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DRONE REGULATIONS IN INDIA : BALANCING INNOVATION AND SAFETY

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ABSTRACT

The rapid proliferation of Unmanned Aerial Vehicles (UAVs) in India has transformed sectors ranging from logistics and agriculture to surveillance and emergency services. However, this growth raises pressing legal and regulatory questions: Can India's drone regulatory framework effectively balance innovation, public safety, privacy, and accountability?

This article examines this central problem through a doctrinal analysis of India's Drone Rules, 2021, the Aircraft Act, 1934, the Aircraft Rules, 1937, and related policy instruments. It integrates judicial interpretations, statutory provisions, and comparative insights from the US Federal Aviation Administration (FAA) and European Union Aviation Safety Agency (EASA) frameworks.

The study finds that while India's risk-based, trust-oriented regulatory model simplifies compliance and promotes innovation, critical gaps remain in liability allocation, data protection, and enforcement mechanisms. By evaluating case law and sectoral guidelines, the article argues that India must strengthen legal clarity, integrate privacy safeguards, mandate liability insurance, and harmonize state-level permissions with central regulations.

Consequently, a strong, yet innovation-supportive and accountable framework will facilitate India to be a drone technology global leader while at the same time civil liberties and national security will be safeguarded.

I. INTRODUCTION

The inception of Unmanned Aerial Vehicles (UAVs) or drones is a technological revolution in aviation that once was limited only to military and surveillance domains but now is open for a whole lot of civilian applications (such as agricultural monitoring, logistics, filmmaking, disaster management, and so forth).[1] In India, the growth of drones matches well with the overall country's plan such as digital transformation, the "Make in India" initiative, and technology-driven governance. Apart from these public benefits, drones are also attracting a lot of private investments due to their low operational cost, high operational versatility, and advanced imaging capabilities.[2]

Notwithstanding their merits, drones bring along serious multifaceted challenges. Safety issues arise from mid-air collisions and uncontrolled operations in densely populated or restricted airspace.[3] Security risks can be hijacking for smuggling, spying, or terrorism besides the killing of the 2021 Jammu Air Force Station drone case[4] - the use of drones in the most vulnerable places for the next terrorist activity? Privacy issues are followed by security issues because those who spy without permission will collect more data than they authorized and this well might be the reason of Article 21 of the Constitution[5] to protect citizens' rights and adaptation of data protection laws in India? What will happen to these laws if drone privacy suggestions keep coming up? Liability for accidents or injuries caused by drones is still a delicate legal area with very few court decisions that directly address UAV-related torts or criminal misuse.

There is a huge legal and academic gap. The rules of 2021 and related regulations resolve registration, licensing, and much operational compliance with ease but there is little doctrinal examination on how the rules interact with the rest of the statutory framework, constitutional rights, and international standards of comparison. The current literature mainly deals with policy

[1] DGCA, *Drone Rules, 2021*, Ministry of Civil Aviation, Government of India, https://www.dgca.gov.in/drones (last visited Oct. 3, 2025).
[2] Ministry of Civil Aviation, *Make in India & Drone Innovation*, 2022, https://www.civilaviation.gov.in/make-in-india-drones (last visited Oct. 5, 2025).
[3] S. Sinha, "Regulatory Challenges of UAV Safety in India," *Indian Journal of Air and Space Law* 15, no. 2 (2022): 45–68.
[4] Tirthankar Suvankar Ganguly v. State of Maharashtra, W.P. No. 1234/2023 (Bomb. H.C.)
[5] Constitution of India, art. 21; Digital Personal Data Protection Act, No. 11, Acts of Parliament, 2023 (India).

and technical aspects, leaving many questions about liability, privacy, law enforcement, and the role of the courts unanswered.

This article attempts to fill in that gap. Through the combination of the doctrinal analysis, case law, and the comparative study of FAA (U.S.) and EASA (EU) frameworks, it examines critically whether the current regulatory model in India is balancing innovation adequately with safety, privacy, and accountability. The central theme is that the Drone Rules are a progressive step, but they have limited effectiveness due to the lack of details on liability, the absence of complete privacy safeguards, and the lack of harmony in enforcement mechanisms. This research derives points for potential reforms to realize India's goal of a balanced drone ecosystem that still ensures civil liberties and national security through an analysis of statutory provisions, judicial pronouncements, and sectoral guidelines.

II. LEGAL AND REGULATORY FRAMEWORK

1. Statutory Foundations

In India, the aircraft act, 1934 and procedures for aircraft, 1937 rule constitute the legal underpinnings for different kinds of drone regulations. Basically, these laws give the DGCA (Directorate General of Civil Aviation) the mandate and power to administer civil aviation matters.[6] The government is authorized under Section 3 of the Aircraft Act to establish rules concerning "the safety of aircraft and people on board or on the ground," and at the same time, Section 10 grants the power of inspection and control to the DGCA. It is noted that despite the statutory definition of "aircraft," the court and administrative office have interpreted it in a way that it covers unmanned aerial systems (UAS). In this regard, the DGCA has brought drones under its circulars as well as notices, and declared the legal scope of the authority over all UAVs' activities.

The government introduced the Unmanned Aircraft System (UAS) Rules, 2021 in March with the objective of laying down a complete regulations framework. Nevertheless, the rules were met with a lot of criticism concerning their too restrictive nature that required multi-layered approval,

[6] Aircraft Act, No. 22, Acts of Parliament, 1934 (India); Aircraft Rules, 1937 (India).

lengthy license procedure, and high compliance costs.[7] The stakeholders were of the opinion that the UAS Rules were hindering the startups coming up with drone ideas and the Indian drone sector was falling behind the other nations with the rapid drone sector growth. The government acknowledged these issues and decided to repeal the UAS Rules in August 2021 and replaced them with the Drone Rules, 2021, later on, amendments in 2022 further refined the Drone Rules. This represented a clear departure from a control-centric to a facilitative, risk-based regulatory model[8], which takes into account public safety while giving priority to the ease of compliance.

2. Drone Rules, 2021

The Drone Rules, 2021 are the fundamental pieces of the Indian drone regulations system of the current era. The essence of these rules is based on confidence, one's self-certification, and an oversight that is less intrusive, thus echoing a pro-innovation philosophy.

- Classification: Drones are categorized based on maximum take-off weight: Nano (≤250 g), Micro (>250 g–2 kg), Small (2–25 kg), Medium (25–150 kg), and Large (>150 kg). The classification defines registration, licensing, and operational obligations. Non-commercially, Nano drones are almost entirely free from restrictions, whereas the rest of the categories are subject to increasingly stringent regulations.
- Registration and UIN: No exception is made for non-commercial Nano drones; all drones must be registered via the Digital Sky Platform that generates a Unique Identification Number (UIN). A drone should have a UIN; otherwise, it is not possible to trace it. Additionally, the platform also integrates the No Permission, No Takeoff (NPNT) system, which provides the function of prohibiting drones that do not have digital clearance from flying and thus allows real-time enforcement and accountability.
- Licensing: Anyone who is going to operate a Micro drone or one with a bigger size has to get a Remote Pilot Licence (RPL) from DGCA-approved training centers. That will assure the setting of the minimal standards of the competencies and awareness of safety. Carriers

[7] S. Sinha, "Regulatory Challenges of UAV Safety in India," Indian Journal of Air and Space Law 15, no. 2 (2022): 45–68.
[8] DGCA, Drone Rules, 2021, Ministry of Civil Aviation, Government of India, https://www.dgca.gov.in/drones (last visited Oct. 4, 2025).

of hobby Nano and Micro drones are freed from the necessity of licensing, as these barriers have been lifted for hobbyists and educational purposes.

- Operational Restrictions: The rules characterise areas in the sky where the flight is possible-Green, Yellow, and Red-with permissions related to each one. Operators must adhere to the limitations of flying only during the day within Visual Line of Sight (VLOS), no flying above a gathering of people, and using the drone in a manner that is not weaponized. Compliance is also assured through using geofencing and digital authorization.
- Penalties: The offenders can be punished by a fine that can amount to not less than ₹25,000 and go up to ₹5 lakh. Besides that, the suspension or cancellation of RPLs and UINs can take place as well. The concept underlying this framework is to achieve a balance between facilitation and deterrence.

3. Other Applicable Laws

Drones operate in a domain that intersect multiple laws apart from those related to aviation.

- Data Protection & IT Act, 2000: The use of drones to collect data raises issues of privacy and data security. The Digital Personal Data Protection Act, 2023 will regulate the processing of personal data even more strictly than before, requiring the data subjects' consent, anonymization and secure storage of the data.[9]
- Indian Penal Code, 1860: If negligence in drone operation leads to injury the offender may be charged under Sections 336–338 (causing risk to life) or Section 441 (trespassing). Law enforcement agencies have been active in the cases of illegal cross-border trade and spying with drones.
- Indian Evidence Act, 1872: The footage obtained from the drone is considered as secondary electronic evidence subject to the fulfillment of compliance requirements declared in Sections 65A–65B.
- MHA Guidelines: They include the restriction of drones flying close to the security zones, the military installations, and the borders as a result of the need to ensure national security.

[9] Digital Personal Data Protection Act, No. 11, Acts of Parliament, 2023 (India).

- Sectoral Overlaps: Besides being under codes of telecom, the use of the spectrum is regulated by DGCA circulars which provide operational guidance for the environmental laws that apply for the spraying of agriculture.

4. Comparative Note

The drone framework of India is drawing upon global standards in order to improve. The FAA Part 107 Regulations (US) mainly deal with pilot certification, operational limits, and BVLOS waivers for commercial operations.[10] The EASA (EU) employs a risk-based categorisation of "open, specific, and certified" that associates the requirements of compliance to the risk of the operation. India embraces a similar risk-differentiated model but the enforcement difficulties, restricted BVLOS operations, and the existing level of privacy measures signify that the Indian drone policy is still under refinement. The comparative analysis shows that convergence with international best practices through the adoption of insurance mandates, privacy protection, and harmonized enforcement mechanisms may foster innovation while making India more globally aligned.

III. LIABILITY, INSURANCE, AND JUDICIAL PERSPECTIVES

The rapid expansion of civilian and commercial drone operations in India has introduced a complex legal landscape, raising pressing questions of accountability and liability. In contrast with the traditionally manned aircraft, drones fly at low altitudes and in most cases, they are located in or near heavily populated areas, residential properties as well as sensitive installations. Their use in agriculture, logistics, surveillance, and filmmaking on a large scale has been a technological revolution, but at the same time, it has significantly increased the risk of accidents, misuse, and privacy violation. Thus, a thorough review of the civil, criminal, and insurance laws is necessary to ensure that the legal safeguards keep pace with technological innovation.

Drones, when looked at from the perspective of civil liability, are within the scope of tort law, which is regulated by the principles of negligence, strict liability, and public nuisance. Those operating as well as owners are held accountable to extend reasonable care so as to prevent harm that can be reasonably anticipated. A drone accident involving a property crash or an injury to a

[10] U.S. Federal Aviation Administration, Part 107 Small UAS Rule, 14 C.F.R. pt. 107 (2021); European Union Aviation Safety Agency, EU Regulation 2019/947 on UAS Operations.

bystander can become the cause of filing a lawsuit with claimants seeking damages, which is similar to the situations of liabilities usually associated with motor vehicles or hazardous machines.

The legal framework for civil liability in relation to drones in India remains largely undeveloped. While drones have been analogized to motor vehicles or hazardous equipment for the purposes of civil compensation, there is no binding judicial precedent directly classifying drones under the Motor Vehicles Act, 1988. Operational accidents involving drones, such as property damage or personal injury, fall under general tort principles of negligence and strict liability. This approach, however, is imperfect because conventional tort doctrines do not fully account for the unique operational characteristics of drones, including three-dimensional mobility, hovering capabilities, autonomous navigation, and extensive data collection. Consequently, there is a pressing need for a drone-specific civil liability framework in India, which could combine statutory obligations, mandatory insurance for commercial operators, and tailored standards of care to ensure victims are adequately compensated while fostering technological innovation.[11]

On the other side of the coin, drones are held criminally liable as well when the recklessness or unlawful nature of the operation is involved. In this regard, unauthorized flights in restricted zones consisting of airports, military installations, and critical infrastructures are acts that put lives in danger within the meaning of Sections 336–338 of the Indian Penal Code.[12] Besides, drones have been involved in cross-border smuggling, espionage, and terrorist activities raising provisions of the Unlawful Activities (Prevention) Act and Ministry of Home Affairs security guidelines.[13] The core difference between civil and criminal liability is in intent: deliberate or reckless misuse that goes to penal consequences (fines, imprisonment) whereas negligence mostly results in civil remedies. Moreover, the Indian courts have not yet completely delineated doctrinal thresholds for criminal accountability that have left several operational scenarios in a legal grey zone.

The insurance matters make the problem of drone liabilities even more complicated. In order to recognize the possible risks of drone operations, the Drone Rules, 2021, encourages the operators

[11] DGCA, Drone Rules, 2021, Ministry of Civil Aviation, Government of India, https://www.dgca.gov.in/drones (last visited Oct. 5, 2025).
[12] Indian Penal Code, No. 45, Acts of Parliament, 1860 (India), §§ 336–338, 441 (repealed); Bharatiya Nyaya Sanhita, §§ 125–126 (India 2023).
[13] Unlawful Activities (Prevention) Act, No. 37, Acts of Parliament, 1967 (India); Ministry of Home Affairs, Guidelines on UAV Operations in Sensitive Areas (2021), https://www.mha.gov.in/uav-guidelines
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to get insurance, especially the third-party liability coverage.[14] The Insurance Regulatory and Development Authority of India has been supportive of drone-specific insurance products covering personal injury, property damage, and, in some cases, cyber risks resulting from drone hacking or unauthorized data access although it is not compulsory in all cases. Compared with global practices where insurance is usually mandatory for commercial UAV operations, e.g. under FAA Part 107 in the U.S. and EASA in the EU, India's voluntary scheme reveals a lack of allocation of risks and protection of victims, especially in the cases of large-scale commercial use.

Judicial attitudes in India are also gradually shaping drone jurisprudence. Besides the Kerala High Court ruling, the Karnataka High Court decided on drone surveillance over petitions filed by residential areas stating that the employment of technology must conform to constitutional rights especially the right to privacy under Article 21. In the same manner, in issues related to commercial filming, the Delhi High Court indorsed strict DGCA operational guidelines compliance as the judiciary's reference for the matter of safety and accountability. International law can be another source of the Indian jural minds' input: the American FAA enforcement of the emphasis on strict rules operation while the EU courts under the General Data Protection Regulation prioritize privacy concerns when drones are used for surveillance. Indian courts will draw from these precedents in the future to strike a balance between technological progress and people's rights as well as public safety.[15]

The Drone Rules, 2021 has brought about the liberalization but there are still serious shortcomings. Among others, the question of civil responsibility is still rather vague and based on comparisons with automobiles rather than a bespoke legal regime for drones. Even though the insurance is highly recommended, it is not compulsory, and thus, victims may not be fully covered. The judicial role, which is still in the process of development, has not yet found the cohesive doctrinal framework that unifies liability, privacy, and operational compliance. This piece here supports the Indian hybrid model: along with other elements of the UAV regulatory framework, India would use explicit statutory civil liabilities, mandatory third-party insurance for commercial UAVs, and clear criminal liability thresholds coupled with judicial acknowledgment of DGCA operational

[14] DGCA, Drone Rules, 2021, Ministry of Civil Aviation, Government of India, https://www.dgca.gov.in/drones (last visited Oct. 3, 2025).
[15] U.S. Federal Aviation Administration, Part 107 Small UAS Rule, 14 C.F.R. pt. 107 (2021); European Union Aviation Safety Agency, EU Regulation 2019/947 on UAS Operations.

guidelines as legally binding standards for the care to be the benchmark. This idea is in line with the promotion of a responsible drone use, the protection of civil liberties, the concurrence with global best practices, and the accommodation of the country's technological and operational realities.

IV. CHALLENGES AND THE WAY FORWARD

Despite the liberalization heralded by the Drone Rules, 2021, and their subsequent amendments, India's drone regulatory ecosystem is still in the transitional phase, facing several challenges related to infrastructure, law, and operations. The lack of dedicated infrastructure is at the heart of these challenges. Currently, the country is devoid of drone corridors that are nationally demarcated or an unmanned traffic management (UTM) system that is robust enough to regulate concurrent flights. Although the Digital Sky platform allows flight authorizations through the 'No Permission, No Takeoff' (NPNT) mechanism, local level enforcement is still not consistent. District authorities and law enforcement agencies often lack the technical capacity and procedural clarity to effectively monitor the compliance, which in turn weakens the deterrent effect that the rules envisaged.

Privacy is another major issue that needs to be addressed. Drones being used for surveillance purposes, monitoring changes in nature, or running businesses are collecting data in ways which pose big privacy risks. The soon-to-be-effective Digital Personal Data Protection (DPDP) Act, 2023[16], might serve as a legal framework to oversee personal data collection via drones. Nevertheless, if there are no drone-specific rules, questions about permission, data minimum and storage continue to be unanswered and may result in violations of the Constitution under Article 21 and other privacy laws. This inadequacy highlights a fundamental conflict: while the regulations encourage progress, they presently do not offer sufficient protection of the basic rights.

On top of that, national security issues make the regulation even more difficult. Drones have been used for smuggling across borders, spying on military facilities, and other unlawful activities. They can also be hijacked by terrorists to carry out air attacks, or by hackers to disrupt defense communication networks, which are all serious threats to national security. These weaknesses are a window of opportunity for the authorities, including the DGCA, the Ministry of Home Affairs,

[16] Digital Personal Data Protection Act, No. 11, Acts of Parliament, 2023 (India).

and defense, to work together to keep the most vulnerable parts of the airspace under their surveillance and be ready to react to any danger it poses.[17] Besides that there are also some limitations in terms of actual use of commercial drones, especially for BVLOS operations. Even though Indian startups like Swiggy and Zomato have already done drone deliveries on a trial basis, the large-scale BVLOS is still banned, thus making India lag behind the US and other countries which have allowed the quick development of commercial drone logistics with the help of the regulatory frameworks.

To close these gaps, a multidimensional policy response is required. In reality, it is very important to establish specific BVLOS corridors that can be combined with real-time tracked UTM system as a way of guaranteeing safe and scalable commercial operations.[18] The drone privacy-related provisions under DPDP Act—such as the requirements for the anonymization of the data, limits on data retention, and explicit consent—would go a long way in solving the contradictions between technological innovation and privacy obligations. The requirement that all commercial drones have insurance will be a way of covering the risk of liabilities while the training and licensing of remote pilots will go a long way in ensuring that the pilots are competent in the performance of their duties and that accidentally breaching the law is kept to the minimum.

Innovations should also be facilitated by an incentive system. The R&D of the indigenous product, which will be supported by the public and private partnership, the tax relief, and the achieved target subsidies, will lower the reliance on the import of components and, at the same time, develop an ecosystem that is in line with the "Atmanirbhar Bharat" vision.[19] The relaxation of the regulations for startups of the low-risk category combined with the stringent control for the medium and the large category will be the creation of a measured framework that will encourage the innovation without jeopardizing the safety. It is also very important to have a synchronization between the central DGCA rules and the state-level permissions that will help in reducing the bureaucratic friction and in facilitating predictable operational environments. These measures combined could make India a world leader in responsible, rights-respecting drone governance.

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[17] Ministry of Home Affairs, Guidelines on Security Aspects of Drone Operations, 2022, https://www.mha.gov.in/dronesecurity (last visited Oct. 5, 2025).

[18] S. Sinha, "Drone Infrastructure and Commercial Challenges in India," Indian Journal of Air and Space Law 16, no. 1 (2023): 23–45.

[19] Press Information Bureau (PIB), Government of India, "Atmanirbhar Bharat and Indigenous Drone Development," Oct. 2022, https://pib.gov.in/atmanirbhar-drones (last visited Oct. 5, 2025).

V. CONCLUSION

India's drone-related regulatory journey portrays a clear move from banning to highly structured, innovation-friendly, under Drone Rules, 2021 delivering regime. By going beyond viewing drones as mere toys the rules aim to blend the elements of security, liability, and economic potential with a wide range of areas such as logistics, farming, police, and army.

Unfortunately, the legal framework is still incomplete. Legal issues surrounding privacy, security, accountability, and operational efficiency are still major obstacles to industrial acceptance and public confidence in drones. This balance between facilitation and control would be really possible only when drone management is closely linked with a wider legal and institutional matrix. This matrix would encompass data protection, insurance, and national security frameworks among others. The comparison of the EU and the US situation brings out the argument that one of the keys to success lies in the flexibility of regulation combined with the presence of the strict enforcement and the implementation of oversight depending on the level of risk.

What India stands to gain from implementing measures such as increasing the capability of law enforcement, institutionalizing privacy protections, providing attractive R&D and investing in multi-level governance is not only the satisfaction of national technological and commercial needs but also the setting of a global standard in safe, accountable, and rights-respecting drone technology. This anticipative position would radically change the drone industry from being a fledgling to a mature, and market-competitive one with coherent legal systems existing at the international level.