"FROM MILITARY TOOL TO CIVILIAN TECHNOLOGY – EVOLUTION OF DRONE LAW"

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ABSTRACT

Drones, which are also referred to as Unmanned Aerial Vehicles (UAVs), are pilotless and non-crewed aircraft that are capable of flying either with the use of remote control or through the use of onboard computers[2]*. Unmanned Aerial Vehicles or drones are also referred to in many different ways, such as remotely piloted vehicles (RPV), remotely piloted aircraft (RPA), and remotely operated aircraft (ROA). Remotely Piloted Aircraft System (RPAS) comprises a remotely piloted aircraft (RPA), with the associated remote pilot station(s), command and control links and any other component*[3]*.*

This research analyses the scope of the policies developed via the Convention on International Civil Aviation, which was held in Chicago[4]*, and then delves into the details of India's management regarding civilian and business usage of drones. It additionally addresses the proposed mechanism to put into effect the rules. The paper addresses noteworthy questions that need to be answered*[5]*. Firstly, whether regulatory measures are vital for the status quo of the operation of drones, and secondly, about the Ministry of Civil Aviation and drones and the importance of air transport, thirdly, the difference between aircraft rules and the civil aviation requirements, and most importantly, the need for drone regulation in India*[6]*.*

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[2] ICAO – RPAS Manual *Int'l Civil Aviation Org.*, Manual on Remotely Piloted Aircraft Systems (RPAS), ICAO Doc. 10019, at 1-1 to 1-3 (2015), https://www.icao.int/safety/UA/Documents/ICAO%20RPAS%20Manual%20Doc%2010019.pdf

[3] ICAO – UAS Circular *Int'l Civil Aviation Org.*, Unmanned Aircraft Systems (UAS), ICAO Cir. 328 AN/190, at 1–5 (2011), https://www.icao.int/Meetings/UAS/Documents/Circular%20328_en.pdf

[4] Chicago Convention (Core Framework)
Convention on International Civil Aviation art. 1, 8, Dec. 7, 1944, 15 U.N.T.S. 295, https://www.icao.int/publications/Documents/7300_cons.pdf

[5] ICAO – UAS Circular (Regulatory Need & Global Framework) *Int'l Civil Aviation Org.*, Unmanned Aircraft Systems (UAS), ICAO Cir. 328 AN/190 (2011), https://www.icao.int/Meetings/UAS/Documents/Circular%20328_en.pdf

[6] Ministry of Civil Aviation (India) – Policy Role Ministry of Civil Aviation, National Civil Aviation Policy, 2016, https://www.civilaviation.gov.in/sites/default/files/NCAP_2016_0.pdf

Keywords: Drones, Civil Aviation, policies. laws

INTRODUCTION

The use of drones for the spread of packages in civil, commercial, and naval domains has become common. Nonetheless, the rules and regulations that are required to ensure safe and comfortable drone operations are struggling to keep pace with drone technological developments[7]. The Indian administration in December 2018 launched a policy that legalised the operation of drones by civilians.[8]

The policy released by the Indian civil aviation administration, the Directorate General of Civil Aviation (DGCA), is analysed along with the announced implementation plan to introduce those coverage adjustments through management. The authors examine India's regulation on privacy, which can be implemented to UAVs, and look at the gaps in the rules. The authors attempt to propose alternative solutions to address those issues.

The article contributes to current literature on the subject of drones and outlines the evolution of India's coverage, highlighting regions and making hints for development. The article additionally contributes to the worldwide governance debates on UAVs, including the ones led by ICAO, figuring out a number of the issues confronted with the resource of growing players in growing economies seeking to harness the ability of drones.[9]

The look at proposes numerous high-quality practices for operators to keep away from privacy-centric conflicts at the same time as running drones. They have a look at assertions that the fact collection procedures by way of UAVs must be guided by using the concepts enshrined in statistics protection laws, together with the guidelines of the General Data Protection Regulations by the EU.[10] They have a look at the exceptional positions of nations in respect to drone rules. The take a look at also explores opportunities for cooperation within the governance of drones and for India's ability to anticipate a more distinguished function as a

[7] DGCA Drone Policy 2018 (Legalisation of Civilian Drone Use) Directorate Gen. of Civil Aviation, Civil Aviation Requirements, Section 3 – Air Transport, Series X, Part I: Requirements for Operation of Civil Remotely Piloted Aircraft System (RPAS) (Aug. 27, 2018), https://dgca.gov.in/digigov-portal/?page=jsp/dgca/InventoryList/dataReports/aviationSafety/CAR-Section3-SeriesX-PartI.pdf

[8] Ministry of Civil Aviation – Press Release on Drone Policy (2018 rollout) Ministry of Civil Aviation, Drone Regulations 1.0 to Come into Force from 1st December 2018, Press Release (Aug. 27, 2018), https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1544112

[9] Supra note 6

[10] Drone Privacy & Legal Concerns Timothy T. Takahashi, Drones and Privacy, *Science & Technology Law Review* 14(1) (2013), https://journals.library.columbia.edu/index.php/stlr/article/view/3968

leading regulator within the international attempt to address international imperatives. Recommendations: On the home front, the take a look at argues that India wishes to take a leading function and create a fixed of excellent practices for drone operators that cope with problems of privacy and trespass, in addition to providing a framework to restrict the use of drones for government surveillance. To a global degree, the authors argue that India can make contributions to the advent of worldwide regulations of the road for UAVs and work with other international locations in the standardisation of requirements and their enforcement[11].

OVERVIEW AND BACKGROUND

1.1. Definition of drone

An unmanned aircraft system (UAS) is an aircraft with its associated elements, which are being operated without a pilot on board. Sub-sets of Unmanned Aircraft are Remotely Piloted Aircraft (RPA), Autonomous Aircraft, and Model Aircraft[12].

Drones, which are also referred to as Unmanned Aerial Vehicles (UAV), are pilotless and non-crewed aircraft that are capable of flying either with the use of remote control or through the use of on-board computers.[13] Unmanned Aerial Vehicles or drones are also referred to in many different ways such as remotely piloted vehicles (RPV), remotely piloted aircraft (RPA), and remotely operated aircraft (ROA). Remotely Piloted Aircraft System (RPAS) comprises a remotely piloted aircraft (RPA), with the associated remote pilot station(s), command and control links and any other component[14].

The Civil Aviation Requirements are issued under Rule 15A and Rule 133A of the Aircraft Rules, 1937, which lay down the requirements for obtaining a Unique Identification Number (UIN). Unmanned Aircraft Operator Permit (UAOP) and other operational requirements for civil Remotely Piloted Aircraft System (RPAS) of drones, as we commonly call them.[15]

1.2. History Of Use of Drones

[11] Safety and Privacy Regulations for Unmanned Aerial Vehicles: A Multiple Comparative Analysis, *Technology in Society* (2022), https://www.sciencedirect.com/science/article/pii/S0160791X22002202
[12] Security & Privacy Issues in UAVs A Survey on Security and Privacy Issues of UAVs, *Computer Networks* (2023), https://www.sciencedirect.com/science/article/pii/S1389128623000713
[13] Sana Sultan et al., Cybersecurity Concerns in Surveillance Drones, *International Journal of Engineering Research & Technology* (2022), https://www.ijert.org/cybersecurity-concerns-in-surveillance-drones
[14] Adish Jain, Usage of Drones Leading to Contemporary Sovereignty Issues, *Indian Journal of Law and Legal Research* (2025), https://www.ijllr.com/post/usage-of-drones-leading-to-contemporary-sovereignty-issues
[15] Requirements for operation of Civil Remotely Piloted Aircraft System (RPAS), Office of the Directorate General of Civil Aviation, 1 December 2018.

Drones or Remotely Piloted Aircraft are a technology platform that has extensive applications in a plethora of fields of everyday life, which range from photography, agriculture and also includes infrastructure asset maintenance, insurance, etc. However, if we go on to trace the history of the use of drones in India, it was first used for military purposes.

1.2.1. Military Use of Drones in India

For the first time, India used military drones during the Kargil War of 1999 with Pakistan. The Indian Air Force deployed manned English Canberra PR57 aircraft for photoreconnaissance along the Line of Control (LoC).[16] Since Kargil, India has been successful in procuring a number of Israeli military unmanned aircraft or drones. In 2009, the Indian Air Force entered into a $100 million contract with Israel Aerospace Industries for the procurement of 10 Harops (an anti-radiation drone that can autonomously home in on radio emissions).[17] In 2013, a deal of $280 million was struck between the Indian Air Force and the Israel Aerospace Industries for a new series of Heron medium-altitude, long-endurance drones. In mid-2013, India used the Heron surveillance drones to help in the Maoist problem in the east by deploying Heron surveillance drones over Maoist rebel strongholds in the east. The drones played a significant role in reducing the Maoist activities in the states of Andhra Pradesh, Odisha, and Chhattisgarh[18].

Directorate General of Civil Aviation (DGCA), the regulatory authority under the 'Ministry of Civil Aviation, India had banned aerial surveying using UAVs in October 2014. By 2016, India's Defence Research and Development Organisation (DRDO) successfully completed the test flight of its Rustom 2 drone at the Aeronautical Test Range. Range. Rustom 2 formed a part of the Rustom series of Unmanned Aerial Vehicles (UAVs) which came after Rustom-I, Rustom-H, and Rustom-C.8[19].

By 2018, the Drone 1.0 policy was released by the Civil Aviation Ministry, which made it legal for individuals & companies to operate drones from December 1 in certain areas other than

[16] Tekendra Parmar, 'Drones in India' (4 December 2014), http://dronecenter.bard.edu/drones-in-india/ accessed on 1 November 2018.
[17] Ibid
[18] Military Use & Evolution of UAVs P.W. Singer, Do Drones Undermine Democracy?, *Foreign Affairs* 94(3) (2015), https://www.foreignaffairs.com/articles/2015-04-20/do-drones-undermine-democracy
[19] UAVs in Modern Warfare Michael J. Boyle, The Costs and Consequences of Drone Warfare, *International Affairs* 89(1) (2013), https://academic.oup.com/ia/article/89/1/

those barred for security reasons. Approval of the commercial use of drones as taxis, delivery vehicles, & other services was held back by the ministry.[20]

The most recent use of drones in military operations is the use of drones by the United States of America to strike ISIS-K after the Kabul airport blasts in August 2021[21].

1.3. Classification of drones

The Directorate of Civil Aviation (DGCA) has categorized drones in accordance with Maximum All-Up-Weight in the following manner.

- Nano is Less than or equal to 250 grams.
- Micro is Greater than 250 grams and less than or equal to 2 kg.
- Small is Greater than 2 kg and less than or equal to 25 kg.
- Medium is Greater than 25 kg and less than or equal to 150 kg.
- Large is Greater than 150 kg[22]

1.4. Contemporary application of drones

Drones in India have evolved to have multiple uses which have become very apparent. They could be used for the quick delivery of donated organs, which helps in avoiding the expenses incurred for hiring air transport or having to deal with traffic.[23] They are also used for improving agricultural efficiency by identifying significant factors like moisture content and nutrient soil availability or detection of theft and pilferage of goods that are meant for public utilization.

Mumbai recently became the first city in India to deliver a margarita pizza by the use of a drone. Under the regulations which were prevalent at that time, the use of drones for commercial purposes was illegal in India. Francesco's Pizzeria avoided legal repercussions by

[20] *Flying Drones Will Be Legal from December 1, Ban on Use for Delivery*, IBEF (Aug. 28, 2018), https://ibef.org/news/flying-drones-will-be-legal-from-december-1-ban-on-use-for-delivery
[21] *Flying Drones Will Be Legal from December 1, Ban on Use for Delivery*, IBEF (Aug. 28, 2018), https://ibef.org/news/flying-drones-will-be-legal-from-december-1-ban-on-use-for-delivery
[22] Directorate General of Civil Aviation, *Requirements for Operation of Civil Remotely Piloted Aircraft System (RPAS)*, Civil Aviation Requirements, Section 3 – Air Transport Series X, Part I (Aug. 27, 2018), https://dgca.gov.in
[23] 'Drones may soon be used for organ transplant, (17 September 2015), https://www.deccanherald.com/content/501388/drones-may-soon-used-organ.html accessed on 29 October 2018.

finding a loophole in the law by delivering the pie to the owner's 'friend,' who cannot be termed as a 'customer' and hence, technically did not engage in any commercial transaction.[24]

In 2017, Amazon filed for patents in India for exclusive rights over multi-scale fiducials, black and white marks on any object, for the autonomous aerial vehicles for the purpose of identifying them from a distance[25].

1.4.1. Drone-based applications being explored in India

1. Agriculture- a compilation of plant count, calculation of fair crop loss percentage, crop supervision, and crop maintenance.

2. Insurance collects crop yield data and assesses damage for insurance purposes, catches discrepancies and fraudulent claims, and risk-adjusts product pricing.

3. Media and entertainment- aerial documentary, aerial photography, cinematography[26]

4. Infrastructure- industrial inspections, 3D video mapping, land audit, town planning, site management via capturing, viewing, and analysing aerial imagery and survey data.

5. Mining-thermal imaging, terrain mapping, and change detection, infrastructure, and equipment inspection.[27]

2.1. INTERNATIONAL CIVIL AVIATION ORGANISATION (ICAO)

The International Civil Aviation Organisation (ICAO) was formed in consonance with the Convention on International Civil Aviation, which was held in Chicago on 7th December 1944. India is an original signatory of the Chicago Convention. 4th April 1947, the Chicago Convention came into force. The ICAO has actively regulated as well as published circulars for the purpose of ensuring uniformity in Civil Aviation standards at the international level. India is not only a State Party to the ICAO but also a Member of the Council of States of the ICAO.[28]

[24] Supra note 20.
[25] Directorate General of Civil Aviation. *Requirements for Operation of Civil Remotely Piloted Aircraft System (RPAS).* Civil Aviation Requirements, Section 3 – Air Transport Series X, Part I. Aug. 27, 2018. https://dgca.gov.in
[26] NITI Aayog, *Adoption of Frontier Technologies: Artificial Intelligence & Drones in India* (2020), https://www.niti.gov.in
[27] Federation of Indian Chambers of Commerce & Industry & Ernst & Young, *Making India the Drone Hub of the World* (2022), https://ficci.in
[28] International Civil Aviation Organization, *Unmanned Aircraft Systems (UAS)*, Circular 328 AN/190 (2011).

In 2011. ICAO, through Circular 328 AN/190, has published Rules and Regulations that pertain to and govern unmanned aircraft systems. or drones. These rules are detailed and consist of seven chapters, and numerous appendices providing uniform guidelines for regulating the licensing, use and operations of the unmanned aircraft systems. A copy of the Guidelines was approved by the Secretary-General and published under his authority[29].

ICAO in 2015, by way of Doc. 10019 AN/507, published a manual on remotely piloted aircraft systems (RPAS), which was approved by the Secretary-General and published under his authority. The manual deals with details, rules, and provisions relating to Remotely Piloted Aircraft Systems (RPAS) and governs the technical minutiae regarding the infrastructure and details of systems that are required to be put in place for operations of RPAS[30].

2.2. LEGAL MATTERS

Under the Chicago Convention, a consensus was reached on certain specific rights by the contracting States for the purpose of developing international civil aviation in a safe and orderly manner, and so that the international air transport services may be established on the core principles of equality of opportunity and operated peacefully as well as economically[31]. These rights and obligations apply equally to both manned and unmanned civil aircraft in principle. If new measures are developed for UAS operations, or existing requirements are met using alternative means, such alterations have to be identified and addressed according to the Chicago Convention[32].

2.2.1. The Convention on International Civil Aviation Article 3 bis

In accordance with Article 3 bis, contracting States are permitted, in certain circumstances, to make the civil aircraft flying above their territory land at designated aerodromes.[33]

[29] K. Kirthan Shenoy & Divya Tyagi, *Use of Unmanned Aircraft Systems and Regulatory Landscape: Unravelling the Future Challenges in the High Sky*, 9 Int'l J. Aviation, Aeronautics & Aerospace (2022),
[30] Gaurav Kumar & Ashok Dobhal, *Law of Aviation with Special Reference to Unmanned Aerial Vehicle: A Study with Global Perspective*, Int'l J. Res. Pub. & Rev. (2025)
[31] Convention on International Civil Aviation pmbl., arts. 1, 3 bis, Dec. 7, 1944, 15 U.N.T.S. 295 (entered into force Apr. 4, 1947), https://www.icao.int/publications/Documents/7300_cons.pdf
[32] International Civil Aviation Organization, *Unmanned Aircraft Systems (UAS)*, Circular 328 AN/190, ¶¶ 2.2–2.4 (2011)
[33] Article 3 bis
(b) The contracting States recognize that every State, in the exercise of its sovereignty, is entitled to require the landing at some designated airport of a civil aircraft flying above its territory without authority.... it may also give such aircraft any other instructions to put an end to such violations. (c) Every civil aircraft shall comply with an order given in conformity with paragraph (b) of this Article.

Thus, the pilot of the Remotely Piloted Aircraft or drones has to comply with instructions provided by the State and should possess the ability to divert to the specified airport at the State's request. The request can also be in the form of visual or electronic means. The requirement to comply with the instructions, which are based on visual means, places significant requirements on certification of RPAS (Remotely Piloted Aircraft System) detection systems for international flight operations.[34]

2.2.2. The Convention on International Civil Aviation Article 12[35]

Article 12 of the Chicago Convention put an obligation on the contracting States to maintain national regulations in consonance with the ICAO Standards, to the greatest possible extent, and to prosecute and convict all individuals and parties who violate them.

2.2.3. The Convention on International Civil Aviation Article 29[36]

Article 29 of the Convention on International Civil Aviation talks about carrying original documents in the aircraft. However, when it comes to Remotely Piloted Aircraft, carrying the originals of the documents is neither practical nor appropriate. Thus, the use of electronic versions of these documents is allowed.

2.2.4. The Convention on International Civil Aviation Article 31[37]

Article 31 talks about the certificate of airworthiness that should be issued by the State in which an aircraft (manned or unmanned) is registered. This also applies to unmanned aircraft engaged in international navigation.

2.3. OPERATIONS

When it comes to the case of a manned aircraft, the pilot-in-command is responsible for the detection and avoidance of potential collisions and other hazards. The same requirement is valid in the case of the remote pilot of a Remotely Piloted Aircraft or drone. Technology to

[34] Supra note 29.
[35] Rules of the Air- Each contracting State undertakes to adopt measures to ensure that every aircraft flying over or manoeuvring within its territory and that every aircraft carrying its nationality mark, wherever such aircraft may be, shall comply with the rules and regulations relating the flight and manoeuvre of aircraft there in force. Each contracting State undertakes to keep its own regulations in these respects uniform, to the greatest possible extent, with those established from time to time under this Convention. Over the high seas, the rules in force shall be those established under this Convention. Each contracting State undertakes to ensure the prosecution of all persons violating the regulations applicable.
[36] Convention on International Civil Aviation art. 29, Dec. 7, 1944, 15 U.N.T.S. 295 (entered into force Apr. 4, 1947).
[37] Certificates of airworthiness- Every aircraft engaged in international navigation shall be provided with a certificate of airworthiness issued or rendered valid by the State in which it is registered.

provide sufficient knowledge to the remote pilot regarding the aircraft's environment should be incorporated into the aircraft with counterpart components located at the remote pilot station to fulfil the responsibility.

It is essential that vigilance for the purpose of detecting potential collisions be exercised on board an aircraft, regardless of the type of flight or the class of airspace in which the aircraft is operating, and while manoeuvring on the movement area of an aerodrome.[38]

A fundamental principle of the rules of the air is that a pilot can see other aircraft and hence avoid collisions by maintaining requisite distance from other aircraft and following the right-of-way rules to keep out of the way of other aircraft. Integration of RPA may not require a change to the Standards, but as RPAS technology advances with time, there is a need to develop alternate means of identifying collision hazards. However, the right-of-way rules will remain integral for the safe operation of aircraft, manned or unmanned. For the surface movement of drones in the aerodrome environment, it is necessary that the RPA operations should be conducted safely and efficiently without disrupting other aircraft operations[39].

Aircraft pilots are required to observe, interpret as well as heed a range of visual signals which are intended to attract their attention and/or convey information to them. Remote pilots are subject to the same requirements even though they are not on board the aircraft. This fact necessitates the development and approval of alternate means of compliance with this requirement.[40]

Thus, both the aircraft and the remote pilot station need to incorporate aspects of the aforementioned functionality to gain the complete technical solution required as part of the RPA operational approval.[41] Depending on the type and location of the operations drones will conduct, the aspects of these solutions could include the ability to

- recognise as well as know aerodrome signs, markings, and lighting;
- recognise visual signals (e.g., interception);
- identify and avoid terrain;

[38] Annex 2, paragraph 3.2.
[39] Convention on International Civil Aviation art. 12, Dec. 7, 1944, 15 U.N.T.S. 295 (entered into force Apr. 4, 1947), https://www.icao.int/publications/Documents/7300_cons.pdf
[40] J. Scott Hamilton, *Managing the Drone Revolution: A Systematic Literature Review*, 89 J. Air Transp. Mgmt. 101929 (2020) https://www.sciencedirect.com/science/article/pii/S0969699720305123?utm
[41] R. Clothier et al., *Aviation Safety Regulations for Unmanned Aircraft Operations: Perspectives from Users*, 125 Transp. Pol'y 192 (2022), https://www.sciencedirect.com/science/article/abs/pii/S0967070X22001718?utm

- identify and avoid severe weather;
- maintain applicable distance from a cloud;
- technology to visually separate aircraft from other aircraft or vehicles; and
- avoid collisions.[42]

2.4. CERTIFICATION OF AIRCRAFT AND SYSTEMS

2.4.1. Aircraft Certification Requirements

Certification requirements for civil (commercial) aircraft are obtained from ICAO Annex 8 Airworthiness of Aircraft [43] and the ICAO Airworthiness Manual, Part V State of Design and of Manufacture.[44] Each ICAO contracting state has to then establish its own legal framework to implement the internationally agreed standards and recommended practices. Compliance with the standards is approached in one of two ways, depending on the requirement. For structures, the approach is known as deterministic, and for systems, the approach is known as Probabilistic.[45] In the instance of structures (deterministic approach), No detrimental deformation of the airframe under the loads produced by a given magnitude of manoeuvre. For systems (probabilistic approach) - Any catastrophic failure condition must be extremely improbable (1 in 109 flight hours) and must not result from a single failure[46].

2.4.2. Certification Process

The following steps are involved in giving certification

1. Technical Overview and Certification Basis

2. Certification Programme

3. Compliance demonstration

4. Technical closure and Type Certificate issue

[42] *Unmanned Aircraft Systems (UAS)*, International Civil Aviation Organization (presentation material), https://docplayer.net/7556384-Unmanned-aircraft-systems-uas.html
[43] ICAO 2016.
[44] ICAO 2014.
[45] *Safety First: Analysing the Problematisation of Drones*, 2024 J. Int'l Aviation L. & Pol'y, https://www.tandfonline.com/doi/full/10.1080/10383441.2024.2303937?utm_source=chatgpt.com
[46] R. Clothier et al., *Aviation Safety Regulations for Unmanned Aircraft Operations: Perspectives from Users*, 125 Transp. Pol'y 192 (2022) https://www.sciencedirect.com/science/article/abs/pii/S0967070X22001718?utm_source=chatgpt.com

2.5. Personnel licensing

Personnel Licensing, as mentioned in Annexure 1 of the Chicago Convention, enumerates the minimum training, operation, and licensing standards and specifications that are required to be met by aviation personnel involved in international air navigation.[47]

The issuance of licenses in accordance with Article 32[48] of the Chicago Convention provides a measure of control to the State of Registry over who all should be involved and under what conditions. Licensing authorities and medical examiners have to take into consideration the location and configuration of the remote pilot station (i.e., whether in a building, vehicle-based, ship-based, airborne, handheld, large suite, etc.) when issuing remote pilot licenses. The type of RPA (i.e., airplane, helicopter, powered-lift) a remote pilot is authorized to pilot and any related privileges the license holder may exercise also has to be stipulated[49].

With regard to the present definition of "aircraft certificated for single-pilot operation", a similar definition for "aircraft certificated for remote pilot operation" is adopted for RPA operations[50].

The RPA operating internationally is different from the operation of manned aircraft in a number of ways. The remote pilot license is issued to an individual who will not be with the aircraft as it arrives in a foreign State. Also, the authorities in the Destination State wouldn't have direct personal contact with the remote pilot or members of the remote crew.[51]

3. REGULATIONS OF DRONES IN INDIA: THE LEGAL DEVELOPMENTS

3.1. Need for drone regulation

Drones are now being extensively used for purposes ranging from aerial photography, express shipping, geographic mapping, and crop monitoring to border control surveillance and drone strikes in modern warfare. There have been a number of developments in the adoption of drone

[47] International Civil Aviation Organization (ICAO), *Annex 1 to the Convention on International Civil Aviation: Personnel Licensing* (11th ed. 2011), https://store.icao.int/en/annex-1-personnel-licensing
[48] Convention on International Civil Aviation art. 32, Dec. 7, 1944, 15 U.N.T.S. 295, https://www.icao.int/publications/Documents/7300_orig.pdf
[49] International Civil Aviation Organization (ICAO), *Manual on Remotely Piloted Aircraft Systems (RPAS)*, ICAO Doc 10019 (1st ed. 2015), https://www.icao.int/safety/UA/Documents/RPAS%20Manual%20Doc%2010019.pdf
[50] Timothy M. Ravich, Drones and Aviation Regulation, 66 *DePaul L. Rev.* 487, 505–510 (2017), https://via.library.depaul.edu/law-review/vol66/iss2/5/
[51] Jae Woon Lee, Legal Issues on the Use of Remotely Piloted Aircraft Systems, 81 *J. Air L. & Com.* 233, 245–250 (2016), https://scholar.smu.edu/jalc/vol81/iss2/3/

technology in various sectors.[52] Such adoption has certain far-reaching legal implications. In the absence of well-defined standards, regulations, and operating procedures, the use of drones can create a number of issues and challenges. In light of the development of drone technology and its increasing adoption in different sectors, the following part discusses the legal development in India vis-à-vis the regulation of drones[53].

4.2.2014

One of the first attempts of the Indian government to regulate the use of drones was in the form of a public notice issued by the Office of the Director-General of Civil Aviation (hereafter referred to as "DGCA") on 7 October 2014.[54]

The notice acknowledged the potential menace that can be caused by the use of drones and highlighted the underlying privacy issue. It asserted that the potential operators are required to get approval from the Air Navigation Service provider [Airport Authority of India]. Defence, Ministry of Home Affairs, and other concerned security agencies, besides the DGCA, for civil use of drones, the notice restricted civil use of drones/unmanned aircraft systems (UAS) by non-governmental organizations or individuals, until regulations for the certificate and operation of drones are issued[55].

4.3.2016

As part of its attempt to draw up drone regulations in India, the DGCA released a set of draft guidelines for obtaining unique identification number (UIN) and operation of UAS for civilian or recreational purposes in April 2016[56] and invited comments from various stakeholders on the same.

The draft highlighted the potential benefits of the utilization of drones for damage assessment of property and life in areas affected by natural calamities, surveys, etc., as well as the potential for misuse of UAS, in case it is left unregulated[57]. The draft, for the first time, defined certain

[52] Ministry of Civil Aviation, *Unmanned Aircraft System Rules, 2021*, G.S.R. 589(E), https://egazette.nic.in/WriteReadData/2021/228484.pdf
[53] Ministry of Civil Aviation, *Drone Rules, 2021*, G.S.R. 701(E), https://egazette.nic.in/WriteReadData/2021/230351.pdf
[54] Public Notice- Use of Unmanned Aerial Vehicle (UAV) Unmanned Aircraft Systems (UAS) for Civil Applications, October 7, 2014.
[55] Jae Woon Lee, Legal Issues on the Use of Remotely Piloted Aircraft Systems, 81 J. Air L. & Com. 233, 240–250 (2016), https://scholar.smu.edu/jalc/vol81/iss2/3/
[56] Air Transport Circular XX of 2016-Guidelines for obtaining Unique Identification Number (UIN) & Operation of Civil Unmanned Aircraft System (UAS).
[57] Timothy M. Ravich, Drones and Aviation Regulation, 66 *DePaul L. Rev.* 487, 495–505 (2017), https://via.library.depaul.edu/law-review/vol66/iss2/5/

technical concepts and laid down guidelines for the operation of UAS and obtaining UIN and operation of UAS. All UAS operators were required to comply with these guidelines.[58]

4.4.2017

In November 2017, a year and a half after releasing the 2016 draft guidelines, the DGCA released another set of draft guidelines and once again asked for comments from various stakeholders. In 2018, these guidelines were formalised as part of the National Drone Policy version 1.0.[59]

4.5.2018

In August 2018, the DGCA released National Drone Policy version 1. The Civil Aviation Requirements (CAR) were provided under Rule 15A and Rule 133A of the Aircraft Rules, 1937. It laid down the requirements for obtaining a UIN and Unmanned Aircraft Operator Permit (UAOP) as well as other requirements for the operation of the civil Remotely Piloted Aircraft System (RPAS)[60]. The government further announced that the process of submission of applications and clearances will take place on an online platform called Digital Sky.[61]

The Drone Policy was applicable to all kinds of civil RPAS which are remotely piloted from a Remote Pilot Station. Furthermore, Remote Pilot Aircraft (RPA) for civil purposes was divided into five categories.

a. Nano weighs Less than or equal to 250 grams.
b. Micro weighs Greater than 250 grams and less than or equal to 2 kg.
c. Mini weighs Greater than 2 kg and less than or equal to 25 kg.
d. small weighs Greater than 25 kg and less than or equal to 150 kg.
e. large weighs Greater than 150 kg.[62]

According to the policy, all categories of RPA require UAOP except

a. Nano RPA flying below 50 feet
b. Micro RPA flying below 200 feet and

[58] Ibid
[59] Arindrajit Basu & Anirudh Burman, *Regulating Drones in India*, Carnegie India (2019), https://carnegieindia.org/2019/12/10/regulating-drones-in-india-pub-80597.
[60] Jae Woon Lee, Legal Issues on the Use of Remotely Piloted Aircraft Systems, 81 *J. Air L. & Com.* 233, 248–252 (2016), https://scholar.smu.edu/jalc/vol81/iss2/3/
[61] Supra note 56.
[62] *Unmanned Aircraft Systems (UAS)*, DocPlayer, https://docplayer.net/7556384-unmanned-aircraft-systems-uns.html

c. RPA owned and operated by NTRO, ARC, and Central Intelligence Agencies[63]

Under the policy, only Indian citizens and Indian entities (government/private) are eligible to apply for UAOP. A person cannot act as a remote pilot of more than one RPAS at a time. The policy stipulates that the UAOP will be granted within 7 days and will be valid for 5 years. After 5 years, the same needs to be renewed, during which a fresh security clearance will be required from the Ministry of Home Affairs. Furthermore, the UAOP shall be non-transferable[64].

The policy further divides the flying area into three zones

a. red zones- It is a no-fly area (which includes regions close to airports, national borders, and military bases)

b. yellow zones- Flying in this area would require approvals

c. green zones- They are unrestricted areas

Under the policy, RPAS can only operate within visual line of sight (VLOS), during daytime and up to 400 feet altitude. The RPAS cannot transport any hazardous material and animal or human payload[65].

In case of violation of any of the provisions of the Drone Regulations, the UIN or UAOP can be suspended or cancelled. Certain acts like falsifying any information can be made punishable under the provisions of the BNS, 2023. Furthermore, the provisions of the Aircraft Act, 1934 can also be attracted in certain situations like non-compliance with the direction issued by the DGCA issued under section 5A of the Act. Further, drone policy version 1 also talks about the setting up of a task force called the drone task force for recommendations vis-à-vis modifications in the current policy or formulating a new one.[66]

4.6.2019

[63] Ministry of Civil Aviation, *Drone Ecosystem Policy Roadmap* (2018), https://www.civilaviation.gov.in
[64] Nidhi Singh, Regulation of Drones in India: Emerging Legal Challenges, 8 *Indian J. L. & Tech.* 45, 52–55 (2020).
[65] Anirudh Burman, India's Drone Regulations: Balancing Innovation and Security, Observer Research Foundation Issue Brief No. 290 (2019), https://www.orfonline.org/research/indias-drone-regulations-balancing-innovation-and-security-47650/
[66] Ministry of Civil Aviation, *Digital Sky Platform – Airspace Map & NPNT Guidelines* (2018), https://digitalsky.dgca.gov.in/home

The Draft National Drone Policy version 2.0 was released by the Ministry of Civil Aviation in January 2019, based on the recommendations of the Drone Task Force, which was set up as a result of Drone Policy 1.0.[67]

The draft drone policy 2.0 provided a roadmap for a drone ecosystem for commercial use of drones in India, especially with respect to the transport of temperature-sensitive commodities like body organs; emergency delivery of life-saving drugs, etc. As opposed to its previous version, version 2.0 allowed the RPAS to fly beyond the visual line of sight as well as beyond the current limit of 400 feet above ground level (AGL).

Furthermore, as opposed to version 1.0, which does not stipulate any privacy standards, the draft policy 2.0 mandates privacy by design. The draft policy 2.0 also talks about drone corridors, which are separate airspace demarcated by the appropriate authorities, to separate commercial UAS operations from manned aircraft operations. It further proposes the establishment of UAS Traffic Management (UTM), which will be responsible for managing UAS traffic in the drone corridors. Further, there should be designated areas known as 'drone ports' to facilitate the landing and take-off of drones[68].

Draft policy 2.0 proposes a maximum life cycle for each type of drone to ensure airworthiness. It further proposes establishment of a Drone Directorate within the DGCA to specifically deal with matters relating to RPAS. Draft version 2.0 also recognizes Digital Sky Service Providers (DSPs), which could be public or private entities registered in India, who would provide services to UAS operators. One of the notable features of the draft version 2.0 is its plan to allow 100% foreign direct investment (FDI) under the automatic route in UAS and RPAS-based commercial civil aviation services.[69]

4.7.2020

The DGCA issued a public notice for voluntary disclosure of civil drones and drone operators in the months of January and June 2020.[70] The notice stipulated that on successful submission of the required documents, an ownership acknowledgement number (OAN) and drone acknowledgement number (DAN) will be issued. Although OAN and DAN do not per se confer any right to operate drones in India, ownership of drones without an OAN and DAN shall invite

[67] Ministry of Civil Aviation, *Report of the Drone Task Force* (2017), https://www.civilaviation.gov.in
[68] Ministry of Civil Aviation, Draft National Unmanned Aircraft System (UAS) Policy 2.0 (Jan. 2019), https://www.civilaviation.gov.in/sites/default/files/Draft%20National%20UAS%20Policy%202.0.pdf
[69] Supra note 66.
[70] https://www.medianama.com/wp-content/uploads/MoCA Public-Notice Issuance of DAN 08 June 2020.pdf

penal actions. Furthermore, the DGCA, in June 2020, released a draft Unmanned Aircraft System Rules, 2020 (UAS Rules, 2020). The same was notified as UAS Rules, 2021, in March 2021. The UAS Rules of 2021 repealed the Civil Aviation Requirements (CAR) on the Remotely Piloted Aircraft System (RPAS), which were operational since 2018 (Drone Policy 1.0).

The UAS Rules classified UAS on the basis of flight as

a. Aeroplane
b. Rotorcraft
c. Hybrid UAS

The categorization of UAS as airplane/ rotorcraft/ hybrid is necessary to be mentioned while obtaining a remote pilot license. It does not have any other significant impact on the applicability of the Rules.

Two types of licenses will be issued under the rules Two types of licenses will be issued under the rules

a. Student remote pilot license- the applicant should have passed class X and should have cleared a DGCA specified medical examination and a background check. An individual, before commencing training for obtaining a remote pilot license, has to be in possession of the student remote pilot license.[71]
b. Remote pilot license- the applicant should be of the age group of 18-65 years, should have passed class X, and should have cleared a DGCA specified medical examination and a background check.[72]

No UAS, except the nano class, can be operated without prior permission from the DGCA.[73]

As per the Rules, no one is allowed to fly a drone over a prohibited area. The prohibited area is defined as the airspace of defined dimensions, above the land areas or territorial waters of India within which the flights of unmanned aircraft are not permitted. Restricted areas include a distance within 5 km from the perimeter of international airports at Mumbai, Delhi, Chennai, Kolkata, Bengaluru, and Hyderabad, within a distance of 3 km from the perimeter of any city.

[71] UAS Rules, 2021, Rule 30(10)
[72] UAS Rules, 2021, Rule 31
[73] UAS Rules, 2021, Rule 35(1).

private or defence airport, within 25 km from the international border, etc.[74] Furthermore, there are restrictions vis-à-vis the altitude and the speed at which a drone can be flown. For example, a micro drone cannot be flown beyond 60m height AGL or faster than 25m/s, and a small drone cannot be flown beyond 120m AGL or over 25m/s.[75]

For ensuring safety, the UAS Rules 2021 provide that all UAS, including the nano category, have to be equipped with a global navigation satellite system, autonomous flight termination system, and geofencing capability, among other things.

2021

Liberalised Drone Rules 2021 were introduced towards shaping transitional drone rules with a stricter, comprehensive legislative framework, which was designed to address the security concerns while enabling unconventional commercial applications in India[76].

2025

The major regulatory shift was during September 2025 when the Ministry of Civil Aviation introduced the draft Civil Drone (Promotion and Regulation) Bill, 2025, which is expected to be enacted in 2026. The bill aims to criminalise several violations and charge them as cognizable offences, meaning arrest without warrant. And to impose higher fines and with detention power up to 3 days on suspicion, even before the guilt is established. Furthermore, the bill states that mandatory third-party insurance is required with a fixed compensation of rupees 2.5 lakhs in case of death and 1 lakh for grievous hurt[77]. The Vital Drone Laws aspects are registration and UIN. To get a Unique Identification Number (UIN), which must be displayed, all drones weighing 250 grams or more must register on the Digital Sky Platform. Nano Drone Regulations (<250g), even tiny "toy" drones must now be registered, and commercial usage requires pilot certification. Operating micro and larger drones, particularly for commercial purposes, requires a remote pilot licence (RPL).[78] Regulating Airspace Zoning is essential in the Red Zone, which includes airports and international boundaries, which are examples of no-fly zones that require specific clearance. Yellow Zone: Air traffic control

[74] UAS Rules, 2021, Rule 35(1).
[75] UAS Rules, 2021, Rule 29.
[76] Directorate General of Civil Aviation, *Digital Sky Platform* (for implementation and approvals), https://digitalsky.dgca.gov.in/home
[77] Ministry of Civil Aviation, *Draft Civil Drone (Promotion and Regulation) Bill, 2025* (India), https://www.civilaviation.gov.in
[78] Ministry of Electronics and Information Technology, *Digital Personal Data Protection Rules, 2025* (India), https://www.meity.gov.in

approval is needed for restricted airspace. In Green Zone, you can fly freely up to 400 feet (120 meters) in altitude. The shift to the Civil Drone (Promotion and Regulation) Bill, 2025, has created a number of significant obstacles for operators, companies, and enthusiasts, despite India's goal of becoming a worldwide drone hub by 2030. Regulatory and Compliance, Criminalisation of Minor Errors leads to A significant change in 2025, the implementation of jail sentences (up to three years) for infractions that were formerly punished with administrative fines. Individual operators and early-stage businesses are said to be discouraged by this "punitive-first" strategy. R&D is Uncertain in the 2025 Bill, which eliminates specific exemptions for testing, research, and development that were present in the 2021 regulations. Now, in order to test a prototype, innovators could need to obtain complete certification and registration, which would greatly slow down the iteration process.[79] Type Certification Requirement is vital. Without a Type Certificate granted by the DGCA, no drone may be produced, sold, or even used. This includes a new need that manufacturers get certified before a drone can be sold, which will significantly increase the cost and length of the supply chain. Security and Supply Chain Issues. Import Dependencies are about 60% of essential parts, such as batteries, flight controls, and sensors, which are still imported, mostly from China. National security and the domestic supply chain become susceptible as a result. Drone operators are officially categorised as "Data Fiduciaries" following the publication of the Digital Personal Data Protection Rules, 2025. This calls for "privacy masking" capabilities in firmware and strong verified consent for the collection of identifying data (faces, license plates). In order to prevent abuse in critical regions, sophisticated counter-drone technology, such as RF jammers, is desperately needed yet expensive[80].

RECOMMENDATIONS

1. A framework for balanced regulation - Adopt a compliance-driven and accommodating system instead of a punitive-first one, particularly for small infractions. Establish graded sanctions that differentiate between deliberate abuse and procedural errors.
2. Encouragement of Local Manufacturing - Reduce reliance on imports by providing financial support and specific measures to encourage domestic manufacturing of essential drone components. Encourage MSMEs and entrepreneurs to take part in government-backed drone technology development initiatives.

[79] Drone Federation of India, *Knowledge Centre*, https://dronefederation.in.
[80] Ibid

3. Enhancing Data Security Procedures - Make sure that privacy-by-design concepts, such as safe data storage and real-time data masking, are strictly implemented. Create industry-specific policies for the use of drone data, especially for law enforcement and surveillance. 4. Assistance with Innovation and Research - To encourage experimentation and innovation without undue compliance demands, reintroduce regulatory sandboxes or exemptions for R&D activities. Simplify the certification procedures for academic research institutes and prototype testing.[81]

5. Building Counter-Drone Infrastructure - Invest in locally produced, reasonably priced counter-drone technology, including neutralisation, jamming, and detecting systems. Install these systems in high-security metropolitan areas, borders, and key infrastructure zones. 6. Coordination of Institutions and Policy - Create a specific regulatory agency or fortify already-existing organisations for integrated drone governance. Improve cooperation between data protection authorities, defence organisations, and aviation authorities.[82]

7. Awareness and Capacity Building - Provide drone operators with instruction on safety regulations, ethical use, and legal compliance. Educate the public on the legal ramifications of allowed drone activities[83].

CONCLUSION

The development of drone law from a framework primarily focused on the military to an all-encompassing civilian regulatory system is indicative of the increasing importance of unmanned aerial technology in contemporary government, business, and society. A gradual but dynamic regulatory approach has shaped this shift in India, starting with restrictive measures in 2014, moving on to structured liberalisation through the 2018 Drone Policy, and ending with more expansive but strict frameworks under the Drone Rules, 2021 and the proposed Civil Drone (Promotion and Regulation) Bill, 2025. These advances show India's desire to become a worldwide hub for drones, but they also highlight a complicated regulatory environment that strikes a balance between innovation and privacy, security, and safety issues. The growing dependence on imported parts, the increased responsibilities under data protection regulations, and the rise of counter-drone threats highlight the complex issues facing decision-makers.

[81] Government of India, *Production Linked Incentive (PLI) Scheme for Drones and Drone Components* (2021), https://www.civilaviation.gov.in
[82] International Civil Aviation Organization, *Manual on Remotely Piloted Aircraft Systems (RPAS)*, ICAO Doc 10019 (1st ed. 2015), https://www.icao.int/safety/UA/Documents/RPAS%20Manual%20Doc%2010019.pdf
[83] Drone Federation of India, *Policy Recommendations and Industry Reports* (2022), https://dronefederation.in.

Furthermore, the 2025 Bill's change to a harsher compliance regime raises questions about how it can stifle innovation, entrepreneurs, and research communities. Therefore, the development of drone legislation in India is a reflection of larger technological, economic, and geopolitical factors rather than just a change in the law. To guarantee that the advantages of drone technology are realised without jeopardising individual rights, national security, or industry expansion, a sophisticated and balanced regulatory strategy is necessary.