



# A Juridical Review of Licensing Regulations and Operational Rules for Drones under Law Number 21 of 2025 Concerning Airspace Management in Indonesia

Gesti Magdalena Sarante<sup>1\*</sup>

Faculty of Law, Universitas Dirgantara Marsekal Suryadarma, Jakarta, Indonesia

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\*Correspondence: Gesti Magdalena Sarante

Email: [gestimagdalena@gmail.com](mailto:gestimagdalena@gmail.com)

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**Abstract:** The rapid development of drone technology in Indonesia has generated substantial contributions across multiple sectors, including aerial photography, geospatial mapping, infrastructure inspection, precision agriculture, logistics, and security surveillance. Nevertheless, the existence of fragmented regulatory instruments, such as PM 90/2023 and SE 15/2024, has led to legal uncertainty, increased risks of misuse (e.g., espionage and privacy violations), challenges in law enforcement, and constraints on technological innovation. In response, the enactment of the Airspace Management Law on November 25, 2025, represents a strategic effort to establish a comprehensive regulatory framework. This study aims to examine how licensing and operational provisions within the law ensure flight safety and national security, as well as to evaluate their effectiveness. This research employs a normative juridical method with legislative and conceptual approaches. Data were collected through library research, encompassing primary legal materials (Airspace Management Law, Aviation Law No. 1/2009, and the Chicago Convention), supported by secondary and tertiary sources. The analysis adopts a normative qualitative approach grounded in Rechtsstaat theory, Friedman's legal system theory, and air law doctrine. The findings demonstrate that preventive licensing mechanisms, including operator registration and authorization, alongside operational regulations such as altitude restrictions, visual line-of-sight (VLOS) requirements, prohibited zones, and sanctions, contribute significantly to minimizing collision risks and preventing unlawful activities, thereby reinforcing airspace sovereignty. However, the effectiveness of these regulations remains constrained by implementation challenges, including procedural complexity, limited public awareness, and insufficient supervisory capacity. Accordingly, strengthening regulatory harmonization, digital-based governance, public education, and technological adaptation is essential to enhance the overall effectiveness of drone regulation in Indonesia.

**Keywords:** Airspace sovereignty; Drone licensing; Drone operation regulations; Flight safety; Legal effectiveness; Normative juridical research; Security governance.

## Introduction

The rapid development of drone technology, also known as unmanned aerial vehicles (UAVs), has precipitated a profound revolution that has transformed myriad aspects of contemporary life through enhanced data acquisition, real-time monitoring, and automated processes across multiple sectors (Rachmawati & Kim, 2022). Evolving from rudimentary recreational applications in aerial photography to sophisticated professional deployments in construction, logistics, and precision agriculture, these technologies now deliver unprecedented levels of operational efficiency and capabilities that were previously unimaginable (Veronica et al., 2024). In Indonesia, the adoption of UAV technology has exhibited accelerated growth, propelled by the increasing accessibility of devices and the

progressive affordability of advanced features amid supportive market dynamics (Ramadian & Setiawan, 2024). This widespread public and industrial enthusiasm underscores the substantial potential for sustained innovation and robust economic expansion, particularly through localized technological ecosystems and policy-driven industrial development.

However, behind the various benefits offered, the use of drones also raises a series of complex and multidimensional legal issues. The rapid dynamics of drone technological development often exceed the capacity of legal frameworks to adapt, thereby creating grey areas that are vulnerable to misuse and uncertainty. Drones have opened new opportunities across various sectors, bringing positive impacts, namely (Susanto, 2025):

1. **Aerial Photography and Videography:** Drones enable the capture of images and videos from unique perspectives that are difficult or costly to achieve through conventional methods, thereby revolutionizing the media and entertainment industry.
2. **Geospatial Mapping and Surveying:** With the capability to collect accurate data from the air, drones are highly useful for topographic mapping, urban spatial planning, and land surveying.
3. **Infrastructure Inspection:** Drones can be utilized to inspect bridges, transmission towers, wind turbines, and other infrastructures in a safer, faster, and more efficient manner compared to traditional methods that require direct human access.
4. **Precision Agriculture:** In the agricultural sector, drones assist farmers in monitoring crop health, identifying areas requiring irrigation or fertilizer, and spraying pesticides with precision, thereby improving efficiency and crop yields.
5. **Logistics Delivery:** The concept of delivering goods using drones has begun to be tested, offering the potential to accelerate delivery processes and reach remote areas.
6. **Surveillance and Security:** Drones are used for border monitoring, law enforcement, search and rescue operations, and surveillance of public areas, although this also raises ethical and privacy concerns.

At present, regulations concerning drones in Indonesia remain partial and are dispersed across several legal instruments. For instance, there is the Regulation of the Minister of Transportation of the Republic of Indonesia Number PM 90 of 2023 concerning Civil Aviation Safety Regulations Part 107 on Unmanned Aircraft Systems and the Circular Letter of the Director General of Civil Aviation Number SE. 15 of 2024 concerning the Operation of Unmanned Aircraft in Controlled Airspace. Although these regulations have provided an initial legal basis, their nature remains fragmented and has not fully covered all operational aspects and legal implications of the increasingly diverse and sophisticated use of drones (Kriyasa, 2025). This regulatory gap generates several negative impacts, some of which, according to the author, need to be addressed immediately:

1. **Legal Uncertainty:** Both individual and corporate drone operators face legal uncertainty. They experience difficulty in comprehensively understanding their rights and obligations, as existing regulations do not provide clear and

comprehensive guidance. This situation may hinder legitimate business development and innovation.

2. **Potential for Misuse:** The absence of a comprehensive legal framework creates opportunities for the misuse of drones for illegal or harmful activities. Examples include drug smuggling, espionage, surveillance, or violations of the privacy of individuals and institutions. Without strong regulations, the potential threat to public security and order increases.
3. **Difficulties in Law Enforcement:** When violations occur, law enforcement authorities face difficulties in taking follow-up actions. The lack of a strong and specific legal basis complicates the process of identifying violators, collecting evidence, and imposing fair and effective sanctions.
4. **Barriers to Innovation and Industry:** An uncondusive regulatory climate becomes a serious obstacle to innovation and the development of a healthy and sustainable drone industry in Indonesia. Investors may hesitate to invest, and technology developers may be hindered from producing new solutions due to the lack of regulatory clarity.
5. **The Government of Indonesia, through the Ministry of Transportation, has formulated the Law on the Management of National Airspace, which was enacted on 25 November 2025. This law is expected to serve as a strong and comprehensive legal foundation for regulating all activities within Indonesian airspace. Its scope is not limited to conventional manned aviation but also accommodates the development of emerging technologies such as drones and the potential use of air taxi vehicles (UAM/Urban Air Mobility) in the future (Ranggawari, 2025).**

This newly enacted law brings several significant expectations for the future regulation of Indonesian airspace:

1. **Comprehensive Legal Certainty:** Currently, regulations related to airspace are scattered across various legal instruments and have not fully accommodated new technologies. This law is expected to unify and update the legal framework, thereby providing legal certainty for all stakeholders, ranging from aviation operators and drone users to the general public.
2. **Enhanced Aviation Safety and Security:** With clearer and more comprehensive regulations, the risks of aviation incidents, whether involving manned aircraft or drones, can be minimized. This law will establish higher safety and security standards to protect lives and property.
3. **Optimization of Airspace Utilization:** The law is expected to optimize the use of national airspace in an efficient and safe manner. This includes establishing clear flight zones, aviation corridors, and procedures that minimize conflicts among airspace users.
4. **Accommodation of Technological Innovation:** One of the greatest expectations is the ability of this law to adapt to technological developments. By incorporating regulations for drones and UAM, Indonesia will be positioned at the forefront of managing innovation in the aviation sector.

5. Protection Against Emerging Threats: Drones, for example, bring potential new threats such as espionage, disruption of vital installations, or violations of privacy. This law is expected to provide a legal framework to address such threats by establishing strict sanctions for violators.
6. Encouraging the Growth of the Aviation and Drone Industry: With clear regulations in place, investors and industry actors will feel more confident to invest and develop businesses in the aviation and drone sectors in Indonesia, which in turn can create employment opportunities and promote economic growth.

Based on the above description, the author is interested in conducting legal research entitled "A Juridical Review of the Regulation of Licensing and Operational Rules for Drones in Law Number 21 of 2025 on the Management of Airspace in Indonesia."

## **Methodology**

### **Type of Research**

This study adopts a normative juridical legal research design, which conceptualizes law as a system of norms embedded within the positive legal order. The research focuses on examining legal principles, doctrines, and statutory provisions governing the management and operation of unmanned aerial vehicles (drones), rather than analyzing law as a social phenomenon. Accordingly, this study relies on library-based research, utilizing secondary data to assess the coherence, consistency, and normative rationality of legal regulations within both national and international legal frameworks. To enhance validity, this research applies a systematic doctrinal review by cross-examining multiple legal instruments and scholarly interpretations. Meanwhile, reliability is ensured through the use of authoritative and verifiable legal sources, as well as consistent analytical procedures grounded in established legal research methodologies.

### **Research Approach**

This study employs two principal approaches:

1. Statutory Approach (Statute Approach)

This approach involves a systematic examination of legislative and regulatory frameworks governing airspace, aviation, and drone operations at both national and international levels. The analysis emphasizes the identification of legal norms, hierarchical relationships among regulations, and the degree of harmonization across legal instruments.

2. Conceptual Approach (Conceptual Approach)

This approach is used to analyze legal doctrines, theories, and scholarly perspectives related to air law and state sovereignty. It facilitates the construction of a robust theoretical framework for interpreting regulatory norms.

The integration of these approaches strengthens analytical validity by allowing triangulation between positive law and legal theory, thereby ensuring that interpretations are not solely text-based but also conceptually grounded.

## Type of Research Data

Consistent with normative juridical research, this study utilizes **secondary data** derived from legal materials. These include:

1. Primary legal materials, which are legally binding sources;
2. Secondary legal materials, which provide interpretation and scholarly analysis;
3. Tertiary legal materials, which support clarification and contextualization.

The use of multiple categories of legal materials contributes to data validity through source triangulation, ensuring that legal interpretations are supported by diverse yet relevant references.

## Data Collection Technique

Data collection is conducted through systematic library research, involving:

1. Identification of relevant legal documents and academic literature;
2. Classification of materials based on their legal authority and relevance;
3. Critical evaluation of sources to ensure credibility and academic rigor.

To ensure reliability, only up-to-date, authoritative, and peer-reviewed sources are included. Additionally, a consistent documentation process is applied to maintain traceability of all referenced materials.

## Sources of Legal Materials

The legal materials used in this research consist of:

1. Primary Legal Materials

These include binding legal instruments such as the Chicago Convention 1944, the 1945 Constitution of the Republic of Indonesia (Undang-Undang Dasar Negara Republik Indonesia Tahun 1945), the Indonesian Criminal Code (Kitab Undang-Undang Hukum Pidana), Law Number 1 of 2009 concerning Aviation (Undang-Undang Nomor 1 Tahun 2009 tentang Penerbangan), Law Number 21 of 2025 concerning Airspace Management (Undang-Undang Nomor 21 Tahun 2025 tentang Pengelolaan Ruang Udara), and other implementing regulations related to civil aviation and unmanned aerial vehicles.

2. Secondary Legal Materials

These include legal textbooks, peer-reviewed journal articles, prior research findings, and expert opinions that provide analytical perspectives on drone regulation and air law.

3. Tertiary Legal Materials

These consist of legal dictionaries, encyclopedias, and legal indexes that assist in clarifying terminology and legal concepts.

The structured classification of legal materials ensures **systematic data organization**, which is essential for both validity and analytical consistency.

## Data Analysis and Interpretation Technique

Data analysis is conducted using a **qualitative normative method**, emphasizing legal reasoning and doctrinal interpretation. The analytical process involves:

1. Data Reduction and Organization

Legal materials are systematically categorized based on themes such as regulatory hierarchy, sovereignty, and drone governance.

2. Interpretative Analysis

Legal provisions are interpreted using grammatical, systematic, and teleological methods to uncover their normative meaning and legislative intent.

3. Legal Reasoning (Syllogistic Method)

Legal norms function as the major premise, while relevant legal issues or factual contexts serve as the minor premise. Conclusions are derived logically to address the research problem.

4. Validation Strategy

Validity is ensured through triangulation of legal sources, consistency checks across regulations, and alignment with established legal doctrines.

5. Reliability Assurance

Reliability is maintained by applying consistent analytical procedures, transparent reasoning processes, and reproducible interpretative steps.

Through this structured analytical framework, the study produces systematic, logically coherent, and empirically grounded legal arguments, thereby ensuring that the findings are both valid and reliable within the scope of normative legal research.

## Result and Discussion

### A. Regulation of Drone Licensing and Operational Rules in the Airspace Management Law

1. Legal Framework for Airspace and Drone Management in Indonesia

Airspace management in the Indonesian legal system is founded upon the principles of state sovereignty and aviation safety as a matter of public interest. The principle of airspace sovereignty constitutes a fundamental doctrine in international air law, affirming that a state possesses complete and exclusive sovereignty over the airspace above its territory, thereby rendering all aviation activities subject to the jurisdiction of the subjacent state (Abdurrasyid, 2014; Kusumaatmadja, 2003). This principle is explicitly affirmed in the *Convention on International Civil Aviation 1944* and has been adopted into national law as the basis for regulating all aviation activities, including the operation of unmanned aircraft.

Within the national legal system, Law Number 1 of 2009 concerning Aviation serves as the foundation for civil aviation regulation by positioning safety and security as the primary objectives of aviation administration. Although the law does not specifically regulate drones, the scope of the aircraft definition enables drones to be classified as legal objects of aviation law, thereby subjecting them to the state's safety and oversight regime (Martono & Sudiro, 2016).

Technical regulations governing drone operations were subsequently formulated through Minister of Transportation Regulation Number 37 of 2020 and CASR Part 107, which regulate altitude limitations, no-fly zones, and administrative licensing mechanisms. However, from a juridical perspective, the status of ministerial regulations as implementing

regulations results in a relatively limited degree of legal certainty, particularly in relation to sanction enforcement (Bediona et al., 2023).

The enactment of Law Number 21 of 2025 concerning Airspace Management marks an important shift in Indonesia's airspace legal system. This law recognizes drones as airspace users who are obliged to comply with state control, the precautionary principle, and the priority of manned aviation safety, while simultaneously strengthening the state's legitimacy in enforcing sovereignty and security over national airspace (Sinaga & Darwis, 2015).

## 2. Regulation of Drone Licensing and Registration

Drone licensing and registration constitute administrative legal instruments functioning as preventive control mechanisms over high-risk activities. From the perspective of administrative law, licensing is understood as a form of state intervention aimed at regulating societal activities in order to protect the public interest (HR, 2018; Mustafa, 2016). The operation of drones, particularly within civil airspace, poses potential risks to aviation safety and public security. Therefore, the obligation to register unmanned aircraft and to certify operators constitutes a primary requirement to ensure technical competence, legal compliance, and the accountability of drone users (Basyuni et al., 2021; Supriyadi, 2014).

Licensing regulations that were previously dispersed across ministerial regulations were subsequently strengthened normatively through Law Number 21 of 2025 as an umbrella norm, thereby providing stronger binding legal force (Law Number 21 of 2025 concerning Airspace Management, 2025). Drone registration also functions as an identification and tracking instrument that strengthens legal accountability in the event of violations or accidents. From the perspective of administrative law theory, this mechanism reflects the principles of legal certainty and accountability in public administration (Hadjon, 2017).

## 3. Rules Governing Drone Operations and the Principle of Aviation Safety

Rules governing drone operations include restrictions on flight altitude, the designation of prohibited zones, regulation of operational time, and the obligation to maintain a safe distance from manned aircraft. Normatively, these restrictions represent a manifestation of the safety principle as the supreme law (*salus populi suprema lex esto*) in aviation law (Supriyadi, 2014). The prohibition of drone operations in airport operational safety zones, national vital objects, and restricted airspace aims to prevent potential disruptions to navigation and the risk of aerial collisions. Law Number 21 of 2025 further emphasizes the obligation of drone operators to comply with the national airspace control system, indicating a shift from a purely administrative approach toward a more comprehensive aviation risk management approach.

## 4. Supervision and Law Enforcement

The effectiveness of drone regulation is largely determined by mechanisms of supervision and law enforcement. Supervision represents a logical continuation of the

licensing system in order to ensure compliance with established legal norms (Soekanto & Mamudji, 2014). In the Indonesian context, the supervision of drone operations involves the Directorate General of Civil Aviation, law enforcement authorities, and the Indonesian Air Force in maintaining sovereignty and defense over national airspace. Law Number 21 of 2025 provides a clearer legal basis for the application of administrative and criminal sanctions against serious violations within airspace. From the perspective of law enforcement theory, the existence of criminal sanctions functions as a deterrent mechanism to prevent violations that may endanger aviation safety and state sovereignty (Abdurrasyid, 2014; Wigyosubroto, 2002).

## **Effectiveness of Drone Licensing Regulations and Operational Rules**

### **1. The Concept of Legal Effectiveness**

Legal effectiveness refers to the extent to which legal norms succeed in achieving the objectives established by lawmakers. Effectiveness is measured not only by the existence of written norms (*law in the books*), but also by their application in practice (*law in action*) (Soekanto & Mamudji, 2014). In the context of drones, the effectiveness of licensing and operational regulations is influenced by the clarity of legal norms, the accessibility of licensing procedures, the level of operator compliance, and the consistency of sanction enforcement.

### **2. Effectiveness of Drone Licensing Regulations**

Normatively, licensing regulations under Law Number 21 of 2025 provide a stronger legal foundation compared to previous sectoral regulations. The obligation of registration and operator certification demonstrates the alignment between legal norms and the objective of aviation safety. However, at the level of implementation, the complexity of procedures and limited public dissemination still have the potential to reduce compliance among drone users (Nurlaeli & dkk, 2024).

### **3. Effectiveness of Drone Operational Rules**

Drone operational rules are designed to prevent conflicts between unmanned aircraft and manned aircraft while also protecting public safety. The effectiveness of these rules largely depends on the consistency of supervision and the firmness of law enforcement. Weak enforcement of sanctions may reduce the deterrent effect and weaken the regulatory objective of aviation safety.

### **4. Regulatory Weaknesses and Future Challenges**

Although the Airspace Management Law has strengthened the legal framework governing drones, several challenges remain, including dependence on implementing regulations, limited adaptation to rapid drone technological developments, and the lack of specific regulations concerning the protection of privacy rights. Therefore, strengthening derivative regulations and enhancing inter-agency coordination constitute essential

prerequisites for realizing airspace management that is safe, orderly, and sovereign (Rahadiyan et al., 2023).

## Conclusion

The overall findings indicate that the enactment of Law Number 21 of 2025 concerning Airspace Management has substantively strengthened Indonesia's legal framework governing drone operations by integrating principles of state sovereignty over airspace and aviation safety with pre-existing regulations, including Law Number 1 of 2009 concerning Aviation, through more structured instruments of licensing, registration, operational control, and sanctions. However, the study identifies a persistent implementation gap, wherein regulatory effectiveness remains constrained by procedural complexity, limited dissemination among operators, uneven supervisory capacity, and the dynamic evolution of drone technology that outpaces regulatory adaptation. These findings imply that legal robustness at the normative level does not automatically translate into regulatory effectiveness without institutional and technological alignment. Accordingly, practical recommendations include the simplification of licensing procedures through integrated digital systems, enhancement of inter-agency coordination in supervision and enforcement, and the development of adaptive regulatory mechanisms that are responsive to technological change. For future research, further empirical investigation is needed to assess operator compliance behavior, the effectiveness of digital governance tools in aviation regulation, and comparative regulatory models across jurisdictions to inform more responsive and evidence-based policy development in drone governance.

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