial aviation safety regarding Airbus and Boeing aircraft, while also evaluating the application of these legal provisions within the specific context of the cases under study.

RESULTS AND DISCUSSION

Results

Aligning Indonesia's domestic regulations with international aviation legal standards to protect the safety rights of commercial aviation consumers

The synchronization between Law Number 1 of 2009 concerning Aviation and international aviation legal standards specifically the 1944 Chicago Convention and standards established by the International Civil Aviation Organization (ICAO) reflects a high degree of substantive harmonization, although practical implementation still faces several challenges. This alignment is crucial for guaranteeing the right to safety for commercial aviation consumers through a clear separation of roles between regulators and operators.

The following details the nature of this synchronization and provides a comparison between Indonesian domestic regulations and international standards:

1. Adoption of ICAO Technical Documents: Standards and Recommended Practices (SARPs), Law Number 1 of 2009 adopts the majority of the 19 Annexes to the Chicago Convention. This is realized through the establishment of domestic technical legal instruments, such as the Civil Aviation Safety Regulations (CASR):
 - a. Airworthiness of Aircraft (Annex 8): Adopted into the airworthiness certification requirements (Certificate of Airworthiness) for every commercial fleet.
 - b. Personnel Licensing (Annex 1): Certification standards for pilots, technicians, and cabin crew are strictly regulated in accordance with global qualifications.
 - c. Aviation Security (Annex 17): Synchronized into the National Aviation Security Program to protect consumers against acts of unlawful interference.

2. Institutional Framework and Accident Investigation

The level of synchronization regarding safety system recovery and evaluation is reflected in accident investigation regulations:

- a. ICAO Annex 13: The Aviation Law mandates independent investigations conducted in the interest of safety, rather than for the purpose of assigning blame or determining criminal liability (a "no-blame culture"). Role of the KNKT: The National Transportation Safety Committee (KNKT) acts as an independent investigative body that issues safety recommendations with which airlines are required to comply.
3. Consumer Rights Protection and Carrier Liability

In addition to physical safety, this harmonization also encompasses civil protections for consumers in the event of a failure in the safety system:

- a) Adoption of the Montreal Convention 1999: The principle of strict liability on the part

of the carrier regarding consumer losses (such as accidents, delays, or lost baggage) has been incorporated into Articles 140 through 186 of Law Number 1 of 2009.

- b) Airlines are required to provide compensation at minimum levels that are adjusted periodically, without requiring consumers to first prove airline fault.

Table 1. A comparison of the implementation status and synchronization of aviation safety regulations based on ICAO standards within Law Number 1 of 2009

Safety Aspects	International Aviation Legal Standards (ICAO)	Implementation in Law Number 1 of 2009	Synchronization Status
Personnel Licensing	Annex 1 (Personnel Licensing)	Aviation personnel (flight crews, aircraft maintenance technicians) are required to hold a valid license and certificate of competence.	Fully Compliant / Fully Meets Requirements
Aircraft Airworthiness	Annex 8 (Airworthiness of Aircraft)	Every aircraft in operation must hold an Airworthiness Certificate.	Fully Compliant / Fully Meets Requirements
Flight Rules	Annex 2 (Rules of the Air)	Regulations regarding flight procedures (VFR & IFR), collision avoidance, and airspace sovereignty.	Fully Compliant / Fully Meets Requirements
Flight Navigation	Annexes 10, 11, 15	Obligations regarding the provision of communication facilities, air traffic services (ATC), and the publication of aeronautical information.	Fully Compliant / Fully Meets Requirements
Airports & Operations	Annex 14 (Aerodromes)	Regulates the Obstacle Limitation Surfaces (KKOP / <i>Kawasan Keselamatan Operasi Penerbangan</i>) and airport facility standards.	Fully Compliant / Fully Meets Requirements
Accident Investigation	Annex 13 (Aircraft Accident Investigation)	Mandate for the establishment of an independent investigation body (National Transportation Safety Committee / KNKT).	Fully Compliant / Fully Meets Requirements

Dispute resolution methods and consumer rights protection regarding compensation under Indonesian law in the event of an accident involving domestic airlines operating aircraft from those two global manufacturers.

Under civil law, an airline acting as a "carrier" bears legal liability based on either the principle of strict liability or fault-based liability for losses suffered by passengers.

- a) National Legal Basis: Law Number 1 of 2009 concerning Aviation (Article 141, paragraph 1): Stipulates that the carrier is liable for losses resulting from the death, permanent disability, or injury of a passenger caused by an air transport incident occurring on board the aircraft.
- b) Minister of Transportation Regulation Number PM 77 of 2011 (Article 3, letter a): Sets the mandatory compensation amount at IDR 1,250,000,000 (1.25 billion Rupiah) per passenger in the event of death, payable to the heirs.
- c) Article 1365 of the Indonesian Civil Code (KUHPerdata): Relates to Unlawful Acts (Perbuatan Melawan Hukum or PMH). Heirs have the right to claim additional compensation in court if gross negligence is proven, exceeding the standard compensation limits.

The Montreal Convention of 1999 is an international treaty governing airline liability and compensation limits regarding passengers on international flights.

Tabel 2. Summary of Passenger Rights (International Aviation Accidents)

Regulatory Aspect	Provisions Under the Montreal Convention 1999
Scope of Liability	Covers death and bodily injury; purely psychological damage without physical injury is excluded.
Strict Liability Limit	Up to 151,880 SDR (Automatically payable without the need to prove airline negligence).
Claims Above the Limit	Unlimited liability, unless the airline can prove they were completely free from negligence.
Limitation Period	The right to damages is extinguished if an action is not brought within 2 years from the date of expected arrival.

Aviation safety standards in Indonesia meet global benchmarks, as evidenced by high Effective Implementation (EI) scores in ICAO audits. However, these standards rely heavily on two pillars:

1. Manufacturers (Airbus/Boeing): The obligation to provide transparent information systems and comprehensive training for airlines.
2. Operators & Regulators: Strict operational oversight (surveillance) and risk mitigation.

The Boeing Case (Boeing 737 MAX):

This case highlights the critical importance of transparency regarding design changes to automated flight systems (MCAS).

It underscores the need for local regulators to conduct independent validation for the sake of passenger safety, rather than relying solely on the aircraft manufacturer's authority (such as the FAA).

The aviation disaster of Lion Air Flight JT-610 on **October 29, 2018**, involving a **Boeing 737 MAX 8 (Registration PK-LQP)** en route from Jakarta to Pangkalpinang, triggered complex cross-border litigation. Resolving the resulting legal disputes and compensation claims required navigating two distinct legal systems **Indonesia and the United States** and encompassed both **carrier liability** and **product liability**.

Under Indonesian positive law, the operating carrier, PT Lion Mentari Airlines, is bound by **strict liability** for passenger fatalities resulting from air transportation operations. This liability is grounded in Article 141, paragraph (1) of Aviation Law No. 1 Year 2009, in conjunction with Article 3, letter a of Ministry of Transportation Regulation No. 77 Year 2011. These statutory frameworks mandate a fixed material compensation of IDR 1.25 billion per passenger, payable to the lawful heirs. However, the disbursement of these funds frequently involved the execution of **Release and Discharge (R&D) exculpatory clauses**, which sought to restrict the beneficiaries' right to pursue subsequent legal action a mechanism that remains a subject of intense legal debate.

Concurrently, the victims' legal heirs, represented by international law firms, pursued **product liability claims against The Boeing Company** in the United States. This litigation focused on design defects inherent in the aircraft's **Maneuvering Characteristics Augmentation System (MCAS)**. The lawsuits were adjudicated within the jurisdiction of the Cook County Circuit Court in Illinois, Chicago, where Boeing's corporate domicile was located. While most civil disputes were resolved via **out-of-court settlements**, the compensation structure varied. Boeing distributed baseline payouts through the **Boeing Financial Assistance Fund (BFAF)** starting at approximately USD 114,500 (around IDR 1.6 billion), whereas families who pursued aggressive, high-stakes litigation secured specialized settlements exceeding IDR 16.8 billion per victim.

Beyond civil remedies, Boeing faced **corporate criminal enforcement** by the U.S. Department of Justice (DOJ). The aerospace manufacturer entered into a **Deferred Prosecution Agreement (DPA)** to resolve criminal conspiracy charges, agreeing to a total

financial penalty and compensation package of USD 2.5 billion. A critical component of this sanction was the allocation of USD 500 million into a dedicated **beneficiary trust fund**, explicitly established to provide financial restitution to the grieving families of both the Lion Air JT-610 and Ethiopian Airlines ET-302 tragedies.

The Airbus Case (Operational & Maintenance Incidents):

Incidents such as AirAsia QZ8501 and engine-related issues demonstrate that safety also depends on the integrity of an airline's internal Safety Management System (SMS), flight crew training, and periodic maintenance performed in accordance with Airbus design specifications.

Based on Indonesian positive law, PT Indonesia AirAsia bears strict liability for the deaths of all passengers resulting from an aviation accident during transport. Under Article 141, paragraph (1) of Law No. 1/2009 on Aviation, alongside Article 3, letter a of Ministry of Transportation Regulation No. 77/2011, the carrier must fulfill its legal obligations. Consequently, through an insurance consortium comprising PT Asuransi Jasa Indonesia and PT Asuransi Sinar Mas, the airline is legally required to provide standard material compensation of IDR 1,250,000,000 per passenger to their lawful heirs.

However, the PK-AXC incident sparked major legal debates concerning the limitation of liability. Because the flight operated on a Sunday without an official route permit (deemed an unauthorized flight), several victims' legal counsel argued that operating without authorization constituted a tortious act (*Perbuatan Melawan Hukum*) rather than mere negligence. In legal doctrine, if the airline's intentional wrongdoing or willful misconduct is proven, the statutory liability cap can be broken, nullifying the standard compensation limit.

CONCLUSION AND RECOMMENDATIONS

Based on the research findings, This study examines the alignment of Indonesia's domestic aviation regulations primarily structured under Law No. 1 of 2009 with global legal frameworks, specifically the 1944 Chicago Convention and guidelines set by the International Civil Aviation Organization (ICAO). The primary objective of this regulatory synchronization is to guarantee safety rights for aviation consumers. Aircraft airworthiness protocols, governed by Articles 34 to 40, categorize certification into the Initial Airworthiness Certificate for maiden flights and the Continuous Airworthiness Certificate for ongoing operations. To acquire and retain these credentials, airlines must satisfy rigorous criteria, including formal registration, technical evaluations of design and manufacturing, routine maintenance aligned with airworthiness directives, and adherence to environmental thresholds for noise and emissions.

Theoretically, the integration of Middle Range Theory and Applied Theory serves as a bridge connecting national sovereignty with standardized international technical mechanisms. Regarding liability, the regulatory framework adopts the Presumption of Liability principle, shifting the burden of proof to the airline in passenger injury or loss claims. Concurrently, preventive enforcement is overseen by the Directorate General of Civil Aviation through standardized ramp checks utilizing ICAO Annexes. A clear institutional separation between regulators and operators is enforced, incorporating global safety strategies such as the Safety Management System (SMS), the Universal Safety Oversight Audit Programme (USOAP), and consumer protection laws integrated with Law No. 8 of 1999.

Despite textual compliance at the normative level, significant hurdles persist regarding substantive harmonization and time lags when adopting urgent technical safety updates from international aircraft manufacturers. Weak oversight by national aviation bodies could compromise real-world passenger safety. Consequently, regular legislative amendments are vital to automatically link domestic policies with emerging global

mandates, alongside strict administrative penalties and the transparent publication of safety audit reports.

For domestic aviation accident litigation, Indonesia enforces a strict liability regime, ensuring that victims and their legal heirs receive compensation without having to prove airline negligence. This approach reflects State Sovereignty Theory, where the government exercises its absolute authority via national statutes like Law No. 1 of 2009 and Ministerial Regulation No. 77 of 2011. Under this governance framework, legal certainty (*rechtssicherheit*) is established to provide precise, structured, and measurable consumer protection from the moment passengers board until they deplane. In scenarios where a disaster stems from a product defect by global manufacturers like Boeing or Airbus, the state applies a middle theory approach to uphold domestic legal security. The state mandates that local airlines settle all victim compensation claims first under domestic jurisdiction. Once these liabilities are met, the airline or its insurers can execute subrogation rights to pursue the foreign manufacturer in international courts. This protocol shields citizens from the friction of complex foreign litigations while demonstrating effective state protection.

Lastly, public safety and legal predictability are reinforced through the Civil Aviation Safety Regulations (CASR), managed by the Ministry of Transportation, which adaptively integrates ICAO Annex 8 and Annex 19 guidelines. Through risk-based surveillance models, the state retains absolute power over the issuance, oversight, and revocation of airworthiness certificates. At the micro-operational level, safety is institutionalized through mandatory Crew Resource Management (CRM) configurations within the CASR framework. Given that human error triggers over 70% of aviation accidents, rigid CRM policies require initial training, recurrent refreshers, joint crew simulations, and core competency evaluations to mitigate psychological risks. This structured mandate legally empowers flight crews to act assertively, functioning alongside macro Safety Management Systems (SMS) to form a robust shield for aviation safety and legal integrity.

Recommendations

Based on the comprehensive analysis of commercial aviation safety standards in Indonesia, this study outlines critical, actionable recommendations for key industry stakeholders. These strategic measures aim to strengthen airworthiness oversight, mitigate operational vulnerabilities within Indonesia's complex geographical terrains, and foster a proactive, long-term safety culture nationwide.

1. Regulatory Policies and Oversight (Ministry of Transportation & DGCA)

Dynamic CASR Updates: Mandate structural revisions to the Civil Aviation Safety Regulations (CASR) within six months of any ICAO State Letter or Annex update, managed by a dedicated harmonization desk.

Digitalized Airworthiness Audits: Implement an integrated real-time dashboard linking regulatory oversight directly to airlines' electronic maintenance logbooks (e-logbooks) to automatically ground aircraft with overdue maintenance or component violations.

Rigorous Operational Sanctions: Enforce performance-linked KPI penalties, ranging from stripping favorable route and slot allocations to revoking Air Operator Certificates (AOC) for maintenance record falsification.

2. Airline Operations and Carrier Management

Just Culture Enforcement: Launch anonymous, encrypted safety reporting platforms managed by independent internal units to protect whistleblowers via Collective Labor Agreements from executive or HR retaliation.

Advanced Maintenance Technology: Transition to IoT-driven predictive maintenance systems, such as Health and Usage Monitoring Systems (HUMS), to stream real-time engine metrics to ground engineering crews mid-flight.

Crew Fatigue Mitigation: Utilize biomathematical circadian modeling software via the Fatigue Risk Management System (FRMS) to schedule crews and strictly ban consecutive back-to-back night flights.

3. Air Navigation and Meteorological Infrastructure (AirNav Indonesia & BMKG)

Remote-Area Surveillance Expansion: Accelerate satellite-based ADS-B and multi-sensor tracking technology to eliminate radar blind spots in extreme mountainous terrains like inland Papua.

Integrated Meteorological Warnings: Connect BMKG's Automated Weather Observing System (AWOS) directly to AirNav controllers and cockpit data links (ACARS/VDL Mode 2) for two-minute real-time updates on hazardous micro-weather phenomena like windshear.

4. Airport Infrastructure and Management (PT Angkasa Pura & MoT Operators)

Runway Excursion and FOD Prevention: Install automated thermal camera and radar systems along runways for Foreign Object Debris (FOD) detection, complemented by routine runway friction tests before and after rainy seasons.

Emergency Response Readiness: Upgrade Aircraft Rescue and Firefighting (ARFF) capabilities to match the largest serviced aircraft classes and organize biennial full-scale emergency drills with regional hospitals.

Passive Safety Installations: Deploy Engineered Material Arresting Systems (EMAS) at the ends of short runways or those adjacent to steep drops and bodies of water to safely decelerate overrunning aircraft.

5. Incident Investigation and Risk Mitigation (NTSC / KNKT)

Accelerated Reporting Commitments: Observe a strict 12-month Service Level Agreement (SLA) for publishing Final Investigation Reports and a 30-day window for critical Safety Recommendations upon detecting systemic vulnerabilities.

Unified Safety Repository: Establish a transparent National Safety Database hosting accident and serious incident logs accessible to academics and the public for recurring hazard prevention research.

6. Aircraft Design and Global Manufacturing (Boeing & Airbus)

Sensor Redundancy and System Architecture:

Boeing must configure flight control systems (such as MCAS) to cross-verify data using at least three independent Angle of Attack (AoA) sensors, eliminating paywalls for essential cockpit safety alerts.

Airbus must audit its flight control computer logic specifically transitions from Normal to Alternate/Direct Law to provide clearer alerts during contradictory sensor inputs, such as pitot tube icing.

Human-Machine Interface (HMI) Transparency: Require comprehensive, mandatory difference training for any software or mechanical adjustments altering flight characteristics, ensuring modifications are never obscured within generic operational manuals.

Re-engineer flight deck layouts to deliver unambiguous out-of-trim and automation failure warnings, enabling pilots to assume manual command immediately without experiencing cognitive overload.

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