Comparative Study of South Korea's Drone Law:

Measures to Achieve Viable Urban Air Mobility

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Abstract

Drone laws are an emerging field of law that requires fresh application of existing legal systems. The need is especially urgent in South Korea where the field is rapidly developing while the legal systems are lagging behind. Hence, this thesis examines major legal issues concerning drone laws in South Korea and presents some suggestions for moving forward. To that end, first, this thesis covers international legal instruments. It examines what international laws regulate drones and their operation under the current legal regime, what efforts International Civil Aviation Organization (ICAO) has made to regulate drones, what regulations have been created as a result of such efforts and what the main features of those regulations are.

Plus, the study of domestic laws of advanced aviation states such as the United States and European Union are followed. What laws regulate drone in the US and EU, what the main contents and characteristics of drone laws are, what legal problems they have, and what parts can be referred to for the improvement of Korean laws are reviewed.

Then, this thesis examines Korean drone laws in earnest. What laws regulate drone in current South Korea's legal regime, what the role and problem of special drone act, 'Act On Promotion Of Utilization Of Drones And Creation Of Infrastructure Therefor' is, and what should be done to solve the problem and move forward are covered.

In addition, By doing so, this thesis reviews whether the current status of drone laws in Korea is appropriate to achieve and be applied to urban air mobility ("UAM"), which is an air transport system in a metropolitan city that utilizes vertical air vehicles. Based on the roadblocks to the application of UAM, this thesis uncovers the reasons behind the problems and proposes solutions for the application of drones to achieve UAM.

Résumé

Les lois sur les drones sont un domaine juridique émergent qui nécessite une nouvelle application des systèmes juridiques existants. Ce besoin est particulièrement urgent en Corée du Sud où le domaine se développe rapidement alors que les systèmes juridiques sont à la traîne. Par conséquent, cette thèse examine les principaux problèmes juridiques concernant les lois sur les drones en Corée du Sud et présente quelques suggestions pour aller de l'avant. À cette fin, ce document couvre tout d'abord les instruments juridiques internationaux. Elle examine quelles lois internationales réglementent les drones et leur fonctionnement dans le cadre du régime juridique actuel, quels efforts l'Organisation de l'Aviation Civile Internationale (OACI) a déployés pour réglementer les drones, quelles réglementations ont été créées à la suite de ces efforts et quelles sont les principales caractéristiques de ces réglementations.

En outre, l'étude des lois nationales des États avancés en matière d'aviation, tels que les États-Unis et l'Union européenne, est suivie. Les lois qui réglementent les drones aux États-Unis et dans l'Union européenne, leurs principaux contenus et caractéristiques, les problèmes juridiques qu'ils posent et les parties auxquelles on peut se référer pour améliorer les lois coréennes sont examinés.

Ensuite, ce document examine sérieusement les lois coréennes sur les drones. Les lois qui régissent les drones dans le régime juridique actuel de la Corée du Sud, le rôle et le problème de la loi spéciale sur les drones, "Loi sur la promotion de l'utilisation des drones et la création d'infrastructures à cet effet", et ce qui devrait être fait pour résoudre le problème et aller de l'avant sont couverts.

En outre, ce document examine si le statut actuel des lois sur les drones en Corée est approprié pour atteindre et être appliqué à la mobilité aérienne urbaine ("UAM"), qui est un système de transport aérien dans une ville métropolitaine qui utilise des véhicules aériens verticaux. En se basant sur les obstacles à l'application de l'UAM, cet article découvre les raisons de ces problèmes et propose des solutions pour l'application des drones à l'UAM.

Acronyms and Abbreviations

AAO - Approved Aviation Organization

AC - Advisory Circulars

AGL - Above Ground Level

ATC - Air Traffic control

ATM - Air Traffic Management

C2 - Command and control

CAA - Civil Aviation Authority

DEP - Distributed Electric Propulsion

DOC - Declaration of Compliance

EASA - European Union Aviation Safety Agency

eVTOL - electric-powered Vertical Take-Off and Landing aircraft

EU – European Union

FAA - Federal Aviation Administration

ICAO - International Civil Aviation Organization

K-UAM - Korea Urban Air Mobility

MLIT - Ministry of Land, Infrastructure and Transport

NAS - National Airspace Systems

OACI - l'Organisation de l'Aviation Civile Internationale

PANS - Procedures for Air Navigation Services

PIC - Pilot in Command

RPA - Remotely Piloted Aircraft

RPAS - Remotely Piloted Aircraft Systems

RPV - Remotely Pilotless Vehicle

SARPs - International Standards and Recommended Practices

UA - Unmanned Aircraft

UAM - Urban Air Mobility

UAS - Unmanned Aircraft Systems

UOC - Unmanned Aircraft System Operator Certification

US – The United States of America

UTK - UAM Team Korea

VLOS - Visual Line-Of-Sight

VTOL - Vertical Take-Off and Landing aircraft

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Chapter 1. Introduction

In human history, there have been several monumental events that divide the before and after. Some will say that one such event is the birth of Jesus, while others will cite the French Revolution in 1789. In my opinion, it is the first flight of the Wright brothers in 1903. Since that conspicuous event, air transportation and the aviation industry in the world have advanced remarkably, which opened the door to the global era we see today, freeing the movement of the entire globe from the constraints of time and space. It is difficult to imagine today's world without air transportation and the air industry.

Another remarkable development in aviation technology and the air industry is the emergence of drones,[1] which have recently come under the spotlight. Drones were initially developed for military purposes, and it is believed that the term "drone" was used first in the 1936 report by Lieutenant Commander Delmer Fahrney of the US Navy who was in charge of a radio-controlled unmanned aircraft project.[2] Thereafter, their use in the civilian realm expanded dramatically. Drones are now used in various fields—mining, remote exploration and repair works, geological survey, agricultural land management, urban transport and delivery, aerial photography, media, and more.[3] The global drone market is expected to increase from $22.5

[1] Drone often refers to an aircraft without a pilot on board, and is also called by various terms such as unmanned aircraft, unmanned aerial vehicle, or remotely piloted aircraft. In fact, drones are generally not used as a legal term in most states, but South Korea uses the term 'drone' directly in the special law regulating the aircraft without a pilot on board, so this thesis will continue to use 'drone' as a term referring to an aircraft that dose not have a pilot on board.

[2] David Hodgkinson & Rebecca Johnston, "*Aviation law and Drones: Unmanned Aircraft and the Future of Aviation*" (New York: Routledge, 2018) at 1.

[3] Anthony A. Tarr, Julie-Anne Tarr & Maurice Thompson, "New Horizons" (2022) Drone Law and Policy Global Development, Risks, Regulation and Insurance 3 at 3.

billion in 2020 to $42.8 billion in 2025 with a compound annual growth rate of about 13.8%.[4] Drones are already having an extensive impact on our daily lives and their influence in various industries is expected only to grow.

But with the expansion of drone use comes a growing concern: possible accidents caused by and risk of drones. There may be injuries to third parties on the ground and threats from illegal drone operations to aircraft operations in the air. And these concerns are becoming substantiated across the globe. For instance, from 2015 to 2020, there were approximately 4,250 drone injuries in the US; there was even a case where one person was killed by electrocution while trying to retrieve a drone from power lines with a metal pole.[5] In South Korea also, there was a large-scale accident in 2019. During the Torch of Independence event held in Daejeon to commemorate the 100th anniversary of the Provisional Government of Korea, a drone carrying a torch crashed into the spectators, causing serious injuries to three people.[6]

The issue of damage caused by the illegal flight of drones is also serious. On July 19, 2015, wildfires occurred from Los Angeles to Las Vegas in the US, and the entry of a firefighting helicopter was delayed for 20 minutes due to the five hobby drones trying to film a wildfire scene. The fire burned 3,500 acres of forest and destroyed 20 vehicles. Firefighters said

[4] ResearchAndMarkets.com, "The Drone Market Report 2020 - 2025" (2020) Businesswire, 21 July 2020 (https://www.businesswire.com/news/home/20200721005593/en/Drone-Market-to-Grow-from-22.5-Billion-in-2020-to-Over-42.8-Billion-by-2025-at-a-CAGR-of-13.8---ResearchAndMarkets.com).

[5] Serap Gorucu & Yiannis Ampatzidis, "Drone Injuries and Safety Recommendations" (2021) AE560 University of Florida IFAS Extension 1 at 2.

[6] Sanggon Lee, "Drone crashes during 'Torch of Independence' relay, three persons injured" (2 April 2019) YTN (https://www.ytn.co.kr/_ln/0115_201904021758306421).

the 20-minute delay increased the damage seriously.[7] Meanwhile, in South Korea in 2020, an unauthorized drone flew near the runway of Incheon International Airport within a 2.7 km radius. This was an illegal flight in an area where flying is prohibited, and the security personnel, the police agency, and the military personnel were urgently mobilized to respond to it, causing take-off and landing operations to be suspended for three hours. As a result, 11 flights were delayed, and one plane failed to land at the airport and returned to Gimpo Airport in Seoul.[8]

To prevent the recurrence of similar incidents and accidents, safe operation and proper management of drones are essential. In addition, to ensure the safety of drones, the enactment and the improvement of related laws are required. In South Korea, the need for legal regulations for the safe operation of drones and the minimization of damage to the ground and traditional air transportation has increased continuously. Reflecting these concerns and requirements, on May 1, 2020, the Act on Promotion of Utilization of Drones and Creation of Infrastructure Therefor was adopted in South Korea (the "Drone Act").[9]

Nevertheless, for more efficient and effective drone control, it is necessary to accurately identify the problems in the Korean air law system, including the Drone Act, and to find ways to improve the applicable legal systems. This is why it is essential and efficient to research

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[7] Michael Martinez, Paul Vercammen & Ben Brumfield, "Above spectacular wildfire on freeway rises new scourge: drones" (19 July 2015) CNN (https://www.cnn.com/2015/07/18/us/california-freeway-fire/index.html).

[8] Changseon Hong, "Whitin 3km radius of Incheon Airport, drone appearance→Military spatch...Claims to shoot a music video" (12 December 2020) Newsis (https://newsis.com/view/id =NISX2020122 _0001281497&cID=10802&pID=14000).

[9] *Act On Promotion Of Utilization Of Drones And Creation Of Infrastructure Therefor (2020),* Act No. 16420, South Korea 2022 (*드론 활용의 촉진 및 기반 조성에 관한 법률*) [*Drone Act*].

international air laws and comparative legal studies of drone-related laws in advanced aviation states like the US and EU.

To this end, this thesis inspects international laws regulating drones and their operation under the current legal regime. Then, the study of local laws of advanced aviation states, such as the US and EU, follows to answer the questions: What are the main content and characteristics of drone laws in the US and EU? What legal problems do they have, and what parts of the legal structure can be used as a reference in improving the relevant laws in Korea?

Specifically, this thesis utilizes the definition, classification, registration, license, and safety inspection (airworthiness) of drones as the main criteria for the research of international air laws and domestic laws on drones. The definition of a drone is the starting point for drone research, and important issues, such as the possibility of autonomous flying, are derived according to the definition. Especially, the classification of drones has a crucial meaning in the legislation of drones. International regulations and domestic laws of most states classify drones according to their risk levels and stipulate different requirements for flight compliance and drone management, such as operator licenses and safety assessment.

Another major issue this thesis examines is whether the current drone-related laws of South Korea can be applied to the operation of urban air mobility ("UAM"). UAM refers to the air transportation system that expands the existing air traffic area connecting airports outside the city into the city center. It is a new-emerging idea of air transport that is expected to substantially reduce traveling time in the city center especially notorious for the traffic jam in the world.[10]

[10] Timothy M Ravich, "On-Demand Aviation: Governance Challenges of Urban Air Mobility ("UAM")" (2020) 124:3 Penn State LR 657 at 658.

However, to proceed with this research, the relationship between drones and UAM must be examined in advance. That is why UAM should be handled in this drone-related thesis.

The Korean government announced the "The Road Map for Preemptive Deregulation in the Drone Sector" in 2019 ("Drone Road Map").[11] The Drone Road Map contains the direction of drone development from 2019 to the 2030s. There, the government plans to implement passenger transport by drones in 2025.[12] In other words, the Drone Road Map shows that drones will be one of the main transport means of UAM, meaning that UAM must be another major research area for drones and drone laws.

Hence, this study examines the problems of and ways to improve South Korea's drone-related laws and whether they can be applied to UAM. Specifically, there are five parts to this examination:

First, this thesis explains international laws regulating drones under the current aviation legal regime. This part examines current international laws, such as the Convention on International Civil Aviation (the "Chicago Convention")[13] and its Annexes, that regulate drones and their roles and effectiveness. In addition, other international regulations focusing on drones,

[11] South Korea, Joint of related ministries, *The Roadmap for Preemptive Deregulation in the drone sector* (2019) (*선제적 규제 혁파 로드맵 - 드론 분야 -*)[*Drone Road map*].

[12] *Ibid* at 4.

[13] *Convention on International Civil Aviation*, 7 December 1944, 15 UNTS 295 (entered into force 4 April 1947) [*Chicago Convention*].

such as the ICAO Model UAS Regulations (2020)[14] and ICAO Manual on Remotely Piloted Aircraft Systems (RPAS) (2015)[15] are also reviewed.

The second part of this thesis looks into the legal issues of drone laws in the US. What are the laws related to drones? What are the unique characteristics of US drone laws? What is the relationship between US federal laws and state laws? What are the drone-related regulations in the Code of Federal Regulations? From this inquiry as well, this study finds implications for the improvement of Korean laws.

Third, the legal issues of drone laws in the EU are summarized. What are the laws related to drones? What are the main characteristics of EU drone laws? What is the relationship between EU drone laws and its member state's laws? And what are the problems with EU drone laws? Then, this thesis finds implications for the improvement of Korean laws.

Fourth, this thesis loops back to drone laws in Korea. The special law regulating drones, the Drone Act,[16] and other air laws related to drones like the Aviation Safety Act (2021)[17] are examined. Furthermore, based on the comparative study of the US and EU laws, measures to overcome the current limitations are presented.

Lastly, this thesis will review whether drones can be used for UAM, a method of urban air transportation system under the current South Korean air law system. the Korean government submitted a special bill on UAM, "Act on Promotion and Support of Urban Air Mobility

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[14] ICAO, *ICAO Model UAS regulations (2020), Part 101, 102, and 149* (entered into force 28 February 2020).

[15] ICAO, *ICAO Manual on Remotely Piloted Aircraft Systems - RPAS (2015),* Doc 10019 AN/507 (2015) [*ICAO RPAS Manual*].

[16] *Drone Act, supra* note 9.

[17] *Aviation Safety Act (2017),* Act No. 14116, South Korea 2023 (*항공안전법*) [*Aviation Safety Act*].

(2022)"[18] to the National Assembly in August, and it is currently pending in the National Assembly. This thesis, hence, reviews the definition and the operation concept of UAM of the said bill, thereby presenting improvement measures for Korean drone laws to be applied to UAM.

[18] *Act on Promotion and Support of Urban Air Mobility (2022),* Bill No. 16930, Iniatiator: 13 members of the National Assembly including Iljun Seo, (19 August 2022), South Korea National Assembly (*도심항공교통 활용 촉진 및 지원에 관한 법률안*) [*UAM bill*].

Chapter 2. International Laws on Drones under the Current Aviation Legal Regime

A. Overview of the current international air law on drones and efforts to integrate drones into the legal systems

International air law is basically based on treaties between states. Furthermore, regarding certain professional and technological issues, international organizations are established to deal with critical issues. The International Civil Aviation Organization (ICAO) is an intergovernmental organization established by the Chicago Convention[19] to ensure the safe and orderly growth of international civil aviation across the globe.[20]

The Chicago Convention's Article 8 (Pilotless Aircraft) is a rule on drones and is the only international law governing drones to date. It reads:[21]

> "No aircraft capable of being flown without a pilot shall be flown without a pilot over the territory of a contracting State without special authorization by that State and in accordance with the terms of such authorization. Each contracting State undertakes to insure that the flight of such aircraft without a pilot in regions open to civil aircraft shall be so controlled as to obviate danger to civil aircraft."

[19] *Chicago Convention, supra* note 13 part II.

[20] *Ibid* art 44.

[21] *Ibid* art 8.

The language shows that drones existed even before World War II when the Chicago Convention was signed,[22] but this is the regulation on the authorization to the international flights of drones and the maintenance of safety for civil aviation in the contracting states and does not directly deal with the operation of drones itself, including the definition of drone, flight safety, aircraft airworthiness, and pilot license.

ICAO, the organization responsible for the development of international civil aviation, has continued to spearhead global efforts to create an international regime for drones.[23] The effort began with the inclusion of drone terminology into international standards and recommended practices (SARPs). SARPs are not international law itself, but they can be applied to all contracting states of the Chicago Convention. This means that its influence is expansive. The first regulations of SARPs related to drones were adopted on March 2012 in Annex 2[24] of the Chicago Convention, "Rules of the Air" and Chicago Convention Annex 7[25] "Aircraft Nationality and registration Marks".[26] The main content is about the definition, classification and simple tasks of drones, which states:

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[22] Fernando Fiallos, "The application of the public international air law regime to the operation of UAS" (2016) The law of unmanned aircraft systems : an introduction to the current and future regulation under national, regional and international law 25 at 32.

[23] Hodgkinson*, supra* note 2 at 39-40.

[24] ICAO, *Annex 2 to the Convention on International Civil Aviation - Rules of the Air (2012),* International Civil Aviation Organization (2005) [*Annex 2*].

[25] ICAO, *Annex 7 to the Convention on International Civil Aviation - Aircraft Nationality and Registration Marks (2012),* International Civil Aviation Organization (2012) [*Annex 7*].

[26] Fiallos*, supra* note 22 at 29.

Annex 2. Rules of the Air

- Command and control (C2) link: The data link between the remotely piloted aircraft and the remote pilot station for the purposes of managing the flight.[27]
- Remotely piloted aircraft (RPA): An unmanned aircraft which is piloted from a remote pilot station.[28]
- Remotely piloted aircraft system (RPAS): A remotely piloted aircraft, its associated remote pilot station(s), the required command and control links and any other components as specified in the type design.[29]
- Remotely piloted aircraft: A remotely piloted aircraft shall be operated in such a manner as to minimize hazards to persons, property or other aircraft and in accordance with the conditions specified in Appendix 4.[30]

Annex 7. Aircraft Nationality and Registration Marks

2. CLASSIFICATION OF AIRCRAFT

2.2 An aircraft which is intended to be operated with no pilot on board shall be further classified as unmanned.

2.3 Unmanned aircraft shall include unmanned free balloons and remotely piloted aircraft.[31]

[27] *Annex 2, supra* note 24 at 1-4.

[28] *Ibid* at 1-7.

[29] *Ibid* at 1-7.

[30] *Ibid* art 3.1.9.

[31] *Annex 7, supra* note 25 art 2.

In addition, ICAO continued its efforts to create a systematic regulation regime at the international level for drones beyond simple tasks attaching the drone-related definitions and classification attachments in SARPs. The first major product of that effort is Circular 328 AN/190 Unmanned Aircraft Systems (UAS) (the "ICAO UAS Circular").[32] [33]

This Circular elucidates the goal of ICAO in addressing unmanned aviation. It is to provide the fundamental international regulatory framework through the SARPs, with supporting Procedures for Air Navigation Services (PANS) and guidance material, to underpin the routine operation of UAS throughout the world in a safe, harmonized, and seamless manner comparable to that of manned operations. It also said this circular is the first step in reaching that goal.[34]

Furthermore, this circular explains the purpose of such efforts. It is to apprise states of the emerging ICAO perspective on the integration of UAS into non-segregated airspace and at aerodromes, consider the fundamental differences from manned aviation that such integration will involve, and encourage states to help with the development of ICAO policy on UAS by providing information on their own experiences associated with these aircraft.[35]

The ICAO UAS Circular, as the first regulation regime for drones, focuses on establishing a general concept of drone operation and the relationship between unmanned aircraft and manned aircraft. First, it regulates the general concept of operation. Specifically, it states that the remotely-piloted aircraft system (RPAS) comprises a set of configurable elements

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[32] Hodgkinson*, supra* note 2 at 40.

[33] ICAO, *Unmanned Aircraft Systems (UAS) (2011),* Cir 328 AN/190 (2011) [*ICAO UAS Circular*].

[34] *Ibid* at (iii) Forward.

[35] *Ibid* at 2 art 1.6.

including an remotely-piloted aircraft (RPA), its associated remote pilot station(s), the required command and control link (C2 link), and any other system elements as may be required, at any point during flight operation. Other features may include, *inter alia*, software, health monitoring, air traffic control (ATC) communications equipment, a flight termination system, and launch and recovery elements.[36]

It also elucidates the relationship between the aircraft and unmanned aircraft as follows: ICAO recognizes many categories of aircraft, among them balloons, gliders, aeroplanes, and rotorcraft. Aircraft can be land, sea, or amphibious. Whether the aircraft is manned or unmanned does not affect its status as an aircraft. Each category of aircraft will potentially have unmanned versions in the future. This point is central to all further issues pertaining to unmanned aircraft and provides the basis for addressing airworthiness, personnel licensing, separation standards, etc.[37] To the maximum extent possible, all terms in common use in ICAO documents will remain unchanged by the introduction of UAS.[38]

This means the unmanned aircraft is the aircraft—hence, basically, the regulations on aircraft and aviation can be applied to unmanned aircraft (drones) if they do not have essentially different parts, or unless otherwise stated.

To make this more clear, the ICAO UAS Circular clarifies the relationship between unmanned aircraft and the Chicago Convention in Chapter 4. The basic principle is as follows: Specific rights and obligations have been agreed upon by the contracting states so that international civil aviation may be developed in a safe and orderly manner and that international

[36] *Ibid* at 8 RPA System Concept art 3.8.

[37] *Ibid* at 4 Fundamentals art 2.5.

[38] *Ibid* at 4 art 2.6.

air transport services may be established based on equality of opportunity and operated soundly and economically. These rights and obligations will, in principle, apply equally to both manned and unmanned civil aircraft.[39]

The ICAO UAS Circular, as the first major regulation for drones, made a significant contribution to establishing the basic concept of drone operation, making it clear the relationship between unmanned aircraft and manned aircraft, and integrating drone operation into the Chicago Convention. However, this circular does not set out the regulation regarding the operation and safety of the drone itself in earnest. This can be regarded as a kind of transitional regulation on drones. Nevertheless, the contribution of the ICAO UAS Circular cannot be ignored in that it has laid the cornerstone for legal regulations on drones.

ICAO's efforts to establish a regulatory regime for drones continued, and these efforts will create a manual in the technical field, especially with respect to remotely piloted aircraft systems (RPAS). That is the Manual on Remotely Piloted Aircraft Systems (2015 Doc 10019 AN/507) (the "ICAO RPAS Manual").[40]

This manual is only for RPAS, one type of unmanned aircraft,[41] which means this addresses RPAS as one subset of UAS,[42] so autonomous unmanned aircraft is not within the scope of this manual.[43] Interestingly, the ICAO RPAS Manual does not apply to model aircraft, because many states identify them as those used for recreational purposes only, and for which

[39] *Ibid* at 11 chapter 4 Legal Matters art 4.1.

[40] *ICAO RPAS Manual, supra* note 15.

[41] *Ibid* at 1-1 art 1.1.1.

[42] *Ibid* at 1-8 art 1.5.1.

[43] *Ibid* at 1-8 art 1.5.2 b)

globally harmonized standards are not considered necessary.[44] This means that the ICAO RPAS Manual applies only to RPA for commercial or professional purposes.[45] The purpose of this manual is to provide guidance on technical and operational issues applicable to the integration of RPA in non-segregated airspace and at aerodromes.[46] The ICAO RPAS Manual has great significance in that it establishes basic technical concepts related to RPA and specifies certain operational issues in detail. But the ICAO RPAS Manual also does not deal with legal issues related to drone regulation that can be applied to member states, such as definition, classification, operation, license, and airworthiness.

Legal regulations on drones had been implemented by the domestic laws of the leading countries in aviation, so ICAO had developed a drone model regulation that can become an international standard and example that member states may consider for implementation to regulate the operation of Unmanned Aircraft Systems (drones).[47] These regulations are ICAO Model UAS Regulations Part 101 ("ICAO Model Regulations 101") and Part 102 ("ICAO Model Regulations 102")[48] and ICAO Model UAS Regulations Part 149 ("ICAO Model Regulations 149").[49]

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[44] *Ibid* at 1-8 art 1.5.2 d)

[45] Hodgkinson*, supra* note 2 at 40.

[46] *Ibid* at 1-7 art 1.4.

[47] Chris Morrison, et al "Transnational Organization" (2022) Drone Law and Policy Global Development, Risks, Regulation and Insurance 288 at 290.

[48] ICAO, *ICAO Model UAS regulations Part 101, and 102 (2020)* (entered into force 23 June 2020) [*ICAO Model regulations 101 or ICAO Model regulations 102*].

[49] ICAO, *ICAO Model UAS regulations Part 149 (2020)* [*ICAO Model regulations 149*].

These model regulations were made by a compilation drawn from current UAS regulations in effect in Vanuatu, New Zealand, Australia, Canada, and the United States and included usual and customary elements of other member states.[50] These regulations are not intended to be prescriptive, mandatory, or construed in any way to pre-empt individual states' legal structures. They are meant to offer model language for States to facilitate the establishment of UAS regulations.[51]

Meanwhile, The ICAO Model UAS regulations are accompanied by Advisory Circulars (AC)[52] [53] and guidance material to assist member states' Civil Aviation Authority (CAA) personnel in the implementation and oversight of UAS operations. The ACs and guidance material serve as an example for ICAO member States to create, add or amend existing or future national UAS guidance material by the respective CAA.[54]

These regulations are the most recent regulation of ICAO, and they stipulate overall matters related to drone operation and management. Therefore, this thesis discusses related issues such as the definition, classification, registration, license, and safety inspection (airworthiness) of drones based on the regulations.

B. Definition of Drones

[50] *ICAO Model regulations 101 and 102, supra* note 48 at 1 Description.

[51] *Ibid* at 1 Description.

[52] ICAO, *ICAO Advisory Circular 101-1 (AC) (2020)* (entered into force 23 June 2020) [*ICAO AC 101-1*].

[53] ICAO, *ICAO Advisory Circular 102-1 (AC) (2020)* (entered into force 23 June 2020) [*ICAO AC 102-1*].

[54] *ICAO Model regulations 101 and 102, supra* note 48 at 1 Description.

The terminology representing drones has changed over time. In 1944, the term, Pilotless Aircraft, emerged in legal instruments. In the 1960s the term, Remotely Pilotless Vehicle (RPV), was used. Then, it was replaced by Unmanned Aerial Vehicle in the 1980s. Later, terms like Unmanned Aircraft or Unmanned Aircraft system were adopted; more recently, a new term, Remotely Piloted Aircraft System, has been introduced.[55] But one common thread here is that the definition of drones is the starting point for drone research. When only based on the exactly fixed definition of a drone, establishing the operation concept and making the regulation of the drone are possible. In particular, the matter is whether the concept of 'drone' contains unmanned aircraft that operate fully autonomously. In this part, this thesis will examine the definition of drones in international air law (Chicago Convention), ICAO UAS Circular, ICAO RPAS Manual, and ICAO Model Regulations.

First, regarding the Chicago Convention, Article 8 of the Chicago Convention regulates "Pilotless Aircraft." But nowhere in the Chicago Convention does it stipulate what Pilotless Aircraft is. However, we can derive its meaning through the ICAO RPAS Manual. It says that the Eleventh Air Navigation Conference (ANConf/11, Montréal, 22 September to 3 October 2003) endorsed the global air traffic management (ATM) operational concept which contains the following text:

> "an unmanned aerial vehicle is a pilotless aircraft, in the sense of Article 8 of the Convention on International Civil Aviation, which is flown without a pilot-in-command on-board and is either remotely and fully controlled from another place (ground, another aircraft, space) or programmed and fully autonomous."[56]

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[55] Ronald Schnitker & Dick Van Het Kaar, *Drone law and policy: Integration into the legal order of civil aviation* (Hague: Eleven International Publishing, 2021) at 10.

[56] *ICAO RPAS Manual, supra* note 15 at 1-1, 1-2 art 1.2.4, 1.2.5.

This can be regarded as ICAO's interpretation of Chicago Convention article 8. Therefore, we can come to the conclusion that Pilotless Aircraft is an aircraft without a pilot on board either remotely controlled or programmed fully autonomously.

ICAO UAS Circular also has some explanations of terms. Some definitions of drones are as follows.

'Unmanned Aircraft' is an aircraft that is intended to operate with no pilot on board. 'Remotely-piloted aircraft' is an aircraft where the flying pilot is not on board the aircraft. 'Autonomous aircraft' is an unmanned aircraft that does not allow pilot intervention in the management of the flight.[57] It is clear that unmanned aircraft include Remotely-piloted aircraft and Autonomous aircraft according to the description of the ICAO RPAS Manual above. However, in the ICAO UAS Circular, the definition of a remotely-piloted aircraft is not clear. In other words, a remotely-piloted aircraft is defined as 'an aircraft' other than 'an unmanned aircraft', so this means a remotely-piloted aircraft includes an aircraft that can be operated by a pilot on board but also can be operated temporarily without a pilot on board.

To solve this problem, the ICAO RPAS Manual revised the definitions of remotely-piloted aircraft as follows. Remotely piloted aircraft (RPA) is an unmanned aircraft that is piloted from a remote pilot station.[58] In other words, it cleared that remotely piloted aircraft does not allow a pilot to be on board by changing the word "aircraft" to "unmanned aircraft." It also clarifies that remotely piloted aircraft is differentiated from autonomous aircraft by attaching "which is piloted from a remote pilot station" to its definition.

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[57] *ICAO UAS Circular, supra* note 33 at (ix), (x).

[58] *ICAO RPAS Manual, supra* note 15 at (xviii).

The most recent product, ICAO Model Regulations, defines drones as follows: "Unmanned aircraft (UA) is an aircraft that is intended to be operated with no pilot onboard. Remotely piloted aircraft (RPA) is an unmanned aircraft that is piloted from a remote pilot station."[59] In conclusion, "Remotely Piloted Aircraft" is distinguished from "Autonomous Aircraft', and "Unmanned Aircraft" is a concept that includes both remotely piloted aircraft and autonomous aircraft.[60]

C. Classification of Drones

The classification of drones has crucial implications. The operation limit of a drone, whether the pilot's license must be obtained, and whether safety-related regulations such as airworthiness are applied may be dependent on that classification. This part will examine the criteria and effects of drone classification based on ICAO Model Regulations.

ICAO model regulations are divided into Part 101 and Part 102 according to the risk level. Part 101 is aimed at lower-risk operations, and Part 102 is directed toward those Unmanned Aircraft that are not covered within Part 101.[61] More precisely, Part 101 applies to all Unmanned Aircraft System users. This part allows lower-risk operations to take place without burdensome authorization requirements, as long as the operator remains compliant with the limitations set out in Part 101 and the UA is registered. On the other side, Part 102 is designed

[59] *ICAO Model regulations 101, supra* note 48 art 101.003.

[60] See, *ICAO RPAS Manual* Figure 1-1.

[61] Morrison, *supra* note 47 at 291.

for higher-risk operations. It is flexible in that very few activities are prohibited. Instead, a UAS authorization or a UAS operator certificate (UOC) will be required.[62]

The criteria that divide Part 101 and Part 102 are the weight and operation way of the unmanned aircraft. Part 101 only applies to drones weighing 25 kg or less that can fully comply with Part 101 operation regulations. Any aircraft weighing more than 25 kg and those that cannot comply with Part 101 regulations must follow the rules under Part 102.[63] The major operational restrictions of Part 101 are as follows:

> Under Part 101, the operation of a UA is subject to the following elements: fly only in daylight; give way to all manned aircraft; be able to see the UA with your own eyes (Visual Line of Sight); maintain flight at or below 120 m (400 ft) above ground level (AGL); the UA is not operated within [30 m] of a person, measured horizontally, who is not directly associated with the operation of the UA; have knowledge of airspace restrictions that apply in the area of operation; fly no closer than 4 km from any aerodrome; obtain an air traffic control (ATC) clearance issued by the local ATC unit, if planning to fly in controlled airspace; remain clear of special-use airspace unless permission is given by the administering authority of the area (e.g. restricted or military operating areas); the person operating the UA operates only that UA; obtain consent from anyone you plan to fly above; and obtain consent from the property owner or person in charge of the area you plan to fly above.[64]

[62] *ICAO AC 101-1, supra* note 52 at 5.

[63] *Ibid* at 6.

[64] See *ICAO Model regulations 101* art 101.7 and *ICAO AC 101-1* at 6.

In conclusion, if the drone weight exceeds 25 kg, or even if the weight does not exceed 25 kg, if the drone does not meet the requirements of Part 101, Part 102 will apply, which means the drone operator must apply for a UAS authorization or a UAS certificate (UOC) under Part 102.[65]

One thing to note is that ICAO model regulations do not classify Model aircraft (Model aircraft is traditionally regarded as UA flown by hobbyists for purely recreational purposes) as a separate category like the US. That is because these rules do not make a distinction between UA based on the purpose of the operation (e.g. commercial, professional, or recreational). This position reflects the view that the aviation-related risk posed by UA differs very little between a UA that is used for recreational, commercial, or professional purposes.[66]

I agreed with this point of view because in the light of the development of drone technology these days, it cannot be asserted that the risk level of model aircraft is less than that of drones for commercial, or professional purpose.

D. Drone Registration

Under ICAO model regulations, drone registration is mandatory. Every person lawfully entitled to the possession of a UA and who will operate a UA in a specified country shall register that UA and hold a valid certificate of registration for that aircraft from the CAA in compliance with the CAA registration rule or the appropriate aeronautical authority of a

[65] *ICAO AC 101-1, supra* note 52 at 6.

[66] *Ibid* at 6.

contracting state of ICAO or the appropriate aeronautical authority of another state that is a party to an agreement with the government of a specified country which provides for the acceptance of each other's registrations.[67]

Registration has important implications in two respects under the ICAO model regulation regime. It allows the identification of the aircraft and owner and provides the CAA with data regarding the industry. Registration is also a way to record experience with a particular model of UA should the operator elect to expand operations into Part 102.[68] In other words, as drones become more popular, the possibility of drone accidents is increasing, and if the victims of injuries or damage cannot identify drone operators in the event of a drone accident, they will have difficulty securing appropriate compensation for their damages.[69] In addition, in the event of an accident, the drone operator must report the accident details to CAA within 48 hours about serious injury to any person and damage to any property other than the UA that exceeds an amount determined by the competent authority stated in the country's currency.[70] Hence, the government can secure major flight performance records for UA and UA operators.

ICAO model regulation imposes registration obligations on very small drones (usually 2 kg or less) and micro drones (usually 250 g or less), which may be considered impractical and ineffective. But I think in order to ensure safety in drone operation, registration for all drones has more to gain than to lose because even micro drones can be used for illegal purpose such as

[67] *ICAO Model regulations 101, supra* note 48 art 101.5.

[68] *ICAO AC 101-1, supra* note 52 at 8 art 101.5.

[69] Morrison, *supra* note 47 at 292.

[70] *ICAO Model regulations 101, supra* note 48 art 101.009.

invasion of privacy by illegal filming or acquisition of personal information without persons' consent.

E. Drone Licenses

Whether a drone operator needs a drone pilot's license depends on the drone itself and the way how it is operated. In other words, a drone license is not required in the area to which part 101 applies, but part 102 requires a drone license from the drone operator.[71] In order for accruing a drone license, the following two conditions must be satisfied: One is general aviation knowledge (incorporating such things as airspace and air law); the other is detailed knowledge of the UA (including aircraft handling), so a pilot license will be evidence of these things.[72]

A person who wants to get a remote pilot license must be 16 years of age or older. The CAA may issue a remote pilot license to the applicant if the following two requirements are met. The first thing is if he or she has passed; an aeronautical knowledge examination within the meaning of certification of pilots for a license; or an aviation license theory examination taken to be an equivalent requirement for the issuance of a remote pilot license; or the theory component of a remote pilot training course; or the theory component of a course conducted in a foreign country which the CAA is satisfied is equivalent to the theory component of a remote pilot training course.[73]

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[71] *ICAO Model regulations 102, supra* note 48 art 102.0.

[72] *ICAO AC 102-1, supra* note 53 art 102.23(b)(6).

[73] *ICAO Model regulations 102, supra* note 48 art 102.1(a).

The second is if he or she has completed: a remote pilot training course in the operation of a category of the UA that he or she proposes to operate; or a training course in the operation of a category of UA that he or she proposes to operate conducted by the UA's manufacturer or an agent of the manufacturer; or a flight test conducted by the CAA for the purposes of this subparagraph and has demonstrated the competencies required for the safe operation of the applicable type of UA and associated UA control station, under standard UA operating conditions.[74]

Basically, Part 101 does not require a remote pilot qualification. However, for Part 101 operations on or within 4 km of an aerodrome, other than a shielded operation conducted outside of the boundary of the aerodrome, it is expected the remote pilot or operator would, at a minimum, have knowledge of the use of aeronautical charts and airspace[75] so that an assessment of the operation and full compliance with Part 101 can be made.[76]

It can be concluded that it is reasonable to divide whether or not a drone operator obtains a drone license according to the risk level of drones. However, ICAO model regulations divide Part 101 and Part 102 basically according to weight. The purpose for regulating UA of all sizes is foremost air safety, especially the prevention of collision and the protection of third parties on the ground.[77] Drones over 250 g can damage a person's head considering the kinetic energy

[74] *Ibid* at 16-17 art 102.1(b).

[75] *ICAO Model regulations 101, supra* note 48 art 101.41.

[76] *ICAO AC 101-1, supra* note 52 at 7 Pilot/Operator qualifications.

[77] Stefan A. Kaiser, "Small and Micro Unmanned Aircraft" (2016) The law of unmanned aircraft systems : an introduction to the current and future regulation under national, regional and international law 15 at 17.

applied to the human body, in the event of a crash accident.[78] Therefore, I believe it is desirable to subdivide drones in more detail even in the scope where they are 25kg or less, regarding whether it is necessary to obtain a remote pilot license according to the weight of the drone.

F. Unmanned Aircraft System Authorization or Unmanned Aircraft System Operator Certification (UOC)

Part 102 is designed for higher-risk operations, so a UAS authorization or a UAS operator certificate (UOC) will be granted on a case-by-case basis once the CAA is satisfied that the operator has identified the hazards associated with the intended operations, the associated consequences, and has a plan in place to mitigate those risks. It is flexible in that very few activities are prohibited with them.[79] In order to satisfy CAA and acquire such authorization and UOC, The key points are the plan for risk mitigation, how to deal with that risks and what kind of actions to take against possible dangers during the drone operation.[80]

Therefore, the application for authorization and UOC must address the matters having regard to the nature, degree, and risk of the intended operation. The main requirements are as follows:

> The identification of a person who will have primary responsibility for the operation; the identification of any person who is to have or is likely to have

[78] Ji-Hoon Kim, "Recent Trends of the Amendment of Provisions on the Unmanned Aircraft in EU Aviation Laws and Its Implications to the Republic of Korea" (2019) vol. 56 Kangwon Law Review 33 at 65 (김지훈, EU 항공법상 무인항공기 관련 규정의 최근 개정 동향 및 시사점).

[79] *ICAO AC 101-1, supra* note 52 at 5.

[80] Morrison, *supra* note 47 at 296.

> control over the exercise of the privileges under the certificate; details of the physical locations to be used in the operation; an operational risk assessment that: (i) identifies the known and likely consequences to hazards to people, property and other aircraft of the proposed operation; (ii) includes a description of the measures that will be implemented to mitigate or manage the risk; procedures for reporting information to CAA including incidents and accidents; operating requirements for personnel licensing, qualifications, training and competency including remote pilot and remote flight crew qualifications, training or medical requirements; details of the number and specifications of the aircraft to be used, including any identification system used on the aircraft (for example color schemes, unique identification numbers, markings); details of the control system to be used to pilot the aircraft; procedures for the maintenance of aircraft and measures to ensure continued airworthiness; in flight procedures, including minimum distances from persons or property; procedures for handling cargo, including dangerous goods, or dropping items, if such operations are intended; the manufacturer's Declaration of Compliance or approval from an AAO.[81]

The CAA may issue a UAS authorization or a UOC to a person who has applied under rule 102.23 (described above).[82] Plus, when issuing or renewing a UOC under this Part, the CAA shall specify a date on which the UAS operator certificate will expire.[83]

Compared to South Korea's air law system, which requires flight authorization in the ultra-light vehicle flight restricted airspace, air control zone, and flight prohibited zone, plus

[81] *ICAO Model regulations 102, supra* note 48 art 102.23.

[82] *Ibid* at 23 art 102.25.

[83] *Ibid* at 24 art 102.31.

flights over 150 m altitudes, and over 25kg weight drone,[84] the range of authorization is more extensive, so I think it is desirable because it is able to guarantee drone safety much more.

G. Safety Inspection (Airworthiness) of Drones

Airworthiness is the measure of an aircraft's suitability for safe flight. The airworthiness objective of an operation with a UAS is targeted primarily at the protection of human beings and property on the surface by not increasing the risk compared with traditional manned aircraft of the equivalent category.[85] As technology for UAS allows a wide range of possible operations, the requirements related to airworthiness, the organizations and the persons involved in the operations of UAS should be set out in order to ensure safety for people on the surface and other airspace users.[86] Unfortunately, under the current systems, there are no recognized design standards, configuration requirements, or airworthiness certificates that apply to UA.[87]

Under ICAO model regulations, there are no airworthiness requirements for the UA in Part 101 unless the UA weighs more than 15 kg. UA weighing more than 15 kg but 25 kg or less requires inspection and approval from an Approved Aviation Organization (AAO), or the manufacturer may file a Declaration of Compliance for a model of UA that specifies the demonstrated capabilities of the UA that the CAA accepts. By providing the additional division

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[84] *Aviation Safety Act, supra* note 17 art 127.

[85] Schnitker*, supra* note 55 at 244.

[86] *Ibid* at 244-245.

[87] *ICAO AC 102-1, supra* note 53 art 102.23(b)(12).

of 15 kg to 25 kg or less, the CAA has additional flexibility to delineate between UAs that warrant additional scrutiny without requiring any additional remote pilot qualifications.[88]

As mentioned above, drones weighing 15 kg or less are not subject to airworthiness, there are no recognized requirements or certificates that apply to those UAs. However, for the safe operation of drones, the UA should be appropriate for the intended use, be of a suitable manufacturing standard, be assembled, constructed, and maintained in accordance with the manufacturer's instructions, and should be operated in accordance with the manufacturer's limitations.[89]

In the case of a drone of more than 25 kg which is subject to airworthiness, as there are no recognized design standards or configuration requirements, the CAA will undertake initial airworthiness assessments on a case-by-case basis. The CAA's assessment will consider whether the UA has been designed and constructed to an appropriate standard or safety assurance level and whether it is suitable for the proposed operation to be conducted, equipment to be used, or payload that will be carried. This can be evidenced by submitting a Declaration of Compliance (DOC) from the manufacturer or the person who constructed the UA.[90]

UA weighing more than 15 kg and 25 kg or less do not require authorization from the CAA, but it is required that the UA be constructed or inspected and approved[91] under the

[88] *ICAO AC 101-1, supra* note 52 at 5.

[89] *Ibid* at 7.

[90] *ICAO AC 102-1, supra* note 53 art 102.23(b)(12).

[91] *ICAO Model regulations 101, supra* note 48 art 101.21.

authority of an Approved Aviation Organization, or the UAS manufacturer must have issued a Declaration of Compliance that has been accepted by the CAA in accordance with Part 102.[92]

The manufacturer declaration is self-certification to the CAA that the UAS complies with a performance standard and ensures the UAS meets the appropriate safety level for a category of operation.[93] The manufacturer's declaration shall specify the manufacturer of the UAS, the model of the system, the maximum take-off weight of the UA, the operations that the UA is intended to undertake, and the category of UA such as fixed-wing aircraft, rotary-wing aircraft, hybrid aircraft or lighter-than-air aircraft and specify that the system meets the means of compliance applicable to the operations for which the declaration was made.[94]

H. Implications and Interim Summary

ICAO model regulations were created with reference to the domestic laws of the United States, Canada, Australia, New Zealand, and Vanuatu.[95] Therefore, it is regarded that the scope is very exclusive and reflects each law's advantage relatively well. Conversely, this point also implies that the ICAO Model Regulations do not play a leading role in enacting global drone-related legislation. For example, with respect to airworthiness for drones, ICAO has not

[92] *ICAO AC 101-1, supra* note 52 at 6.

[93] *ICAO AC 102-1, supra* note 53 art 102.307.

[94] *ICAO Model regulations 102, supra* note 48 art 102.307.

[95] *ICAO Model regulations 101 and 102, supra* note 48 at 1 Description.

provided any recognized standards,[96] because it is based on the practical experiments and data obtained by industrial research of each country.

Plus, some parts are questionable as to their feasibility. For instance, when operating a drone over a person, it stipulates that the person's approval must be obtained in advance,[97] but there is no regulation on how to obtain such consent. In addition, this also raises questions about the feasibility of obtaining consent if a person passes by suddenly below the flying drone.

Nevertheless, the ICAO model regulations dealt with a wide range of drone operations and management. Above all, it would be of great significance as it presented a standard regulation model for each country's drone legislation related to actual drone operation and safety.

[96] *ICAO AC 102-1, supra* note 53 art 102.23(b)(12).

[97] *ICAO AC 101-1, supra* note 52 at 11 art 101.25(a)(1).

Chapter 3. Current Laws on Drones in the US

A. **Overview**

The US, where the Wright brothers' first flight took place, is the largest aviation industry state and the most advanced nation in the aviation field, and the same goes for drones. As can be seen from the fact that the ICAO Model Regulations are largely based on US law,[98] the regulatory structure in the US provides a good indicator as to where future drone regulation is likely headed and is a good potential marker for other jurisdictions currently less advanced in their consideration of drones issues.[99]

The early US aviation sector was governed by the Air Commerce Act of 1926,[100] the Civil Aeronautics Act of 1938,[101] and the Federal Aviation Act of 1958.[102] [103] In particular, the Federal Aviation Act of 1958 gave birth to Federal Aviation Administration (FAA).[104] [105] It has

[98] *ICAO Model regulations 101, supra* note 48 at 1 Description.

[99] Jeffrey Ellis, "National regulatory structure and responses: USA" (2021) Drone Law and Policy Global Development, Risks, Regulation and Insurance 319 at 319.

[100] *Air Commerce Act of 1926*, 49 USC § 171 (1926).

[101] *Civil Aeronautics Act of 1938*, 49 USC § 401 (1938).

[102] *Federal Aviation Act of 1958*, 49 USC Ch 1 (1958) [*Federal Aviation Act*].

[103] Ellis*, supra* note 99 at 322.

[104] *Federal Aviation Act, supra* note 102 preface, Title I s 101.

[105] FAA, "Origins of the FAA" FAA official website, Federal Aviation Admistration/ About FAA/ History/ A Brief History of the FAA < https://www.faa.gov/about/history/brief_history#birth >.

the authority to regulate civil aviation to promote safety.[106] In line with its scope of work, the FAA issues and enforces regulations and minimum standards covering manufacturing, operating and maintaining aircraft including drones,[107] so it has played a crucial role in regulating drones in the US.

The origin of a specific regulatory regime regarding drones can be traced back to the first attempts to regulate the use of model aircraft.[108] [109] Model aircraft are, as the name suggests, small-scale models of larger aircraft. Such models and persons flying the same have been in existence since the early 1900s.[110] With the growth of model aircraft flying, the FAA saw the need to regulate that aircraft[111] and issued an advisory circular in 1981.[112] This advisory circular outlines, and encourages voluntary compliance with safety standards for model aircraft operators.[113]

However, since then, the use of drones for commercial business purposes as well as model aircraft for simple recreational purposes has increased dramatically. Therefore, the need

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[106] See, FAA, "Mission" FAA official website, About FAA/ Mission/ What we do/ Summary of Activities <https://www.faa.gov/about/mission >.

[107] Fernando Fiallos, "Unided States" (2016) The law of unmanned aircraft systems : an introduction to the current and future regulation under national, regional and international law 341 at 343.

[108] Ellis*, supra* note 99 at 322.

[109] The definition, history of regulation including laws, operational limitation of model aircraft, and whether drone-related laws apply to model aircraft or not will be discussed in detail in the part "C. Classification of drone".

[110] Ellis*, supra* note 99 at 322.

[111] *Ibid* at 323.

[112] US, Federal Aviation Administration, *Model Aircraft Operating Standards* (Advisory Circular AC 91-57) (Washington, D.C. Department of Transportation, 1981) [*AC 91-57*].

[113] *Ibid* art 1.

for regulating it has been required continuously, so in 2005, the FAA issued a memorandum to regulate drones. It was "Unmanned aircraft systems operations in the US National Airspace System–Interim Operational Approval Guidance."[114] Its purpose is to provide the guidance to be used to determine if UAS may be allowed to conduct flight operations in the US National Airspace Systems (NAS).[115]

Shortly after, in 2007, the FAA issued another Policy Statement[116] clarifying its earlier guidance regarding the operation of unmanned aircraft in the National Air Space.[117] That statement implies there needs to be another drone category to be distinct from model aircraft.[118] This proves that the FAA recognized the need for regulations against the risks that a dramatic increase in small drones other than model aircraft could cause.

As a result of these efforts, the FAA Modernization and Reform Act of 2012 was implemented in 2012.[119] The Act clearly stipulated in its definition[120] that "unmanned aircraft" was an "aircraft".[121] It also defined model aircraft for the first time by law[122] and stipulated

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[114] US, Federal Aviation Administration, *Unmanned aircraft systems operations in the US National Airspace system – Interim Operational Approval Guidance*. (Memorandum AFS-400 UAS POLICY 05-01) (Washington, D.C. Department of Transportation, 2005) [*Policy 05-01*].

[115] *Ibid* art 1.

[116] US, Federal Aviation Administration, *Unmanned Aircraft Operations in the National Airspace System* (Policy Statement FAA-2006-25714) (Washington, D.C. Department of Transportation, 2007) [*Policy Statement 2007*].

[117] Ellis*, supra* note 99 at 325.

[118] *Policy Statement 2007, supra* note 116 at 6.

[119] *FAA Modernization and Reform Act of 2012*, 49 USC § 40101 (2012) [*Reform Act 2012*].

[120] The definition of "Unmanned Aircraft" will be examined in detail in the part "B. Definition of drones".

[121] *Reform Act 2012, supra* note 119 s 331.

[122] *Ibid* s 336 (c).

some special rules to be applied thereto.[123] In addition, by newly classifying "small unmanned aircraft", which is distinguished from model aircraft, it established a basis for specifically regulating small drones that are most frequently used in reality from other drones.[124]

On the other hand, the explosion of drones has raised concerns about the dangers drones can pose to national emergencies and national infrastructure.[125] To control this situation, the FAA Extension, Safety, and Security Act of 2016 was enacted in 2016.[126] For example, this Act bans operating an unmanned aircraft and in so doing knowingly or recklessly interfering with wildfire suppression, law enforcement, or emergency response effort, so a person who breaks this prohibition is liable to the United States Government for a civil penalty of fines.[127] Plus, it stipulates drone flights can be prohibited near critical infrastructures such as energy production, transmission, distribution facilities, and railroad facilities.[128]

Meanwhile, an contentious part of the United States air law including drone law is the issue of legislative power between the federal and state governments. As examined above, the FAA, established by the Federal Aviation Act of 1958, has the authority to enact regulations on civil aviation matters, but the state government has legislative powers over the property and safety of the state's territories, and sometimes it could be an obstacle to the safety of aviation.

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[123] *Ibid* s 336 (a).

[124] *Ibid* s 331.

[125] Ellis*, supra* note 99 at 328.

[126] *FAA Extension, Safety, and Security Act of 2016*, 49 USC § 40101 (2016) [*Extension Act 2016*].

[127] *Ibid* s 2205.

[128] *Ibid* s 2209.

This is a long-standing problem in US aviation law. Regarding this matter, the Supreme Court first noted that the airspace within which these flights were operated had been recognized by Congress to be under federal, not state or local control.[129] The Supreme Court then noted that the Administrator of the FAA had broad authority to regulate the use of navigable airspace.[130] This matter applies to drones as well. The FAA Modernization and Reform Act of 2012 also confirms the authority of the FAA as follows; Federal agencies that employ unmanned aircraft systems technology in the national airspace system, and the unmanned aircraft systems industry, shall develop a comprehensive plan to safely accelerate the integration of civil unmanned aircraft systems into the national airspace system.[131]

Plus, the FAA published the Fact Sheet in 2015 to clarify the legislative power between the federal and state governments.[132] This was created to ensure the maintenance of a safe and sound air transportation system and navigable airspace free from inconsistent restrictions, FAA has regulatory authority over matters pertaining to aviation safety.[133] The fact sheet declared the need for exclusive legislation by the federal government for air safety warning the dangers of state legislation as follows;

Substantial air safety issues are raised when state or local governments attempt to regulate the operation or flight of aircraft. If one or two municipalities enacted ordinances

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[129] Ellis*, supra* note 99 at 321.

[130] *Ibid* at 321.

[131] *Reform Act 2012, supra* note 119 s 332.

[132] US, *State and Local Regulation of Unmanned Aircraft Systems (UAS) Fact Sheet* (Fact Sheet 2015) (Washington, D.C. Department of Transportation, 2015) [*Fact Sheet 2015*].

[133] *Ibid* at 2.

regulating UAS in the navigable airspace and a significant number of municipalities followed suit, fractionalized control of the navigable airspace could result. In turn, this 'patchwork quilt' of differing restrictions could severely limit the flexibility of the FAA in controlling the airspace and flight patterns, and ensuring safety and an efficient air traffic flow. A navigable airspace free from inconsistent state and local restrictions is essential to the maintenance of a safe and sound air transportation system.[134]

In conclusion, the federal government has exclusive legislative authority on flight operations, aviation safety, and the management of national airspace.

B. Definition of Drones

Of the various terminologies used to refer to drones, the FAA has adopted the name "Unmanned Aircraft".[135] First, The FAA's 2005 Guidance, Policy 05-01 defines Unmanned Aircraft as follows; Unmanned Aircraft - a device that is used or intended to be used for flight in the air that has no onboard pilot. This includes all classes of airplanes, helicopters, airships, and transnational lift aircraft that have no onboard pilot. A UA is an aircraft as defined in 14 CFR 1.[136]

However, since Policy 05-01 defines Unmanned Aircraft as the term "device" that has a truly wide spectrum, it raises controversy whether Unmanned Aircraft is an aircraft or not. This

[134] *Ibid* at 2 Regulating UAS Operations.

[135] Schnitker*, supra* note 55 at 14.

[136] *Policy 05-01, supra* note 114 art 5.

matter has significant implications, because if it is a broader concept than aircraft, various aviation laws that have applied to aircraft may not apply to Unmanned Aircraft.

The FAA Modernization and Reform Act of 2012 settled this problem by defining "Unmanned Aircraft" as "Aircraft." The definition is as follows; The term "unmanned aircraft" means an aircraft that is operated without the possibility of direct human intervention from within or on the aircraft.[137] The Code of Federal Regulations also defines unmanned aircraft in the same way as the Reform Act of 2012.[138]

One thing to note here is that the definition of Unmanned Aircraft in this Act does not mention drones that fly autonomously, such as autonomous aircraft.[139] Since there is no other limitation on the definition, it is judged reasonable that Unmanned Aircraft is a concept that includes both autonomous aircraft and remotely piloted aircraft.

C. Classification of Drones

In the US aviation legal system, drones are largely classified as Unmanned Aircraft (large), Small Unmanned Aircraft, and Model Aircraft. Unmanned Aircraft and Model Aircraft are also Aircraft,[140] because "aircraft" means any contrivance invented, used, or designed to navigate or fly in the air.[141] In other words, a 1 kg Unmanned Aircraft and an Airbus 380 with a

[137] *Reform Act 2012, supra* note 119 s 331.

[138] *Aeronautics and Space, 14 CFR Part 1 § 1.1 (1962)* [*14 CFR*].

[139] *ICAO UAS Circular, supra* note 33 at (ix).

[140] *Reform Act 2012, supra* note 119 s 331, 336.

[141] *Transportation*, 49 USC § 40102 (2011) [*Transportation*, 49 USC].

take-off weight of 575 tons are both considered aircraft according to the definition of the United States code.[142]

Therefore, unless there are some specific provisions regarding UA, basically all provisions related to aircraft apply to unmanned aircraft and model aircraft. But certain exceptions are recognized in this regulatory system for model aircraft and small UAS. This is because the most commonly used drones in the US are model aircraft and small UAS, so some preferential actions are given to them to facilitate using those aircraft, but at the same time, certain special restrictions are placed on them for the safe operation of them.

First, examining the model aircraft, the first movement to regulate model aircraft was in 1981. It was "Model Aircraft Operating Standards" (Advisory Circular AC 91-57).[143] At that time it was regarded that model aircraft can at times pose a hazard to full-scale aircraft in flight and to persons and property on the surface, and it was believed that establishing standards and complying with those standards will help reduce the potential for that hazard and create a good neighbor environment with affected communities and airspace users.[144]

It sets out five standards that Model Aircraft must follow, which were as follows:

> A. Select an operating site that is of sufficient distance from populated areas. The selected site should be away from noise sensitive areas such as parks, schools, hospitals, churches, etc.
> B. Do not operate model aircraft in the presence of spectators until the aircraft is successfully flight tested and proven airworthy;

[142] Fiallos*, supra* note 107 at 349.

[143] Ellis*, supra* note 99 at 323.

[144] *AC 91-57, supra* note 112 art 2.

C. Do not fly model aircraft higher than 400 feet above the surface. When flying aircraft within 3 miles of an airport, notify the airport operator, or when an air traffic facility is located at the airport, notify the control tower, or flight service station;

D. Give right of way to, and avoid flying in the proximity of, full-scale aircraft. Use observers to help if possible;

E. Do not hesitate to ask Air Traffic Service or assistance from any airport traffic control tower or flight service station concerning compliance with these standards.[145]

This Advisory Circular has significance in that it was the first instrument to regulate Model Aircraft. However, this was only a legally non-binding advisory circular[146] and above all, it had intrinsic defects in fact that there was no definition of Model Aircraft in spite of regulating the operation of that.[147]

Afterward, in 2005, the FAA published a policy memorandum on the Unmanned Aircraft systems operations in the US National Airspace system,[148] and the contents of the Model Aircraft are included in that. It says as follows; Advisory Circular (AC) 91-57, Model Aircraft Operating Standards, published in 1981, applies to model aircraft. UA that comply with the guidance in AC 91-57 are considered model aircraft and are not evaluated by the UA criteria in this policy.[149]

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[145] *Ibid* art 3.

[146] *Ibid* art 1.

[147] Ellis*, supra* note 99 at 324.

[148] *Policy 05-01, supra* note 114.

[149] *Ibid* art 6.13.

This regulation has crucial important implications. The first is that it acknowledges that the Model Aircraft is an Unmanned Aircraft, and the second is that nonetheless, the policy on Unmanned Aircraft does not apply to the Model Aircraft. In other words, this implies that Model Aircraft will be excluded from its application in the legislation on Unmanned Aircraft in the future.

But it is still pointed out as a big problem that this memorandum does not have a definition of Model Aircraft like the Advisory Circular in 1981.[150] This means that no legislative development on Model Aircraft has taken place for about 25 years. This is likely because model aircraft were considered akin to a hobby activity and in the US, drone technology was basically perceived primarily for military use.[151] [152]

After that, in the FAA Modernization and Reform Act of 2012, the definition of model aircraft and whether the application of Unmanned Aircraft regulations can be applied to that were confirmed. First, the Act defines the model aircraft as follows; In this section, the term ‘‘model aircraft’’ means an unmanned aircraft that is (1) capable of sustained flight in the atmosphere; (2) flown within the visual line of sight of the person operating the aircraft; and (3) flown for hobby or recreational purposes.[153]

However, I think this definition confuses the definition of model aircraft and its operation limit of it. In other words, when it comes to the second requirement of the definition of model

[150] Ellis*, supra* note 99 at 324.

[151] *Ibid* at 324.

[152] Jeong-Su Gang, “The United States and Europe are taking different paths in drone industrial policy and regulatory policy (강정수, 미국과 유럽, 드론 산업정책과 규제정책에서 서로 다른 길을 걷다)” (2015) No. 158 The optical journal 61 at 63.

[153] *Reform Act 2012, supra* note 119 s 336 (c).

aircraft “(2)” if the model aircraft in flight flies beyond the visual line of sight, from then on it does not become a model aircraft. This is obviously contradictory and unreasonable.

In addition, this Act states that if the model aircraft follows the five operating standards, the regulations on unmanned aircraft under the Act do not apply to it. The standards are as follows;

Notwithstanding any other provision of law relating to the incorporation of unmanned aircraft systems into Federal Aviation Administration plans and policies, including this subtitle, the Administrator of the Federal Aviation Administration may not promulgate any rule or regulation regarding a model aircraft, or an aircraft being developed as a model aircraft, if:

> (1) the aircraft is flown strictly for hobby or recreational use;
> (2) the aircraft is operated in accordance with a community-based set of safety guidelines and within the programming of a nationwide community-based organization;
> (3) the aircraft is limited to not more than 55 pounds unless otherwise certified through a design, construction, inspection, flight test, and operational safety program administered by a community-based organization;
> (4) the aircraft is operated in a manner that does not interfere with and gives way to any manned aircraft; and
> (5) when flown within 5 miles of an airport, the operator of the aircraft provides the airport operator and the airport air traffic control tower (when an air traffic facility is located at the airport) with prior notice of the operation (model aircraft operators flying from a permanent location within 5 miles of an airport should establish a mutually-agreed upon operating procedure with the airport operator

and the airport air traffic control tower (when an air traffic facility is located at the airport)).[154]

This Act is meaningful in that it was the first law to define model aircraft and to declare that the regulations related to unmanned aircraft do not apply to model aircraft if it satisfies all of the criteria specified in section 336.

The concept of Small Unmanned Aircraft began with the 2007 FAA Policy statement.[155] In accordance with the explosive growth of the small drone industry, the FAA recognized a need to establish the category of small drones and regulate them specially.

The policy says that the FAA recognizes that people and companies other than modelers might be flying UAS with the mistaken understanding that they are legally operating under the authority of AC 91-57. AC 91-57 only applies to modelers, and thus specifically excludes its use by persons or companies for business purposes.[156]

It also says the FAA has undertaken a safety review that will examine the feasibility of creating a different category of unmanned "vehicles" that may be defined by the operator's visual line of sight and are also small and slow enough to adequately mitigate hazards to other aircraft and persons on the ground. The end product of this analysis may be a new flight authorization instrument similar to AC 91-57 but focused on operations that do not qualify as sport and recreation but also may not require a certificate of airworthiness. They will, however,

[154] *Ibid* art 336 (a).

[155] *Policy Statement 2007, supra* note 116.

[156] *Ibid* at 5-6.

require compliance with applicable FAA regulations and guidance developed for this category.[157]

This implied that a new category would be established soon for small drones with business or practical purposes that airworthiness would not apply.

After five years, the FAA Modernization and Reform Act of 2012 created a new category called "Small Unmanned Aircraft". It defines Small Unmanned Aircraft as "Small Unmanned aircraft means an unmanned aircraft weighing less than 55 pounds".[158] However, although the Act created a new category for Small Unmanned Aircraft, it does not include the purpose and rationale for establishing such a new range.

After that "Small Unmanned Aircraft Systems (14 CFR part 107)"[159] was enacted to specify the contents of Small Unmanned Aircraft such as the operation of Small Unmanned Aircraft Systems in the National Airspace System.[160] This regulation stipulates some rules regarding the operational limitations of Small Unmanned Aircraft.[161] The main limitations are as follows:

- Unmanned aircraft must weigh less than 55 lbs. (25 kg).
- Visual line-of-sight (VLOS) only; the unmanned aircraft must remain within VLOS of the remote pilot in command and the person manipulating the flight

[157] *Ibid* at 6.

[158] *Reform Act 2012, supra* note 119 s 331.

[159] *Aeronautics and Space, 14 CFR Part 107 (2016)* [*14 CFR Part 107*].

[160] Ellis*, supra* note 99 at 329.

[161] *14 CFR Part 107, supra* note 159 subpart B.

controls of the small UAS. Alternatively, the unmanned aircraft must remain within VLOS of the visual observer.

- At all times the small unmanned aircraft must remain close enough to the remote pilot in command and the person manipulating the flight controls of the small UAS for those people to be capable of seeing the aircraft with vision unaided by any device other than corrective lenses.
- Small unmanned aircraft may not operate over any persons not directly participating in the operation, not under a covered structure, and not inside a covered stationary vehicle.
- Daylight-only operations, or civil twilight (30 minutes before official sunrise to 30 minutes after official sunset, local time) with appropriate anti-collision lighting.
- Must yield right of way to other aircraft.
- First-person view camera cannot satisfy "see-and-avoid" requirement but can be used as long as requirement is satisfied in other ways.
- Maximum groundspeed of 100 mph (87 knots).
- Maximum altitude of 400 feet above ground level (AGL) or, if higher than 400 feet AGL, remain within 400 feet of a structure.
- Minimum weather visibility of 3 miles from the control station.[162]

Meanwhile, the FAA explains the purpose of regulating small unmanned aircraft focusing on two different sides: societal benefit and national security.[163] [164] Plus, 14 CFR Part 107

[162] US, Federal Aviation Administration, *Summary of Small Unmanned Aircraft Rule (Part 107)* (FAA News July 2016) (Washington, D.C. Department of Transportation, 2016) [*Summary of Part 107*].

[163] US, Federal Aviation Administration, *14 CFR Parts 21, 43, 61, et al. Operation and Certification of Small Unmanned Aircraft Systems; Final Rule* (Federal Register 42605 vol 81 no 124) (Washington, D.C. Department of Transportation, 2016) [*Federal Register* 42065].

[164] *Federal Register* 42065 says that Because of the potential societally beneficial applications of small UAS, the FAA has been seeking to incorporate the operation of these systems into the national airspace system (NAS) since 2008. Section 333 of Public Law 112–95 directed the Secretary to determine whether

regulating Small Unmanned Aircraft does not apply to Model Aircraft either if it satisfies all of the criteria specified in section 336 of Reform Act 2012.[165] [166]

What is noteworthy here is the legitimacy of the distinction between model aircraft and small unmanned aircraft. Model Aircraft is also Aircraft,[167] and Model Aircraft and Small Unmanned Aircraft have the same weight limit of 55 lbs.[168] [169] But the model aircraft is not subject to the operating restrictions for small unmanned aircraft if it meets the criteria of Reform Act 2012.[170] This presupposes that the risk level of the model aircraft is not that high, but this premise is based on the level of technology 40 years ago when the regulations for the model aircraft were first established.[171]

Model Aircraft and Small Unmanned Aircraft differ only in their purpose. However, Judging based on the current drone technology, recreational drones can not be considered to be less dangerous than small unmanned aircraft in terms of speed or flight method. Therefore, it should be considered to strengthen regulations on model aircraft operations.

UAS operations posing the least amount of public risk and no threat to national security could safely be operated in the NAS.

[165] US, Federal Aviation Administration, *Small Unmanned Aircraft Systems (sUAS)* (Advisory Circular AC 107-2) (Washington, D.C. Department of Transportation, 2016) art 4.1. [*AC 107-2*].

[166] *Summary of Part 107, supra* note 162 Model Aircraft.

[167] *Transportation*, 49 USC*, supra* note 141.

[168] To be precise, Model Aircraft is not more than 55 pounds and Small Unmanned Aircraft is less than 55 pounds. See *Reform Act 2012* s 336 and *14 CFR Part 107* art 107.3.

[169] Actually, there is no regulation on weight limit in the definition of Model Aircraft in Reformact 2012. However, in order not to be subject to that act and *14 CFR Part 107*, the weight must be not more than 55 pounds, and most model aircraft used in reality are not more than 55 pounds, so this thesis refers to this as 'weight limit'.

[170] *AC 107-2, supra* note 165 art 4.1.

[171] *AC 91-57, supra* note 112 art 3.

D. Drone Registration

No person may operate a civil aircraft unless it has an effective US registration certificate issued to its owner for operation within the United States.[172] Hence, registration is essential. Of course, small unmanned aircraft should also be registered.[173] However, the drones that weigh 0.55 pounds (250 grams) or less are the exception from registration.[174] Model aircraft also need to be registered, but owners using the model aircraft for hobby or recreation will only have to register once and may use the same identification number for all of their model UAS.[175]

In conclusion, the US imposes registration obligations on all types of drones including model aircraft except for drones weighing 250g or less. This is a desirable policy to secure drone safety, reduce the probability of an accident, and smoothly proceed with compensation for damages in the event of an accident.

E. License or Certificate of Drones

[172] *Aeronautics and Space, 14 CFR Part 91 (1997)* art 91.203 [*14 CFR Part 91*].

[173] *Aeronautics and Space, 14 CFR Part 48 (2015)* art 48.15 [*14 CFR Part 48*].

[174] FAA, "How to Register Your Drone" FAA official website, Federal Aviation Administration/ Unmanned Aircraft Systems (UAS)/ Getting Started/ How to Register Your Drone <https://www.faa.gov/uas/getting_started/register_drone>.

[175] FAA, "FAA Small Unmanned Aircraft Registration Begins" FAA official website, Federal Aviation Administration/ News room/ FAA Small Unmanned Aircraft Registration Begins <https://www.faa.gov/newsroom/faa-small-unmanned-aircraft-registration-begins>.

As examined above, 17 CFR Part 107 does not apply to model aircraft,[176] so in order to operate model aircraft, there is no need to have any pilot license or certificate.[177]

However, regarding small UAS, no person may manipulate the flight controls of a small unmanned aircraft system unless that person has a remote pilot certificate with a small UAS or that person is under the direct supervision of a remote pilot in command and the remote pilot in command has the ability to immediately take direct control of the flight of the small unmanned aircraft.[178]

In order to be eligible for a remote pilot certificate with a small UAS rating, a person must be at least 16 years of age; Be able to read, speak, write, and understand the English language; Not know or have reason to know that he or she has a physical or mental condition that would interfere with the safe operation of a small unmanned aircraft system; and Demonstrate aeronautical knowledge by satisfying one of the following conditions, in a manner acceptable to the Administrator: (1) Pass an initial aeronautical knowledge test about small unmanned aircraft or (2) If a person holds a pilot certificate (other than a student pilot certificate) and meets the flight review requirements, complete training covering the areas of knowledge of small unmanned aircraft system.[179]

F. Airworthiness of Drones

[176] *AC 107-2, supra* note 165 art 4.1.

[177] *Summary of Part 107, supra* note 162 Model Aircraft.

[178] *14 CFR Part 107, supra* note 159 art 107.12.

[179] *Ibid* art 107.61.

Transportation, 49 USC says that "the registered owner of an aircraft may apply to the Administrator for an airworthiness certificate for the aircraft. The Administrator shall issue an airworthiness certificate when the administrator finds that the aircraft conforms to its type certificate and, after inspection, is in condition for safe operation."[180] It means every registered aircraft is potentially subject to airworthiness certification. Policy 05-01 also implied the necessity of airworthiness of Unmanned aircraft saying that "Unmanned Aircraft must be shown to be airworthy to conduct flight operations in the NAS."[181]

However, requirement of airworthiness does not apply to model aircraft because provisions of law relating to the incorporation of unmanned aircraft systems into Federal Aviation Administration plans and policies may not promulgate any rule or regulation regarding a model aircraft.[182]

Small UAS are not subject to compulsory airworthiness certification either. As the 2007 FAA Policy statement implicated,[183] FAA airworthiness certification is not required for that.[184] This is due to the purpose of the regulating small UAS, 'societally beneficial applications of small UAS' that posed the least amount of public risk and no threat to national security.[185] [186]

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[180] *Transportation*, 49 USC*, supra* note 141 § 44704.

[181] *Policy 05-01, supra* note 114 art 6.3.

[182] *Reform Act 2012, supra* note 119 s 336.

[183] *Policy Statement 2007, supra* note 116 at 6.

[184] *Summary of Part 107, supra* note 162 Aircraft Requirements.

[185] Ellis*, supra* note 99 at 329-330.

[186] *Federal Register* 42065*, supra* note 163 I. Executive Summary.

G. Implications and Interim Summary

The most important issue in the U.S. drone law is, above all, the model aircraft that is subject to some special operating regulations. This is due to the long historical background of the development of drones for recreational purposes. However, the current development of drone technology raises some doubts about whether it is necessary to continue the category "model aircraft", which is not subject to the small unmanned aircraft regulations.[187]

Even the Advisory Circular 91-57B (2019)[188] mentions the dangers of model aircraft and cautions operators as follows: "Most unmanned aircraft manufactured for recreational use are not tested to any FAA standards for airworthiness, meaning they come with no assurance they will stay airborne or fly predictably, especially when encountering unexpected circumstances such as radio interference, winds, or power failures. When you fly an unmanned aircraft in the United States, it is your responsibility to ensure the safety of the flight, and to understand and follow the appropriate federal, state, and local laws."[189]

ICAO Model UAS Regulations do not make a distinction either based on the purpose of the operation because the aviation-related risk posed by UA differs very little between UAs that are used for recreational, commercial or professional purposes.[190]

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[187] *Summary of Part 107, supra* note 162 Model Aircraft.

[188] US, Federal Aviation Administration, *Exception for Limited Recreational Operations of Unmanned Aircraft* (Advisory Circular AC 91-57B) (Washington, D.C. Department of Transportation, 2019) [*AC 91-57B*].

[189] *Ibid* art 7.

[190] *ICAO AC 101-1, supra* note 52 at 6.

Plus, the classification criteria for drones in the current EU legal regime are based on the risks posed by drones not by the purposes of drones.[191]

I think the time has come to review the risks of model aircraft deeply again in line with the changes in the times and the pace of technological development.

[191] The classification of drones in EU legal regime will be examined in detail in Chapter 4. Current Laws on Drones in EU, part "C. Classification of Drones".

Chapter 4. Current Laws on Drones in EU

A. Overview

The first legislation related to drones in the EU was EU Regulation 216/2008.[192] [193] The principal objective of this regulation is to establish and maintain a high uniform level of civil aviation safety in Europe.[194] But these basic rules limited its scope to unmanned aerial vehicles weighing more than 150 kg, and vehicles weighing no more than 150 kg were not subject to this regulation.[195] Accordingly, each country has used unmanned aerial vehicles weighing no more than 150 kg under its own regulations.[196]

As a result, UAS operators had to follow different operating procedures for each member state when flying drones. This adversely affects efficiency and competitiveness as well as the safety of drones,[197] and it also causes some problems in terms of legal stability.[198] Plus, it

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[192] EC*, REGULATION (EC) No 216/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC,* [2008] OJ, L 79/1 [*EU 216-2008*].

[193] In Ok Song & Dongsoo Song, "A Comparative Study of Korea-EU to Secure Drone Safety (송인옥 & 송동수, 드론 안전성 확보를 위한 한국-EU 비교법적 연구)" (2021) 25:3 Ewha Law Journal 53 at 69.

[194] *EU 216-2008, supra* note 192 art 2.

[195] *Ibid* Annex II, Aircraft referred to in Article 4(4).

[196] Biljana M. Činčurak Erceg, "Legal Regulation of Unmanned Aircraft Systems in the European Union with Reference to the Legislation of the Republic of Croatia" (2019) 53:1 Zbornik Radova 327 at 331-332.

[197] Song, *supra* note 193 at 70.

[198] Gyeo-Cheol Lim, "Review on the Act on the Promotion and Foundation of Drone Utilization and the Safety Requirements of Drone on the Aviation Safety Act." (2019) Vol. 19 The Journal of Comparative

became an obstacle to the vitalization of the drone industry in the entire EU.[199] For this reason, in 2018, a new regulation, Common Rules in the Field of Civil Aviation and Establishing a European Union Aviation Safety Agency (Regulation 2018/1139),[200] was enacted.[201]

Plus, to regulate unmanned aircraft in more detail, Delegated Regulation 2019/945[202] and Implementing Regulation 2019/947[203] was established.[204] These Regulations were enacted to replace most of the existing domestic or national provisions on drone operations in EU member states, in effect creating a homogenization of drone-related legislation across the EU reducing the variety of operational requirements, obligations, and restrictions between Member States. They also encourage drone operators to freely circulate within the EU without further registration or paperwork required.[205] Currently, these two regulations play a key role in regulating drones in Europe and are regarded as two pillars regulating drones.

Law 209 at 217 (임규철, 드론 활용의 촉진 및 기반조성에 관한 법률 및 항공안전법상의 드론 안전사항에 대한 고찰).

[199] Song, *supra* note 193 at 70.

[200] EC*, Regulation (EU) 2018/1139 of the European Parliament And of The Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91,* [2018] OJ, L 212/1 [*EU 2018-1139*].

[201] Song, *supra* note 193 at 70.

[202] EC*, Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems,* [2019] OJ, L 152/1 [*EU 2019-945*].

[203] EC*, Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft,* [2019] OJ, L 152/45 [*EU 2019-947*].

[204] Song, *supra* note 193 at 70.

[205] Morrison, *supra* note 47 at 303.

The Key authority regulating drones in the EU is European Union Aviation Safety Agency (EASA).[206] EASA was established in 2002 by Regulation (EC)1592/2002[207] to establish and maintain a uniform level of civil aviation safety in the EU.[208] EASA has been making various efforts to develop the drone industry and secure aviation safety, such as issuing Guide Materials.

One legal issue to consider here is the matter of the legislative power of the EU and each member state for drone regulation. EU regulation is directly binding on each member state without a specific legal adoption process by that member state, but it does not limit the legislative power itself of each member country except regarding the subject matter covered by the EU Regulation.[209] Therefore, the capacities that have not been effectively conferred by EU member states under the basic regulation or such matters that fall out of its scope continue to be regulated by the EU member states at a national level.[210] In light of that point, Member States will be free to define "zones" within their respective airspace to restrict drone operations. Hence, the flight zones will still be designated and regulated by respective national legislation.

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[206] *Ibid* at 303.

[207] EC*, Regulation (EC) No 1592/2002 Of The European Parliament And of The Council of 15 July 2002 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency,* [2002] OJ, L 240/1.

[208] *Ibid* art 2.1.

[209] EU, "Types of legislation", EU official website, EU / Institutions, law, budget/ Law/ Types of legislation < https://european-union.europa.eu/institutions-law-budget/law/types-legislation_en>.

[210] Gustavo Boccardo, "European Aviation Safety Agency" (2016) The law of unmanned aircraft systems : an introduction to the current and future regulation under national, regional and international law 135 at 136.

Any registrations or authorizations required under the harmonized rules will also be implemented at the national level.[211]

B. Definition of Drones

In the EU air law system, drones are defined as follows; Unmanned Aircraft' ('UA') means any aircraft operating or designed to operate autonomously or to be piloted remotely without a pilot on board.[212]

This implies two significant meanings. The first is to clarify that unmanned aircraft is also aircraft. In other words, unless there are some specific and special regulations for UA, all regulations regarding manned aircraft are basically applied to unmanned aircraft.

The second is to specify that unmanned aircraft includes both UAs that operate automatically and operate remotely. In other words, the EU Drone laws do not create some sub-categories such as "Autonomous Aircraft"[213] or "Remotely Piloted Aircraft"[214] like the ICAO UAS Circular or the ICAO RPAS Manual. This can be regarded as applying more comprehensive and general legislative flexibility to the legislator in enacting and enforcing drone regulations.

C. Classification of Drones

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[211] Morrison, *supra* note 47 at 303.

[212] *EU 2019-945, supra* note 202 art 3(1).

[213] *ICAO UAS Circular, supra* note 33 at (ix), (x).

[214] *ICAO RPAS Manual, supra* note 15.

The classification criteria for drones in the current EU legal regime are based on the risks posed by drones. In a similar vein to the ICAO Model Regulations, the EU Regulations seek to target the heaviest regulatory burden at the areas of highest perceived risk while maintaining a relatively light touch approach to those operations considered lower risk.[215] According to this standard, the drones of the EU are classified into three categories: "Open", "Specific", and "Certified."[216]

Depending on the risk assessment, the low-risk level drone operations (Open Category) would be exempted from airworthiness approval or licenses for operators and pilots.[217] The medium-risk level drone operations (Specific Category) require pre-flight authorization by the competent authority, taking into account the mitigation measures identified in an operational risk assessment; or a pre-flight declaration for certain standard scenarios; or under the auspices of a model aircraft club association.[218] The last and high-risk operating drones (Certified Category) would be subject to equivalent rules as for manned aircraft, most notably regarding type certificates.[219]

(1) Open Category

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[215] Morrison, *supra* note 47 at 303.

[216] *EU 2019-947, supra* note 203 art 3.

[217] Vincent Correia & Noura Rouissi, "The European Union and Civil Drones: The Riga Declaration and the future of the European RPAS Industry" (2016) The law of unmanned aircraft systems : an introduction to the current and future regulation under national, regional and international law 123 at 130.

[218] Morrison, *supra* note 47 at 303.

[219] Correia, *supra* note 217 at 130.

The drones belonging to the Open Category have the lowest risk level, so UAS operations in the 'open' category shall not be subject to any prior operational authorization, nor to an operational declaration by the UAS operator before the operation takes place.[220] However, instead, the drones belonging to this category must comply with special and specific requirements for the safety of drone operation.[221] This regulation method is similar to the way the ICAO model regulation is applied between Part 1 and Part 2.[222]

Operations shall be classified as UAS operations in the 'open' category only where the following requirements are met: (a) the UAS belongs to one of the classes set out in Delegated Regulation (EU) 2019/945[223] or is privately built or meets the conditions defined in Article 20; [224] (b) the unmanned aircraft has a maximum take-off mass of less than 25 kg; (c) the remote pilot ensures that the unmanned aircraft is kept at a safe distance from people and that it is not flown over assemblies of people; (d) the remote pilot keeps the unmanned aircraft in VLOS at all times except when flying in follow-me mode or when using an unmanned aircraft observer; (e) during flight, the unmanned aircraft is maintained within 120 meters from the closest point of the surface of the earth, except when overflying an obstacle, (f) during flight, the unmanned

[220] *EU 2019-947, supra* note 203 art 3(a).

[221] *Ibid* art 4.

[222] *ICAO AC 101-1, supra* note 52 at 5.

[223] C0 - C4 classes, See EU 2019-945 Annex Part 1-5.

[224] The conditions of article 20 are that the UAS types which do not comply with C0 - C4 classifications and which are not privately-built are allowed to continue to be operated under some specific conditions, when they have been placed on the market before 1 July 2022, See EU 2019-947 art 2.

aircraft does not carry dangerous goods and does not drop any material.[225] Meanwhile, the open category is further divided into subcategories A1, A2, and A3 according to the detailed classification requirements.[226]

The main requirements of the A1 class are as follows:

> The UA should be (1) the one with class C0 that has an MTOM of less than 250 g and a maximum speed of 19 m/s;[227] or (2) the one with C1 that has an MTOM of less than 900 g, and a maximum speed of 19 m/s;[228] or (3) privately built one that has an MTOM of less than 250 g, and a maximum speed of less than 19 m/s; or (4) not privately-built one with no C0 - C4 classification that has an MTOM of less than 250 g, placed on the market before 1 July 2022.[229]
> In case of (1), (3), (4), UA may overfly uninvolved persons but shall never overfly assemblies of people; When it comes to (2), UA does not overfly assemblies of people and reasonably expects that no uninvolved person will be overflown. In the event of unexpected overflight of uninvolved persons, the remote pilot shall reduce as much as possible the time during which the unmanned aircraft overflies those persons[230]

Meanwhile, the main requirements of the A2 class state:

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[225] *EU 2019-947, supra* note 203 art 4.

[226] *Ibid* art 4.2.

[227] *EU 2019-945, supra* note 202 Annex part 1.

[228] *Ibid* Annex part 2.

[229] *EU 2019-947, supra* note 203 art 20.

[230] *Ibid* Annex part A UAS.OPEN.020.

The UA should be the one with class C2 that has an MTOM of less than 4 kg, including payload, and has a maximum attainable height above the take-off point limited to 120 m.[231]
The UA should not overfly uninvolved persons and the UAS operations take place at a safe horizontal distance of at least 30 meters from them; the remote pilot may reduce the horizontal safety distance down to a minimum of 5 meters from uninvolved persons when operating an unmanned aircraft with an active low speed mode function and after evaluation of the situation regarding weather conditions, performance of the unmanned aircraft, segregation of the overflown area.[232]

Lastly, the main requirements of the A3 class stipulate:

The UA should be the one with class C2 that has an MTOM of less than 4 kg, and has a maximum attainable height above the take-off point limited to 120 m;[233] or the one with class C3 that has an MTOM of less than 25 kg, and has a maximum characteristic dimension of less than 3 m;[234] or the one with class C4 that has an MTOM of less than 25 kg;[235] or privately built one that has an MTOM of less than 25 kg; or not privately-built one with no C0 - C4 classification that has an MTOM of less than 25 kg, placed on the market before 1 July 2022.[236]

[231] *EU 2019-945, supra* note 202 Annex part 3.

[232] *EU 2019-947, supra* note 203 Annex part A UAS.OPEN.030.

[233] *EU 2019-945, supra* note 202 Annex part 3.

[234] *Ibid* Annex part 4.

[235] *Ibid* Annex part 5.

[236] *EU 2019-947, supra* note 203 art 20.

> The UA should fly in an area where the remote pilot reasonably expects that no uninvolved person will be endangered within the range where the unmanned aircraft is flown during the entire time of the UAS operation; be conducted at a safe horizontal distance of at least 150 metres from residential, commercial, industrial or recreational areas.[237]

(2) Specific Category

The drones with medium operational risk level are classified into Specific Category. This applies to UAs that are not included in the Open Category.[238] EU Regulation 2019/947 requires three types of requirements in this category. That is an operational authorization issued by the competent authority or an authorization received by the request of model aircraft clubs and associations or a declaration to be made by a UAS operator under the standard scenario.[239]

A person who intends to operate unmanned aircraft that falls under a Specific Category basically must obtain authorization issued by the competent authority.[240] When applying to a competent authority for operational authorization, the operator shall perform a risk assessment and submit it together with the application, including adequate mitigating measures.[241] If all the

[237] *Ibid* Annex part A UAS.OPEN.040.

[238] Song, *supra* note 193 at 74.

[239] *EU 2019-947, supra* note 203 art 3(b).

[240] *Ibid* art 5.1.

[241] *Ibid* art 5.2.

requirements[242] by the competent authority, including risk assessment, are met, the authority shall issue an operational authorization.[243]

An operational authorization shall not be required for operations conducted in the framework of model aircraft clubs and associations that have received authorization[244] The authorization will be issued to a club or an association if established procedures, organizational structure, and management system of the model aircraft club or association ensure the basic requirements for safe operation.[245]

Plus, operational authorization shall neither be required if the UAS operator submits a declaration to the competent authority informing that an operation will comply with a standard scenario.[246] Standard scenario means a type of UAS operation in the 'specific' category, as defined in Appendix 1 of the Annex of EU Regulation 2019/947, for which a precise list of mitigating measures has been identified in such a way that the competent authority can be satisfied with declarations in which operators declare that they will apply the mitigating measures when executing this type of operation.[247] However, a standard scenario has not yet been established.[248]

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[242] *Ibid* Annex part B UAS.SPEC.040.

[243] *Ibid* art 5.3.

[244] *Ibid* art 5.6.

[245] For more detail requirements, See EU 2019-947 art 16.

[246] *EU 2019-947, supra* note 203 art 5.5.

[247] *Ibid* art 2.(6).

[248] See EU 2019-947 Appendix 1.

(3) Certified Category

The drones, whose risk level is high, fall under the Certified Category.[249] In this category, the operation is conducted under any of the following conditions: Over assemblies of people; Involves the transport of people; Involves the carriage of dangerous goods, that may result in high risk for third parties in case of an accident.[250]

Therefore, UAs that belong to this category have the following characteristics:

It has a characteristic dimension of 3 m or more, and is designed to be operated over assemblies of people; It is designed for transporting people; It is designed for the purpose of transporting dangerous goods and requiring a high level of robustness to mitigate the risks for third parties in case of an accident.[251] This category has uniqueness in that this is based on the purpose of operations in addition to conditions such as size and the way to operate.

This category targets drones with high-risk levels, judging on the base of the size of UAs or the purpose of the operation. Therefore, UAS operations in the 'certified' category shall require the certification of the UAS pursuant to Delegated Regulation (EU) 2019/945 and the certification of the operator and, where applicable, the licensing of the remote pilot.[252]

Plus, UAS operations shall be classified as the 'certified' category where the competent authority, based on the risk assessment, considers that the risk of the operation cannot be

[249] Song, *supra* note 193 at 75.

[250] *EU 2019-947, supra* note 203 art 6.1.

[251] *EU 2019-945, supra* note 202 art 40.

[252] *EU 2019-947, supra* note 203 art 3.(c).

adequately mitigated without the certification of the UAS and of the UAS operator and, where applicable, without the licensing of the remote pilot.[253]

D. Drone Registration

EU States shall establish and maintain accurate registration systems for UAS[254] whose design is subject to certification and for UAS operators[255] whose operation may present a risk to safety, security, privacy, and protection of personal data or environment.[256]

This means that unless drones are certified, they do not need to be registered. A drone is certified when it has a certificate of airworthiness (or a restricted certificate of airworthiness) issued by the National Aviation Authority. In this case, it requires registration. A certified drone is needed only when the risk of the operation requires it. So certification is never needed for drones operated in the 'open' category.[257] In other words, drones that are in the open category are never registered in their own right. But drone operators/owners must register themselves.[258]

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[253] *Ibid* art 6.2.

[254] Unmanned Aircraft System ('UAS') means an unmanned aircraft and the equipment to control it remotely. See EU 2019-947 art 2(1).

[255] Unmanned Aircraft System Operator ('UAS operator') means any legal or natural person operating or intending to operate one or more UAS. See EU 2019-947 art 2(2).

[256] *EU 2019-947, supra* note 203 art 14.1.

[257] EASA, "Registration requirements", EASA official website, European Union Aviation Safety Agency/ The Agency/ Frequently Asked Questions/ Using the FAQ / Drones (UAS) < https://www.easa.europa.eu/en/the-agency/faqs/drones-uas#category-registration-requirements >.

[258] EASA, "Drone operators' and pilots' main responsibilities" EASA official website, European Union Aviation Safety Agency/ drones/ Drone operators & pilots <https://www.easa.europa.eu/en/light/topics/drone-operators-pilots>.

They register once, independently of how many drones they have operating in the 'open' or the 'specific' category. The registration will be valid for a period defined by the member states' National Aviation Authority.[259]

This process also applies to drone operators in the Specific Category.[260] In other words, all drone operators in the specific category need to register themselves (not the actual drone/s).[261]

However, not all drone operators are subject to registration obligations within the 'open' category. The drone operators who have UAs with an MTOM of less than 250 g, or which in the case of an impact can transfer to human kinetic energy not more than 80 Joules are not subject to register themselves. However, even if the above requirements are met, a UA that is equipped with a sensor able to capture personal data is subject to registration, unless it complies with Directive 2009/48/EC.[262] [263] [264]

In other words, they do not need to register themselves if their drone(s): weighs less than 250g and has no camera or other sensor able to detect personal data; or even with a camera or

[259] *EASA official website, supra* note 257.

[260] *EU 2019-947, supra* note 203 art 14.5(b).

[261] EASA, "Registration of drone operators", EASA official website, European Union Aviation Safety Agency/ domains/ Civil drones/ Specific Category - Civil Drones <https://www.easa.europa.eu/en/domains/civil-drones-rpas/specific-category-civil-drones>.

[262] *EU 2019-947, supra* note 203 art 14.5.

[263] EC*, Directive 2009/48/EC of The European Parliament And of The Council of 18 June 2009 on the safety of toys,* [2009] OJ, L 170/1.

[264] This directive is about the safety of toys and applies to products designed or intended, whether or not exclusively, for use in play by children under 14 years of age. See Directive 2009/48/EC art 1, 2.

other sensor, weighs less than 250g, but is a toy (this means that its documentation shows that it complies with 'toy' Directive 2009/48/EC).[265]

E. License or Certificate of Drones

To operate a drone in the Certified Category, A drone pilot license is required.[266] For obtaining that, the drone pilot needs to complete the necessary online training, pass a pilot exam, and get a valid remote pilot competency certificate.[267]

There is no need for remote pilots to get a drone pilot license when operating UAS in the 'open' category, only if they shall comply with the competency of the operation requirements of the open category.[268]

Operating UAS in the 'specific' category does not require a remote pilot license but remote pilots must have at least the following competencies: the ability to apply operational procedures (normal, contingency and emergency procedures, flight planning, pre-flight and post-flight inspections); ability to manage aeronautical communication; manage the unmanned aircraft flight path and automation; leadership, teamwork and self-management; problem-solving and decision-making; situational awareness; workload management; coordination or

[265] *EASA official website, supra* note 257.

[266] *EU 2019-947, supra* note 203 preface (11).

[267] *EASA official website, supra* note 258.

[268] *EU 2019-947, supra* note 203 art 8.1.

handover, as applicable.[269] In summary, to operate in the certificate category, a pilot license is mandatory, but in an open category or a specific category, that is not necessarily required.

F. Airworthiness of Drones

Article 10 (Rules and procedures for the airworthiness of UAS) of EU 2019/947 says that unless privately-built, or used for operations referred to in Article 16, or meeting the conditions defined in Article 20, UAS used in operations set out in this Regulation shall comply with the technical requirements and rules and procedures for the airworthiness defined in the delegated acts adopted according to Article 58 of Regulation (EU) 2018/1139.[270] [271]

Meanwhile, article 3 of EU 2019/947 says that UAS operations in the 'certified' category shall require the certification of the UAS under Delegated Regulation (EU) 2019/945 and the certification of the operator and, where applicable, the licensing of the remote pilot.[272] Therefore, it is obvious that UAS operating in the certified category is required to obtain an airworthiness certificate.

EASA also elucidates that the 'certified' category caters for the operations with the highest level of risk. Future drone flights with passengers on board such as the air taxi, for example, will fall into this category. The approach used to ensure the safety of these flights will be very similar to the one used for manned aviation. For this reason, these aircraft will always

[269] *Ibid* art 8.2.

[270] *Ibid* art 10.

[271] *EU 2018-1139, supra* note 172 art 58.

[272] *EU 2019-947, supra* note 203 art 3(C).

need to be certified (i.e. have a type certificate and a certificate of airworthiness).[273] On the contrary, certification is never needed for drones operated in the 'open' category,[274] so UAS in the open category is not required to obtain an airworthiness certificate.

However, whether the UAS in the Specific category is subject to a certificate of airworthiness is not clear. Here, the UAS in the Specific category unless it is privately-built, or operated in the framework of model aircraft clubs and associations,[275] or is meeting the conditions defined in Article 20 (not privately-built one, with no C0 - C4 classification and placed on the market before 1 July 2022) must be subject to a certificate of airworthiness according to article 10 of EU 2019/947.[276]

G. Implications and Interim Summary

The EU drone law system is highly appreciated in that for the safe operation of drones, it is thoroughly based on the risk level that drones can cause and it is reclassified very systematically and in detail according to that sophisticated reclassification criterion.

However, it can be an incomplete legislative system in that the standard scenario for the declaration of UAS operator in a specific category has not yet been finalized. In addition, the

[273] EASA, "Certified Category - Civil Drones", EASA official website, European Union Aviation Safety Agency/ domains/ Civil drones/ Drones - regulatory framework background/ Certified Category - Civil Drones <https://www.easa.europa.eu/en/domains/civil-drones/drones-regulatory-framework-background/certified-category-civil-drones>.

[274] *EASA official website, supra* note 257.

[275] *EU 2019-947, supra* note 203 art 16.

[276] *Ibid* art 10.

regulation that pilot licenses are not mandatory for drone operation in the specific category should require reconsideration.

That is because even if the flights go through risk assessment and the operator gets the authorization through the competent authority examining the mitigation methods that the operator submitted, drones that weigh not less than 25 kg cannot be said to have low risk. For the same reason, it will be helpful to secure drone-operation safety to impose an obligation of registration on the drone itself in a specific category.

Chapter 5. Current Laws on Drones in South Korea

A. Overview

In order to understand Korea's drone-related law system, it is necessary to first overview the entire Korean aviation legal system. Korea enacted the Aviation Act in 1961[277] to stipulate almost everything related to aviation, including aviation operations, aviation business, and aviation facilities.[278] But criticism had been subsequently raised that it is inefficient and unprofessional to regulate all vast aviation-related matters with only one integrated law.

Therefore, various efforts were made to enact a new law by separating the aviation law into some mainly essential fields, and as a result, the Aviation Act was abolished in 2017, and Aviation Safety Act,[279] Aviation Business Act,[280] and the Airport Facilities Act[281] were implemented in 2017.

Meanwhile, drones were stipulated for the first time in the Aviation Act in 1999.[282] It mentioned "Unmanned Aerial Vehicles" meaning drones.[283] The Aviation Act of 1999 also stipulates the obligation to register unmanned aerial vehicles, and obtain the prior approval of a

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[277] *Aviation Act (1961),* Act No. 591, South Korea 2017 (*항공법*) [*Aviation Act*].

[278] Song, *supra* note 193 at 59.

[279] *Aviation Safety Act, supra* note 17.

[280] *Aviation Business Act (2017),* Act No. 14115, South Korea 2022 *(항공사업법)*.

[281] *Airport Facilities Act (2017),* Act No. 14113, South Korea 2022 (*공항시설법*).

[282] Song, *supra* note 193 at 59.

[283] *Aviation Act 1999, supra* note 277 art 2.25-2.

competent authority when flying, and the relevant ministries shall establish and announce the technical standards for flight safety of unmanned aerial vehicles.[284] Since the Aviation Act has been separated into three acts, drone-related matters have been regulated by three acts concerning each related part. Among them, matters related to drone operation and safety have been mainly regulated by the Aviation Safety Act.

But regulations on drones have proceeded in a new direction based on the rapid growth of the drone industry and the ripple effect on the economy. The Korean government announced a "The Road Map for Preemptive Deregulation in the Drone Sector" in 2019.[285] The road map pays attention to the economic ripple effect of drones and recognizes the drone industry as one of the future economic growth engines.[286] The main content of this road map is confirming that it should break down unnecessary regulations and any processes to be played as obstacles to the development of the drone industry and create the rules and regulations beneficial to develop the drone industry preemptively.[287] In particular, this road map predicts that the drone industry will generate a production inducement effect of about 16 billion dollars and create about 1.74 million jobs in South Korea by 2028.[288]

The government's perspective on the drone industry shown in the road map implies the government's policy and legislative direction regarding drone regulation. It was the "Act On Promotion Of Utilization Of Drones And Creation Of Infrastructure Therefor (2020) (Drone

[284] *Ibid* art 23-2.

[285] *Drone Road Map, supra* note 11.

[286] *Ibid* at 1.

[287] *Ibid* at 3.

[288] *Ibid* at 19.

Act)"[289] that came out as a result of these government policies. This act is the first special law enacted to regulate drones, which will be discussed in detail in the next section.

B. Act on Promotion of Utilization of Drones and Creation of Infrastructure Therefor

The Drone Act was implemented on May 1, 2020. Article 1 of this Act stipulates the purpose of this law as follows:

> The purpose of this Act is to lay the foundation for the development of the drone industry and contribute to providing more convenience to people and developing the national economy through the promotion of the drone industry by providing such matters as promoting the utilization of drones, laying the foundation therefor, and the operation and management of drone systems.[290]

As can be seen from the above clause, the purpose of this act is not to operate drones smoothly or secure drone safety, but contribute to the national economy through the promotion of the drone industry. I think this provision best represents the characteristics of the Drone Act.

Article 2 of the Drone Act defines drones. The definition of drone in this act takes a very complicated way, which will be discussed in detail in the next Part "C. Definition of Drones."

Chapter II of this Act[291] stipulates the government system for implementing policies about drones. The main contents are: the Government shall establish and implement a master

[289] *Drone Act, supra* note 9.

[290] *Ibid* art 1.

[291] *Ibid* Chapter II. System For Implementing Policies.

plan for fostering and developing the drone industry every five years including the present situation and future prospects of the drone industry, basic direction-setting for policies to foster the drone industry, and measures for fostering the drone industry by sector.[292]

Chapter III of the act is about Fostering of Drone Industry.[293] Mainly, it says:

- The Government may implement research and development projects necessary for developing technology for drone systems, as prescribed by Presidential Decree, in order to promote the development of technology for drone systems and efficiently implement the master plan[294];
- The Minister of Land, Infrastructure and Transport may designate and manage drone special free zones in order to promote the practical use, commercialization, etc. of drone systems[295];
- The Government may provide the following administrative and financial support to promote and encourage business startups relating to the drone industry, as prescribed by Presidential Decree such as Lending loans for starting a new business, Providing outcomes of research and development relating to drones and providing test equipment and facilities[296];

[292] *Ibid* art 5 Establishment of Master Plans for Development of Drone Industry.

[293] *Ibid* Chapter III. Fostering of Drone Industry.

[294] *Ibid* art 9 Researching and Developing Drone Systems.

[295] *Ibid* art 10 Designation and Management of Drone Special Free Zones. In this zone, some authorizations from competent authority such as Special certification of airworthiness and Permission for a flight of an unmanned aircraft can be exempted and simplified.

[296] *Ibid* art 12 Encouragement of Business Startups.

- The Government shall prepare measures for protecting and fostering intellectual property rights in drone systems in order to protect and foster activities for research on drone systems and the drone industry.[297]

This Act is the first special law regulating drones and has some advanced aspects such as defining drones, but the purpose of the law is to contribute to the development of the Korean economy through the drone industry, not to secure the safe operation of drones. In other words, this Act has an intrinsic limitation in that it does not provide any guidelines for the safe operation of drones, because it does not stipulate anything about the crucial parts of drones such as classification, registration, pilot license, airworthiness, and the operation restrictions of drones.

C. Definition of Drones

As explained above, the initial regulation on drones in the South Korean air law regime was regarding an unmanned aerial vehicle that the Aviation Act stipulated in 1999.[298] Since then, the enactment of the Drone Act in 2020 has established the definition of drones for the first time. In this part, this thesis will examine the definition of drones and their effect on the South Korean air law system.

The Drone Act defines a drone as follows:

[297] *Ibid* art 15 Protecting and Fostering Intellectual Property Rights.

[298] *Aviation Act 1999, supra* note 277 art 2.25-2.

Article 2 (Definitions)

(1) The definitions of the terms used in the Act are as follows:

1. The term "drone" means **an apparatus among flying vehicles operable with no pilot onboard** that meets the standards prescribed by the Ordinance of the Ministry of Land, Infrastructure and Transport and falls under any of the following:

(a) An unmanned aerial vehicle referred to in subparagraph 3 of Article 2 of the Aviation Safety Act;

(b) An unmanned aircraft referred to in subparagraph 6 of Article 2 of the Aviation Safety Act;

(c) Any other flying vehicle operable by any of the means prescribed by the Ordinance of the Ministry of Land, Infrastructure and Transport, such as remote control or automatic or autonomous operation.[299]

Prior to reviewing the content in earnest, I think a brief explanation of the unique definition method of Korean acts is needed. Like the definition of drone seen above, Korean laws usually delegates essential requirements constituting the definition of a term to subordinate statutes, such as the Presidential Decree or Ordinance of Ministry. This is to amplify flexibility in legislation by stipulating it in a subordinate statute that is easy to amend rather than an act that is difficult to amend.[300] However, this works as a major factor to make the definition very complicated.[301]

[299] *Drone Act, supra* note 9 art 2.

[300] Lim, *supra* note 198 at 216-217.

[301] *Ibid* at 217.

The first noticeable issue about this regulation is that it defines the term "drone" as a legal term. The "drone" is probably the most popular term to describe a pilotless aircraft used by the media, industry, and the public.[302] However, the legal term "drone" is rarely used in other states' legal regimes including ICAO.[303] One of the reasons is that it can bring about the negative images that drones usually have been used in the military field and it has killing potential during armed conflicts.[304] Furthermore, even for more practical reasons, the term drone has not been welcomed among legislators including ICAO. ICAO expresses its opinion that the term "drone" is not proper to distinguish between the different types of unmanned aircraft categories.[305]

The second thing to note in this definition, as can be seen from provisions (a), (b) above, is that this regulation does not define a drone by extracting the essential characteristics of drones or creating a new concept, but it merely borrows and encompasses the existing drone-related definitions regulated in other Korean air laws. In other words, this regulation only borrowed the definition of Unmanned Aerial Vehicle and Unmanned Aircraft from the existing Aviation Safety Act as a definition of drones.

Therefore, in order to seize the definition of drone, the definitions of Unmanned Aerial Vehicle and Unmanned Aircraft of the Aviation Safety Act should be checked in advance. The

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[302] Benjamyn I. Scott "Terminology, Definitions and classifications" (2016) The law of unmanned aircraft systems : an introduction to the current and future regulation under national, regional and international law 9 at 9.

[303] *Ibid* at 9.

[304] *Ibid* at 9.

[305] ICAO, "What is the difference between UAS and RPAS? Why can't we just call them all drones?" ICAO official website, ICAO / Safety / Unmanned Aviation / UAS Toolkit / Frequently Asked Questions < https://www.icao.int/safety/UA/UASToolkit/Pages/FAQ.aspx >.

way the Aviation Safety Act stipulates its terms is rather complicated. Subparagraph 3 of Article 2 of the Aviation Safety Act mentions 'unmanned aerial vehicles' in the provision of 'ultra-light vehicle' as follows;

> Article 2. 3.
> The term "ultra-light vehicle" means powered flying machines, hang gliders, paragliders, hot air balloons, **unmanned aerial vehicles**, etc., **meeting the standards prescribed by the Ordinance of the Ministry of Land, Infrastructure and Transport (MLIT)**, such as the aircraft's own weight and the number of seats, which are machines capable of flying by the reaction of the air, other than aircraft and light sport aircraft.[306]

From this provision, we can see that unmanned aerial vehicles are a subcategory of ultra-light vehicle. This is one of the unique chateristics of Korean drone laws. In other words, through this article we can find that 'unmanned aerial vehicles' means drones that weigh less.

Subparagraph 5 of Article 5 of the Ordinance of MLIT of the Aviation Safety Act defines unmanned aerial vehicles as follows:[307]

> Article 5.5.
> An unmanned aerial vehicle: Any of the following flying devices that do not have a person on board.

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[306] *Aviation Safety Act, supra* note 17 art 2.3.

[307] *Ordinance of the Ministry of Land, Infrastructure and Transport of The Aviation Safety Act (2017),* Ordiance No. 1188, South Korea 2022 art 5.5 (*항공안전법 시행규칙*) [*MLIT Ordinance of Aviation Safety Act*].

A. unmanned powered aerial vehicle: Unmanned airplane, unmanned helicopter or unmanned multicopter whose own weight, excluding fuel, is 150 kg or less.

B. Unmanned airship: Unmanned airship with a self-weight of 180 kg or less excluding the weight of fuel and 20 meters or less in length.

In conclusion, unmanned aerial vehicle is subcategorized as unmanned powered aerial vehicle and unmanned airship.

Meanwhile, regarding “Unmanned Aircraft”, Subparagraph 6 of Article 2 of the Aviation Safety Act defines (strictly speaking, mentions) ‘Unmanned Aircraft’ in the definition provision of ‘Aircraft Accident’ as follows:[308]

Article 2. 6.

The term "aircraft accident" means any of the following occurrences prescribed by Ordinance of the Ministry of Land, Infrastructure and Transport, in relation to the operation of an aircraft from the time any person boards the aircraft for the purpose of flight until all persons on board the aircraft disembark from the aircraft **[in cases of an aircraft that flies without a human aboard, but by remote control, etc. (hereinafter referred to as "unmanned aircraft")** referring to the moment it moves for the purpose of flight until the moment its engines stop because the flight has ended]**.**

This regulation defines Unmanned Aircraft as “an Aircraft that flies without a human aboard”. It means the Unmanned Aircraft is also an Aircraft, so in order to know the term

[308] *Aviation Safety Act, supra* note 17 art 2.6.

'Unmanned Aircraft', we need to examine the definition of Aircraft in advance. Aircraft is defined in the Aviation Safety Act.

Subparagraph 1 of Article 2 of the Aviation Safety Act defines 'Aircraft' as follows:[309]

> Article 2.1. (Definitions)
> The terms used in this Act are defined as follows: 1. The term "**aircraft**" means the following apparatus **meeting the standards prescribed by Ordinance of the Ministry of Land, Infrastructure and Transport**, such as the maximum takeoff weight and the number of seats, and other apparatuses prescribed by Presidential Decree, which are capable of flying by capitalizing on the reaction of the air (excluding reaction of the air against the surface of ground or water; hereinafter the same shall apply): (a) **Airplane** (b) **Helicopter** (c) **Airship** (d) **Glider**.

From this provision, we can see that aircraft is limitedly subcategorized as Airplane, Helicopter, Airship, and Glider. However, the definition of Aircraft does not mention Unmanned Aircraft directly. Article 2 of The Ordinance of MLIT regulates the standards of aircraft through measurable figures, such as the maximum takeoff weight and the number of seats stipulated in Subparagraph 1 of Article 2 of the Aviation Safety Act. It mentions unmanned aircraft as the subcategory of an airplane, helicopter and airship. It says as follows:[310]

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[309] *Ibid* at 2.1.

[310] *MLIT Ordinance of Aviation Safety Act, supra* note 307 art 2.

Article 2 (Standards for Aircraft)

The standards prescribed by Ordinance of the Ministry of Land, Infrastructure and Transport, such as the maximum takeoff weight and the number of seats" in subparagraph 1 of Article 2 of the Aviation Safety Act are the following standards

1. Airplane or Helicopter

A. If a person is on board: All of the following criteria must be met:

1) The maximum take-off weight must exceed 600 kg (650 kg when used for water flight);

2) The number of boarding seats including pilot seats must be at least one

3) There must be at least one mechanical device that generates power (hereinafter referred to as "motor")

B. When flying without a person on board by remote control, etc.: **All of the following criteria must be met**

1) Its own weight, excluding the weight of fuel, must exceed 150 kg.

2) There must be one or more motor

2. Airship

A. When a person is on board, all of the following criteria must be met:

1) There must be one or more motor

2) The number of boarding seats including pilot seats must be at least one

B. All of the following criteria must be met when flying without a person on board, such as by remote control.

1) There must be one or more one motor

2) Its own weight, excluding fuel, must exceed 180 kilograms, or the length of the airship must exceed 20 meters.

Based on this regulation, Unmanned Aircraft is defined as follows:[311]

[311] Song, *supra* note 193 at 60.

1) Airplane or Helicopter whose own weight, excluding the weight of fuel, must exceed 150 kg and that must have one or more motor
2) Airship whose own weight, excluding fuel, must exceed 180 kilograms, or whose own length of the airship must exceed 20 meters and that must have one or more motor.

This is the result of a long and complex process. Unmanned Aircraft is also Aircraft, and Aircraft is defined as an airplane, helicopter, airship, glider that meets the requirements of the Ordinance of MLIT. Again, the Ordinance of MLIT limits Unmanned Aircraft to airplanes and helicopters exceeding 150 kg, and airships exceeding 180 kg or exceeding 20 m.

Plus, concerning "Any other flying vehicle operable by any of the means prescribed by Ordinance of the Ministry of Land, Infrastructure and Transport, such as remote control or automatic or autonomous operation" of Item C of Subparagraph 1 of Paragraph 1 of Article 2 of the Drone Act, Article 2.2 of the Ordinance of MLTI of Drone Act stipulates as follows:[312]

Article 2.2 (Scope of Drone)
In Article 2.(1).1.(C). of the Act, the term "Any other flying vehicle operable by any of the means prescribed by Ordinance of the Ministry of Land, Infrastructure and Transport, such as remote control or automatic or autonomous operation" means any of the following flying vehicles:
1. Flights that can be controlled remotely from the outside

[312] *Ordinance of the Ministry of Land, Infrastructure and Transport of the Act On Promotion Of Utilization Of Drones And Creation Of Infrastructure Therefor (2020),* Ordinance No. 723, South Korea 2020 art 2.2 (*드론 활용의 촉진 및 기반조성에 관한 법률 시행규칙*) [*MLIT Ordinance of Drone Act*].

2. Flights that can be automatically navigated to predetermined routes without external remote control
3. A flying vehicle capable of autonomously changing the flight speed, route, etc. by recognizing and determining changes in the flight environment that occur during navigation

Meanwhile, regarding another requirement for the Drone, “the standards prescribed by Ordinance of the Ministry of Land, Infrastructure and Transport” of Subparagraph 1 of Paragraph 1 Article 2 of Drone Act, Article 2.1 of the Ordinance of MLTI of Drone Act stipulates as follows:[313]

Article 2.1. (Scope of Drone)
The term “the standards prescribed by Ordinance of the Ministry of Land, Infrastructure and Transport” in Article 2 (1) 1 of the Act On Promotion Of Utilization Of Drones And Creation Of Infrastructure Therefor (hereinafter referred to as the "Act") means the following standards:
1. There must be one or more mechanical devices that generate power
2. It is possible to control the navigation of the flying vehicles on the ground

In conclusion, by combining these complex, long and scattered regulations, the definition of drones of the Drone Act is as follows:

An apparatus among flying vehicles operable with no pilot on board which must have one or more mechanical devices that generate power and whose navigation is possible to control on the ground. It falls under any of the following.

[313] *Ibid* art 2.1.

1. Unmanned Aerial Vehicle

   A. Unmanned powered Aerial Vehicle: Unmanned airplane, unmanned helicopter or unmanned multicopter whose own weight, excluding fuel, is 150 kg or less.

   B. Unmanned airship: Unmanned airship with a self-weight of 180 kg or less excluding the weight of fuel and 20 meters or less in length.

2. Unmanned Aircraft

   A. Airplane or Helicopter: Its own weight, excluding the weight of fuel, must exceed 150 kg and it must have one or more motor.

   B. Airship: Its own weight, excluding fuel, must exceed 180 kilograms, or whose own length of the airship must exceed 20 meters and that must have one or more motor.

3. Any other flying vehicle

   A. A flying vehicle that can be controlled remotely from the outside

   B. A flying vehicle that can be automatically navigated to predetermined routes without external remote control

   C. A flying vehicle capable of autonomously changing the flight speed, route, etc. by recognizing and determining changes in the flight environment that occur during navigation

In spite of this hard process to define drones, there are some problems with this regulation. The biggest problem in the definition of drones in the Drone Act is that this act confused the definition and classification regulations. A definition is to extract the most important and common elements of a concept and to stipulate it concisely.

In this definition, there is only one common element: “an apparatus among flying vehicles operable with no pilot onboard”.[314] There are, however, no explanations on the meaning of

[314] *Drone Act, supra* note 9 art 2.1.1.

apparatus and flying vehicles and it limits drones to the following three things: Unmanned Aerial Vehicle, Unmanned Aircraft, and Any other flying vehicle. In other words, drones are defined under the Drone Act as Unmanned Aerial Vehicle, Unmanned Aircraft, and Any other flying vehicle, but this regulation is actually a classification of drones, not a definition.

Another problem is that the definition of drone under the Drone Act borrows and encompasses the existing drone-related definitions regulated in other air laws, and it brought about conflicts and contradictions among the terms. In other words, Under the Drone Act, drones are defined as an apparatus among flying vehicles operable with no pilot onboard,[315] but the Unmanned Aircraft[316] and Unmanned Aerial Vehicles[317] of Aviation Safety Act require no human boarding on them. In other words, in the case of drones, people such as passengers can board even if the pilot is not on board, but nobody including pilots and passengers can board unmanned aircraft and unmanned aerial vehicles. This shows there happens a contradiction in the definition of drone. This problem is likely to have stemmed from the concept of drones in the Drone Act, which can be used for transporting passengers.[318]

The other problem is that the definition of drone in the Drone Act does not provide any practical benefits to ensure the safe operation of the drone. The Aviation Safety Act regulating the operation of drones does not use the term "drone". It means that all matters related to the safe operation of drones are regulated by the term "Unmanned Aircraft" and "Unmanned Aerial

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[315] *Ibid* art 2.1.1.

[316] *Aviation Safety Act, supra* note 17 art 2.6.

[317] *MLIT Ordinance of Aviation Safety Act, supra* note 307 art 5.5.

[318] The possibility of the passenger transportation using drones is examined in detail in the Chapter 6. Applicability of Drone Laws to Urban Air Mobility under the Current Legal Regime in South Korea.

Vehicles" under the Aviation Safety Act. In other words, the term "drone" defined in the Drone Act is only about the development of the drone industry.

For this reason, in order to increase drone use in the private sector, some argue that it is necessary to separate Unmanned Aerial Vehicles from Ultra-Light Vehicles under the Aviation Safety Act and to independently establish a definition of a drone through the concept of Unmanned Aerial Vehicles in the Drone Act.[319]

As examined above, the definition of drones has various problems. In addition, the drone regulation system under the Aviation Safety Act, which coexists "unmanned aircraft" and "unmanned aerial vehicles" together, is also considered to be problematic. I suggest the following as measures to solve the issues:

First, Unmanned Aircraft and Unmanned Aerial Vehicle, which are terms used in the Aviation Safety Act, should be unified into Unmanned Aircraft. Unmanned aircraft is an aircraft that flies without a human aboard.[320] Unmanned Aerial Vehicle is flying devices that do not have a person on board,[321] and Unmanned Aerial Vehicle is also one of the ultra-light vehicles, which are defined as "machines capable of flying by the reaction of the air, other than aircraft and light sport aircraft".[322]

Both of them can fly through the reaction of the air. This means that the terms are different between the two but they are practically the same things in light of the flight principle. However,

[319] Lim, *supra* note 198 at 220.

[320] *Aviation Safety Act, supra* note 17 art 2.6.

[321] *MLIT Ordinance of Aviation Safety Act, supra* note 307 art 5.5.

[322] *Aviation Safety Act, supra* note 17 art 2.3.

it is also obvious that the two are different in the Aviation Safety Act. The Aviation Safety Act classifies aircraft and ultra-light vehicles mainly by weight.[323]

In the case of a drone, if it exceeds 150 kg, it is defined as an Unmanned Aircraft,[324] and if it is not more than this, it is defined as an Unmanned Powered Aerial Vehicle.[325] [326] However, this does not comply with scientific standards for aircraft and ICAO regulations. ICAO defines an aircraft as "any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface,"[327] and it also defines Unmanned Aircraft as "An aircraft which is intended to operate with no pilot on board."[328] According to the definition of the Korean Aviation Safety Act, even an unmanned aircraft that satisfies all the requirements of an aircraft, if the weight is not more than 150 kg, becomes an unmanned aerial vehicle, not an aircraft. It is an unreasonable result. Plus, as examined above, Unmanned Aerial Vehicles are an old-fashioned term used in the 1980s.[329] Furthermore, there is no legal regime

[323] *Ibid* art 2.1, 2.3.

[324] *MLIT Ordinance of Aviation Safety Act, supra* note 307 art 2.1.

[325] *Ibid* art 5.5.

[326] Unmanned Aerial vehicle is devided to two categories. One is Unmanned Powered Aerial Vehicle weighing 150 kg or less and the other is Unmanned Airship weighing 180 kg or less. However, usually when we mention drones, we usually talk about unmanned powered aerial vehicles among unmanned aerial vehicles, so this thesis deals with unmanned aerial vehicles as unmanned powered aerial vehicles.

[327] *ICAO UAS Circular, supra* note 33 at (ix).

[328] *Ibid* at (x).

[329] Hodgkinson*, supra* note 2 at 2.

that coexists with the term Unmanned aircraft and Unmanned Aerial Vehicles. ICAO,[330] The US[331] and the EU[332] all use the term "Unmanned aircraft".

Second, Unmanned Aircraft must have a separate definition regulation in the Aviation Safety Act. Currently, "Unmanned Aircraft" is defined (strictly speaking mentioned) in the "Aircraft Accident" definition.[333] However, this does not conform to the regulatory system that sets the definition as a separate regulation in Article 2 of the Aviation Safety Act, and when considering the increasing importance of Unmanned Aircraft, it should be defined in a separate provision.

Lastly, the term drone in the Drone Act should be changed to Unmanned Aircraft. Of course, the title of the act should also be changed. First, the term drone itself is not a distinct concept from unmanned aircraft, so it is not needed to create a new term. Plus, as ICAO said the term drone is not proper to distinguish between the different types of unmanned aircraft categories.[334]

D. Classification of Drones

As examined in the part "C. Definition of Drones", drones are largely divided into "Unmanned Aircraft" and "Unmanned Aerial Vehicles" under the South Korean air law system.

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[330] *ICAO Model regulations 101, supra* note 48 art 101.003.

[331] *Reform Act 2012, supra* note 119 s 331.

[332] *EU 2019-945, supra* note 202 art 3.

[333] *Aviation Safety Act, supra* note 17 art 2.6.

[334] ICAO official website, *supra* note 305.

The criteria of classification are weight. If a certain drone exceeds 150 kg, it is an Unmanned Aircraft. On the other way, If a drone weighs 150 kg or less, it will be an Unmanned Aerial Vehicle.[335]

The unmanned aerial vehicle is one of the ultra-light vehicles.[336] An ultra-light vehicle pilot shall observe matters prescribed by the Ordinance of MLIT to prevent the ultra-light vehicle from causing casualties or damage to property.[337] Therefore, unmanned aerial vehicle pilots also must observe this regulation.

Article 310 of the Ordinance of MLTI of the Aviation Safety Act regulates matters to be observed as follows.[338]

> A pilot of an ultra-light vehicle shall not do any of the following acts:
>
> Dropping a falling object that may endanger life or property; Flying over densely populated areas or other crowded places, such as residential and commercial areas, in a manner that may pose a risk to life or property; Flying close to a building in a manner that is likely to collide with a building over an area where people or buildings are concentrated; Flying in the controlled airspace; Flying at night from after sunset to before sunrise; Acts of manipulating in a state in which it is impossible to perform flight duties normally due to the influence of narcotics or hallucinogens, etc., or acts of ingestion or use of alcoholic beverages.

[335] *MLIT Ordinance of Aviation Safety Act, supra* note 307 art 2.1, 5.5.

[336] *Aviation Safety Act, supra* note 17 art 2.3.

[337] *Ibid* art 129.1.

[338] *MLIT Ordinance of Aviation Safety Act, supra* note 307 art 310.1.

In addition, a pilot of an ultra-light vehicle shall fly carefully so that the aircraft or light sport aircraft can be avoided in advance;[339] a pilot of an ultra-light vehicle using power must give way to all aircrafts, light sport aircrafts and ultra-light vehicles that do not use power;[340] a pilot of unmanned aerial vehicle control the relevant unmanned aerial vehicle in a range that can be visually confirmed.[341]

The Aviation Safety Act classifies drones based on weight, not risk. Weight is obviously related to the dangers of drones. However, with the development of technologies such as new materials, weight is not necessarily proportional to risk. Therefore, detailed classification criteria based on risk are required.[342]

E. Drone Registration

Since an unmanned aircraft is an aircraft,[343] it is subject to aircraft registration just like aircraft. In other words, Any person who owns or leases an aircraft and thereby has the right to use the aircraft shall file for registration of the aircraft with the Minister of Land, Infrastructure and Transport.[344]

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[339] *Ibid* art 310.2.

[340] *Ibid* art 310.3.

[341] *Ibid* art 310.4.

[342] Lim, *supra* note 198 at 221.

[343] *Aviation Safety Act, supra* note 17 art 2.6.

[344] *Ibid* art 7.1.

In the case of unmanned aerial vehicles, they are subject to reporting, not registration. A person who owns or has the right to use an ultra-light vehicle shall report its category, uses, the name of its owner, whether it is possible for the ultra-light vehicle to gather personal information and personal location information, and other matters to the Minister of Land, Infrastructure and Transport, as prescribed by Ordinance of MLIT. However, the ultra-light vehicle prescribed by Presidential Decree is not subject to reporting.[345]

Article 24 of the Presidential Decree of Aviation Safety Act says as follows:[346]

> Article 24 (Scope of Ultra-Light Vehicle Not Requiring Reporting) "Ultra-light vehicles prescribed by Presidential Decree" in the provision of Article 122 (1) of the Act means any of the following, which refers to one not used for air charter service, sport and leisure aviation service, or ultra-light vehicle use business
> 5. An unmanned powered aerial vehicle whose maximum take-off weight does not exceed 2 kilograms;

It means unmanned aerial vehicles that weigh 2 kg or less are not subject to reporting, but if they are used for business purposes such as air charter service, or sport and leisure aviation service, they are still subject to reporting.

F. License or Certificate of Drones

[345] *Ibid* art 122.

[346] *Enforcement Decree Of The Aviation Safety Act (2017),* Presidential Decree No. 33103, South Korea 2023 art 24 (*항공안전법 시행령*) [*Presidential Decree of Aviation Safety Act*].

As examined above, drones are largely divided into unmanned aircraft and unmanned aerial vehicles in the South Korea air law system.

First, when it comes to unmanned aerial vehicles, A person who intends to operate a flight using an ultra-light vehicle prescribed by the Ordinance of MLIT, such as a powered flying machine, shall be certified by the head of an agency or organization prescribed by Ordinance of MLIT to operate the flight of the relevant ultra-light vehicle. It is referred to as "Ultra-light Vehicle Pilot Certification".[347] Since an unmanned aerial vehicle is one subcategory of Ultra-light Vehicle, an unmanned aerial vehicle pilot must obtain Ultra-light Vehicle Pilot Certification to operate it. However, unmanned aerial vehicles that maximum take-off weight including fuel is 250 grams or less are not subject to that Certification.[348]

In addition, certifications for unmanned aerial vehicles are classified according to their weight as follows:[349]

Class 1: The maximum take-off weight exceeds 25 kg and its own weight excluding the weight of fuel is 150 kg or less
Class 2: The maximum take-off weight exceeds 7 kg and 25 kg or less
Class 3: The maximum take-off weight exceeds 2 kg and 7 kg or less
Class 4: The maximum take-off weight exceeds 250 g and 2 kg or less

[347] *Aviation Safety Act, supra* note 17 art 125.

[348] *MLIT Ordinance of Aviation Safety Act, supra* note 307 art 306.1.4.

[349] *Ibid* art 306.4.

This classification is to make it easier for drone pilots to obtain qualifications by varying the contents of qualification tests according to the risks of drones.

Meanwhile, regarding Unmanned Aircraft, Pilot Certification is not established yet. Aviation Safety Act stipulates as follows:[350]

A person who intends to be engaged in aviation services shall obtain certification of qualification of aviation personnel ("certification of qualification") from the Minister of Land, Infrastructure and Transport, as prescribed by the Ordinance of MLIT: Provided, that the same shall not apply to the operation of an unmanned aircraft among aviation services.

Furthermore, so far, no unmanned aircraft pilot certification has been established for private purposes as well as air services. This is believed to be due to the fact that unmanned aircrafts exceeding 150 kg have not yet been introduced into the private sector. However, it is essential to establish a pilot certification system for unmanned aircraft to cope with the development of drone technology in the future, as it is clear that unmanned aircraft more than 150 kg will soon also be commercialized.

G. Airworthiness of Drones

Unmanned Aircraft is an aircraft, so it is subject to Aircraft Safety Certification.[351] Aircraft Safety Certification is composed of three certifications. That are Type Certification for proving that the aircraft is designed according to the technical standards,[352] and Production

[350] *Aviation Safety Act, supra* note 17 art 34.

[351] Song, *supra* note 193 at 64.

[352] *Aviation Safety Act, supra* note 17 art 20.

Certification for proving that a person who intends to produce an aircraft has the technology, facilities, human resources, a quality management system to produce aircraft conforming to Type Certification[353] and Airworthiness Certificate for proving that an aircraft is airworthy.[354]

When it comes to Unmanned Aerial Vehicles, a person who intends to operate a flight using an ultra-light vehicle shall obtain Safety Certification that the ultra-light vehicle meets technical standards for flight safety determined and publicly notified by the Minister of Land, Infrastructure and Transport.[355] However, drones with a maximum take-off weight of 25 kg or less are not subject to Safety Certification.[356]

In the case of Unmanned Aircraft, aviation safety is relatively well secured because it is subject to the process of the manned aircraft safety process. However, concerning unmanned aerial vehicles, unmanned aerial vehicles weighing less than 25 kg are excluded from the object of safety certification. I believe that it is desirable to expand the objects of safety certification to strengthen the operation safety of drones.

H. Implications and Interim Summary

South Korean government sees the drone industry as a driving force for future economic growth and is responding to it quickly.[357] As a result of such efforts, the Drone Act was born in

[353] *Ibid* art 22.

[354] *Ibid* art 23.

[355] *Ibid* art 124.

[356] *MLIT Ordinance of Aviation Safety Act, supra* note 307 art 305.

[357] *Drone Road map, supra* note 11 at 1.

2019. It tried to contribute to the development of the drone-related legal system through such as defining the term “Drone”.[358] However, as we examined above, the Drone Act is basically a law for the development of the drone industry, not a law for the safety of drone operations.

Meanwhile, as for matters related to the Aviation Safety Act, I believe that it is necessary to unify the terms of drones that are “Unmanned Aircraft” and “Unmanned Aerial Vehicle” into Unmanned Aircraft. They have the same principle of flight, using a reaction of air, so it is unreasonable that the distinction between the two depends on weight. It is also inconsistent with the ICAO regulation defining aircraft[359] and general scientific principles.

If the terminology is unified into Unmanned Aircraft, a more sophisticated classification method for categorizing Unmanned Aircraft is needed. In general, the weight of the Unmanned Aircraft will be an important criterion, but the approach of risk-based operation may also be an important classification criterion.

The South Korean government has a strong tendency to legislate drones from an economic point of view. Of course, the drone industry is also very important. However, the most important thing is the safety of drone operations. Drone safety and drone industry should interact like two wheels of a wagon.

[358] *Drone Act, supra* note 9 art 2.1.1.

[359] *ICAO UAS Circular, supra* note 33 at (ix).

Chapter 6. Applicability of Drone Laws to Urban Air Mobility under the Current Legal Regime in South Korea

A. Overview of UAM, the Korean Government's Policy and Legislative Efforts

Urban Air Mobility is usually regarded as a new safe, secure and more sustainable air transportation system for passengers and cargo in urban environments, enabled by new technologies and integrated into multimodal transportation systems. The transportation is performed by electric aircraft taking off and landing vertically, remotely piloted or with a pilot on board.[360]

It is a brand-new type of air traffic system. In other words, the current air transportation has been based on the premise of airport-to-airport systems that connect airports, but UAM is the expanded air transportation system to connect airport-to-city or city-to-city based on new technologies.

However, the concept of passenger transport by aircraft in the city center, especially in metropolitan areas is not unprecedented.[361] Commercial UAM operations have occurred in the United States since at least the 1940s. For example, from 1947 to 1971, Los Angeles Airways used helicopters to transport people in LA, including Disneyland and LA Airport. Tragically, the company experienced two accidents in 1968 caused by mechanical failures that killed several dozens of passengers and crews. New York Airways primarily also used helicopters to

[360] EASA, "What is UAM?" EASA official website, European Union Aviation Safety Agency/ domains/ Urban Air Mobility (UAM)/ Infographic 'What is UAM' < https://www.easa.europa.eu/en/what-is-uam>.

[361] Ravich, *supra* note 10 at 663.

fly people between heliports in Manhattan and LaGuardia, JFK, and Newark airports from 1949 to 1979. However, that company also stopped flying due to several incidents of mechanical failures that caused the deaths and injuries of dozens of passengers, and crew members in 1977.[362]

These were all due to the technical inadequacies of helicopters for air transportation in the city center, but the subsequent development of vertical take-off and landing aircraft technology (in particular, distributed electric propulsion ("DEP") and autonomous operation technologies)[363] made air transportation for urban passengers safe. The development of these technologies showed the potential of UAM as an industry, and governments began to recognize UAM as a driving force for economic development, and the Korean government also caught the potential of UAM.

The Korean government announced the "Korea Urban Air Mobility (K-UAM) Road Map" in 2020.[364] This suggests the directions and measures of policy to improve the infrastructure and legal system for realizing UAM in South Korea and includes detailed implementation plans until 2025.[365] Subsequently, the Korean government launched "UAM Team Korea (UTK)", a policy consultative body, in June 2020. It was composed of 37

[362] David P. Thipphavong, et al. "Urban air mobility airspace integration concepts and considerations." (2018) Aviation Technology, Integration, and Operations Conference 1 at 2.

[363] Ravich, *supra* note 10 at 663.

[364] South Korea, Joint of related ministries, *Korea Urban Air Mobility (K-UAM) Road map* (2020) (*한국형 도심항공교통(K-UAM) 로드맵*)[*K-UAM Road map 2020*].

[365] *Ibid* at 47-49.

organizations including industry, academia, and government agencies to develop policies, technologies, and technical road map for establishing UAM in Korea.[366]

Since then, the Korean government publicized the Korea Urban Air Mobility Technology Road map (K-UAM Technology Road map) in June 2021.[367] It includes the establishment of an efficient R&D investment strategy for the promotion of national R&D projects and performance improvement and the establishment of a technology field strategy for leading UAM technology.[368] Most recently, the Korean government issued the Korea Urban Air Mobility Concept of Operations 1.0 (K-UAM Concept of Operations 1.0) in September 2021.[369] This document deals with the definition of basic concepts necessary for UAM commercial services and the operation procedures.

The Korean government's efforts to institutionalize and systematize UAM finally led to enacting a special bill to regulate UAM that is the "Act on Promotion and Support of Urban Air Mobility (2022)"[370]. Now it is currently pending in the National Assembly. This bill defines

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[366] The main members of UAM Team Korea (UTK) are as follows. The Ministry of Land, Infrastructure and Transport, the Ministry of National Defense, Hyundai Motor Company, Hanwha System, Korean Air, SK Telecom, Korea Aerospace University, Seoul National University, Korea Airports Corporation, and Incheon International Airport Corporation.

[367] South Korea, The Ministry of Land, Infrastructure and Transport, Ministry of Science and ICT, Ministry of Trade, Industry and Energy, Ministry of SMEs and Startups, Korea Meteorological Administration, *Korea Urban Air Mobility Technology Road map (K-UAM Technology Road map)* (2020) (*한국형 도심항공교통(K-UAM) 기술로드맵*)[*K-UAM Technology Roadmap 2020*].

[368] *Ibid* at 12-19.

[369] South Korea, UAM Team Korea, *Korea Urban Air Mobility Concept of Operations 1.0 (K-UAM Concept of Operations 1.0)* (2021) (*한국형 도심항공교통(K-UAM) 운용개념서 1.0*) [*K-UAM Concept of Operations 1.0*].

[370] *UAM bill, supra* note 18.

some essential elements related to UAM and covers the government's policies for the successful implementation of UAM.

However, as with the introduction of any new system, UAM also has some problems and obstacles to solve for implementation. In particular, As UAM is a new-emerging system of air transport that has not been implemented in earnest, there is a lack of academic studies and are not numerous confirmed legal issues so far, so it is hard to predict the legal issues exactly. Nevertheless, some efforts are being made to identify and solve such issues. Federalism, preemption, airspace, and community acceptance were raised as those issues.[371] Among them, Community acceptance of UAM is considered to be the most important factor for implementing UAM, so EASA conducted a special survey on that issue.[372] According to this survey, the top three concerns of European society about UAM are safety, environment/noise and security.[373] It supports that the most important thing for UAM operation is safety.

This thesis examines the applicability of which drones can be used as vertical aircrafts for UAM under the current Korean air law system. For that, first, the definition of UAM stipulated in the UAM bill and other government policy documents should be reviewed, and whether passenger transportation using drones is possible should be examined in earnest under the Aviation Safety Act. However, the first thing to examine is the relationship between drones and UAM. In other words, the matter is why we should research the applicability of drones to UAM.

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[371] Ravich, *supra* note 10 at 667.

[372] EASA, "Study on the societal acceptance of Urban Air Mobility in Europe" (2021) < https://www.easa.europa.eu/en/domains/urban-air-mobility-uam>.

[373] *Ibid* at 70.

B. Relationship between Drones and UAM

Here we need to see how UAM and drones are conceptually different. The biggest difference is that drone refers to the unmanned aircraft itself, and UAM refers to a system that can be transported in urban areas, regardless of whether it is an unmanned aircraft or a manned aircraft. In other words, drones can be an element of UAM, but UAM does not necessarily require drones as a means of transport.[374]

However, the governments that intend to implement UAM usually regard drones as the most important means of transportation for UAM in the future. That is because they think an autonomous air transport system is the most developed level of air transportation and for that drone is essential.

K-UAM Concept of Operations 1.0 plans to divide Korea's UAM development stage into three stages. That is an early period (2025~), growth period (2030~), and maturity period (2035~). During the growth period, remotely piloted drones are planned to be used as UAM aircraft and furthermore, for the maturity period, autonomous drones will be introduced as UAM aircraft.[375]

EASA also elucidates its plan saying that the drones used for the transport of goods will be remotely piloted. The aircraft used for the transport of persons will initially have a pilot on board. At a later time, maybe 10 years from now, we expect to see the human pilots on board

[374] See, "What is UAM?" *supra* note 360.

[375] *K-UAM Concept of Operations 1.0, supra* note 369 at 14.

air taxis being gradually replaced with remote pilots on the ground. And in a further evolution, we may see air taxis operating autonomously, without any human intervention during flight.[376] The EU also plan to use autonomous drones as well as remotely piloted drones. Moreover, the time to use drones is almost the same as Korea.

In conclusion, drones are not an essential element in the concept of UAM operation. However, drones are accepted as the highest level of air transport means for UAM operation, so the legal research for the applicability of drones to UAM is essential for the successful implementation of UAM.

C. The Bill: "Act on Promotion and Support of Urban Air Mobility"

The bill "Act on Promotion and Support of Urban Air Mobility (UAM Bill)" was proposed on August 19, 2022, to promote and support UAM in South Korea. This bill is largely classified into three parts: Chapter 1 for General rule, Chapter 2 for the promotion of the use of urban air mobility, and Chapter 3 for the creation of a circumstance for the use of urban air mobility.[377]

Chapter 1. General Rule, is mainly composed of the objective of this bill and the definition of some essential concepts for implanting UAM.

The object of this bill is as follows:

[376] EASA, "Will UAM aircraft fly manned and/or unmanned?" (2021), Frequently Asked Questions On UAM at 2 < https://www.easa.europa.eu/en/downloads/127750/en>.

[377] *UAM bill, supra* note 18 chapter 1,2,3.

This Act promotes and supports the use of urban air mobility by prescribing matters necessary for the introduction and spread of urban air mobility and the establishment and support of the operational basis for safe and efficient navigation of UAM aircraft, thereby promoting the people's right of mobility and the development of the national economy.[378]

This provision mentions the establishment and support of the operational basis for 'safe and efficient navigation of UAM aircraft, which means this bill is to take UAM safety operation seriously and importantly. However, the ultimate objective of this bill is to contribute to the promotion of people's mobility rights and the development of the national economy, which means that this bill focuses on the development of the UAM industry.

The bill defines Urban Air Mobility and some essential concepts of UAM.[379] Regarding these definitions, this thesis examines them in the next part 'D. Definition of UAM'.

Chapter 2, which deals with the promotion of the use of UAM, is mainly about the establishment of government plans to promote the use of UAM, the development of Vertiport, and the designation of urban air mobility business operators.

In other words, the Minister of Land, Infrastructure and Transport (the Minister of LIT') shall formulate a basic plan for urban air mobility every five years for the introduction and spread of UAM, safe and efficient navigation management, and the development of the UAM industry, including the basic direction and goals of the support of UAM industry, R&D plans for UAM.[380]

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[378] *Ibid* art 1.

[379] *Ibid* art 2.

[380] *Ibid* art 4.

Plus, the Minister of LIT may implement a project to develop Vertiport and if a person other than the Minister of LIT intends to implement the Vertiport Development Project, he/she shall obtain permission from the Minister of LIT as prescribed by Presidential Decree.[381]

In addition, a person who intends to conduct urban air mobility business in a temporary operation area shall be designated as an urban air mobility business operator, as prescribed by Presidential Decree.[382]

Chapter 3, which concerns the creation of a circumstance for the use of urban air mobility, covers mainly administrative and financial support for entities related to UAM and training and management of professional human resources.

In detail, the state and local governments shall provide necessary administrative, financial, and technical support to institutions or business operators conducting infrastructure business for the safety of urban aircraft and the research for developing UAM.[383]

Plus, the Minister of LIT shall endeavor to foster professional human resources necessary for the development and competitiveness of the UAM industry, and the Minister of LIT can support the following projects to train the professional resources: domestic and international training to foster UAM professionals; Development and dissemination of UAM education programs; Other projects necessary for the development of UAM industries.[384]

This bill is significant in that it defined the essential concept of UAM and institutionalized the government's policy for UAM development. However, like the Drone

[381] *Ibid* art 12.

[382] *Ibid* art 16.

[383] *Ibid* art 25.

[384] *Ibid* art 27.

Act,[385] the bill has a limitation in that it has focused on the economic perspective that UAM will bring as an industry. In other words, the bill does not present any suggestions and solutions concerning the operation and safety of UAM.

D. Definition of UAM

UAM usually refers to a new air-transport system to transport persons and cargo in the city center. However, for the safety of UAM operation and the successful implementation of UAM, institutionalization and regulation are essential, and the first step for that is the exact definition of the UAM operation concept. That is because without setting the definition of the UAM operating concept, it is impossible to draw the legal issues of it and to suggest any solutions concerning that issues for the development of UAM.

First, the UAM bill defines UAM as follows; The term “Urban Air Mobility” means the use, management, and operating system of UAM aircraft, Vertiport, UAM corridors, etc. that are individually or organically linked to each other to perform activities related to the transport of people or cargo.[386]

This bill also defines UAM aircraft as follows; The term "UAM aircraft" means an aircraft or equivalent device under subparagraph 1 of Article 2 of the Aviation Safety Act, which the Minister of LIT have publicly announced after deliberation and resolution of the UAM Committee under Article 6.[387]

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[385] *Drone Act, supra* note 9.

[386] *UAM bill, supra* note 18 art 2.1.1.

[387] *Ibid* art 2.1.2.

This definition can give flexibility to the recognition of UAM aircraft by delegating UAM aircraft requirements to the Minister's announcement, but this is incomplete legislation that does not know what UAM aircraft is because the definition does not stipulate any requirements for UAM aircraft.

Plus, the bill defines Vertiport as follows; The term "Vertiport" means certain facilities used for takeoff and landing of UAM aircraft and their auxiliary facilities and support facilities designated and announced by the Minister of LIT pursuant to Article 14.[388] Article 14 says that the Minister of LIT may designate and announce Vertiports as prescribed by the Ordinance of the Ministry of LIT after deliberation and resolution by the Committee. The same shall also apply when the designation is changed or canceled.[389]

The criticism of UAM aircraft is applied to this definition samely. This definition does not stipulate any requirements for Vetiport, so we can not get any information about what is essential for a vertiport.

In addition, the bill defines “UAM corridors” as follows; The term "UAM corridor" means the path of space indicated above the surface of the earth by the Minister of LIT as suitable for the navigation of UAM aircraft.[390]

In conclusion, The UAM bill defines UAM as an air transport system for people or cargo with UAM aircraft, Vertiports and UAM corridors as essential elements.

Meanwhile, K-UAM Concept of Operations 1.0 defines UAM as follows; Urban Air Mobility is a new type of air transportation system that is operated in conjunction with other

[388] *Ibid* art 2.1.3.

[389] *Ibid* art 14.1.

[390] *Ibid* art 2.1.4.

means of transportation to transport passengers or cargo by using eco-friendly electric-powered vertical take-off and landing aircraft (eVTOL) that can be used in urban areas.[391]

K-UAM Concept of Operations 1.0 clarifies that UAM aircraft shall be electric-powered vertical take-off and landing aircraft (eVTOL).

Meanwhile, the EU's definition of UAM is as follows:

> Urban Air Mobility is a new air transportation system for passengers and cargo in and around densely populated and built-up environments, made possible by vertical take-off and landing electric aircraft (VTOL) equipped with new technologies, such as enhanced battery technologies and electric propulsion. These aircraft will have a pilot on board or be remotely piloted.[392]

What is noteworthy about the EU's definition of UAM is that it specifies that UAM can be operated by unmanned aircraft.

The US's definition of UAM is as follows:

> Urban Air Mobility (UAM) envisions a safe and efficient aviation transportation system that will use highly automated aircraft that will operate and transport passengers or cargo at lower altitudes within urban and suburban areas. UAM will be composed of an ecosystem that considers the evolution and safety

[391] *K-UAM Concept of Operations 1.0, supra* note 369 at 10.

[392] EASA, "What is Urban Air Mobility (UAM)?" (2021), Frequently Asked Questions On UAM at 1 < https://www.easa.europa.eu/en/downloads/127750/en>.

of the aircraft, the framework for operation, access to airspace, infrastructure development, and community engagement.[393]

A characteristic of the US UAM definition is that it does not require vertical take-off and landing aircraft. Meanwhile, it is not clear what level of aircraft is meant as highly automated aircraft. In other words, there may be controversy about whether it means autonomous drones or not.

The definition of UAM in South Korea is an air transport system for human and cargo transportation that requires Veriport, UAM corridor, and eVTOL powered by electricity that can take off and land vertically. For clear concept of UAM operation, clear definition in the UAM bill is required.

E. Applicability of Drones to UAM under the Current Aviation Safety Act

As examined above, the UAM bill does not have any provisions that regulate the safety and operation of UAM substantially. That means that the Aviation Safety Act still applies to the implementation of UAM using drones. If so, the question is whether drone-related regulations can be applied to the operation of UAM under the current aviation safety law, and the most important issue is whether it is possible to transport passengers using drones.

[393] FAA, "What is Urban Air Mobility?" FAA official website, Federal Aviation Admistration/ Unamanned Aircraft Systems (UAS)/ Advanced Operations/ Urban Air Mobility & Advanced Air Mobility <https://www.faa.gov/uas/advanced_operations/urban_air_mobility>.

As reviewed above, Drone Act defines a drone as “flying vehicles operable with no pilot onboard”.[394] This means that pilots and passengers are different things, and without pilots, transporting passengers is possible. In other words, according to the definition of drones under the Drone Act, passenger transport through drones is possible. however, unfortunately, the Aviation Safety Act does not use the term drone, and drones are largely divided into Unmanned Aircraft and Unmanned Aerial Vehicles based on a weight of 150 kg under the Aviation Safety Act.

Unmanned Aircraft is defined as an aircraft that flies without a human aboard[395] and Unmanned Aerial Vehicles are also defined as flying devices that do not have a person on board.[396] This means that both unmanned aircraft and unmanned aerial vehicles stipulated in the Aviation Safety Act presuppose that no person is on board, including pilots. In other words, under the current aviation safety Act, it is impossible to transport passengers using drones.

In order to solve this problem, it will be reasonable to revise the definition of unmanned aircraft and unmanned aerial vehicles under the Aviation Safety Act from “without a human aboard” and “flying devices that do not have a person on board” to “with no pilot onboard” and “flying devices that do not have a pilot on board”, in other words, from “non-human boarding” to “non-pilot boarding”.

Another important issue under the Aviation Safety Act is what kind of unmanned aircraft or unmanned aerial vehicles can be applied to UAM operations. This issue originates from the regulating way confusing the definition with the classification under the Aviation Safety Act.

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[394] *Drone Act, supra* note 9 art 2.1.1.

[395] *Aviation Safety Act, supra* note 17 art 2.6.

[396] *MLIT Ordinance of Aviation Safety Act, supra* note 307 art 5.5.

First, examing the definition of aircraft and unmanned aircraft in the Aviation Safety Act, as discussed in chapter 5. part C. “Definition of drones”, aircraft are categorized as (a) Airplane (b) Helicopter (c) Airship (d) Glider.[397] Unmanned aircraft can be applied to airplanes, helicopters, and airships among aircraft.[398] In the case of airplanes and helicopters, the weight of unmanned aircraft must exceed 150 kg, while when it comes to unmanned aircraft belonging to airships, its weight must exceed 180 kg and its length must exceed 20 m.[399]

Meanwhile, Unmanned Aerial Vehicles is categorized as (a) Unmanned Powered Aerial Vehicles and (b) Unmanned Airship. In the case of Unmanned Powered Aerial Vehicles, the weight of that must be 150 kg or less, and it is categorized again as Unmanned Airplane, Unmanned Helicopter or Unmanned Multicopter, while regarding Unmanned Airship, its weight must be 180 kg or less and its length must be 20 m or less.[400] [401]

In light of the fact that UAM is the air transportation system that transports passengers, it is difficult to imagine that the aircraft for UAM weighs 150 kg or less, so the UAM Aircraft stipulated by the UAM Bill[402] will in almost all cases be Unmanned Aircraft of the Aviation

[397] *Aviation Safety Act, supra* note 17 art 2.1.

[398] *MLIT Ordinance of Aviation Safety Act, supra* note 307 art 2.

[399] *Ibid* art 2. See note 310.

[400] *Ibid* art 5.5. See note 307.

[401] According to MLIT Ordinance of Aviation Safety Act art 5.5, Unmanned aerial vehicle includes Unmanned Airship. However, usually when we mention drones, we usually talk about unmanned powered aerial vehicles among unmanned aerial vehicles, so this thesis will deal with unmanned aerial vehicles as unmanned powered aerial vehicles.

[402] *UAM bill, supra* note 18 art 2.1.2.

Safety Act. In other words, UAM Aircraft must be an Unmanned Airplane or an Unmanned Helicopter under the Aviation Safety Act.[403]

However, the problem is that while Unmanned Aerial Vehicles include Unmanned Multicopters as the category of that under the Aviation Safety Act, Unmanned Aircraft does not include unmanned multicopters as the subcategory. Multicopter is one of the most widely used drone aircraft in the world with enhanced flight safety and stability by supplementing the technical inadequacies of helicopters. EASA describes it as a Wingless type of UAM aircraft.[404] The Aviation Safety Act probably did not anticipate the implementation of UAM when it stipulated unmanned aircraft.

In order to solve this problem, a multicopter should be added in parallel to a helicopter, because it is also a rotorcraft like a helicopter, in paragraph 1 of Article 2 of the Aviation Safety Act, and multicopter should also be designated and added in paragraph 1 of Article 2 of the MLIT Ordinance of Aviation Safety Act, in other words, form "an airplane or helicopter" to "airplane, helicopter, or multicopter".

F. License or Certificate of UAM Aircraft

[403] According to MLIT Ordinance of Aviation Safety Act art 2, Unmanned aircraft includes Unmanned Airship. However, usually when we mention drones, we usually talk about unmanned powered aircrafts among unmanned aircrafts, so this thesis will deal with unmanned aircrafts as unmanned powered aircrafts.

[404] EASA, "Vehicle Types, Main Use Cases And Infrastructure?" EASA official website, European Union Aviation Safety Agency/ domains/ Urban Air Mobility (UAM)/ Infographic 'What is UAM' < https://www.easa.europa.eu/en/what-is-uam>.

In this part, this thesis will examine the pilot licenses for UAM aircraft, in the case of drones used for UAM. As examined in chapter 5. part F. "License or Certificate of Drones" in South Korean law, the pilot license for Unmanned Aircraft is not established yet.[405] Therefore, there is no pilot license system for UAM Aircraft in the South Korean legal system.

However, at this point, it should be considered if the current Aviation Safety Act establishes a pilot license system for Unmanned Aircraft, whether it can be applied to UAM aircraft. It will not be applicable. That is because, under the current Aviation Safety Act, unmanned aircraft is based on the premise that no person is on board,[406] while UAM aircraft is based on the premise of transporting passengers.[407] The basic concept is completely different. In other words, under the current aviation safety law, an unmanned aircraft pilot license, even if it is established, cannot be applied to UAM aircraft. Therefore, it is necessary to research, develop and establish a pilot license system for unmanned aircraft used for UAM.

On the other hand, examining the situation in the EU and the US, the EU in early 2019, it has already launched preparatory activities that will lead to rules for the pilots/remote pilots of these vehicles, their operators and the infrastructure, e.g. vertiport operators.[408]

The US established the concept of Pilot in Command (PIC), which means the person aboard the UAM aircraft who is ultimately responsible for the operation and safety during

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[405] *Aviation Safety Act, supra* note 17 art 34.

[406] *Ibid* art 2.6.

[407] *UAM bill, supra* note 18 art 2.1.

[408] EASA, "EASA regulatory activities; On operations and pilot licencing" EASA official website, European Union Aviation Safety Agency/ domains/ Urban Air Mobility (UAM) <https://www.easa.europa.eu/en/domains/urban-air-mobility-uam>.

flight.[409] However, it has not mentioned the pilot license for unmanned aircraft used for UAM Aircraft.

G. Airworthiness of UAM

As examined above, the same matter can be applied to the airworthiness of Unmanned Aircraft used for UAM Aircraft. Unmanned aircraft is an aircraft, so it is subject to Aircraft Safety Certification. These are Type Certification,[410] Production Certification,[411] and Airworthiness Certificate.[412]

However, this Aircraft Safety Certification is not applicable to UAM Aircraft that requires passenger transportation because it was established under conditions and standards created under the premise that no person would be on board an Unmanned Aircraft. Therefore, the Aircraft Safety Certification system that can be applicable to Unmanned Aircraft for UAM aircraft should be established soon.

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[409] FAA, "Concept of Operations ver 1.0 Foundational Principles, Roles and Responsibilities, Scenarios and Operational Threads, Urban Air Mobility (UAM)" (2020) Federal Aviation Admistration Architecture and Next Den Development, Washington DC art 4.3.3.

[410] *Aviation Safety Act, supra* note 17 art 20.

[411] *Ibid* art 22.

[412] *Ibid* art 23.

Chapter 7. Conclusion

Since drones were introduced to the private sector, they have developed remarkably both in quality and quantity, and the use of drones will expand to more diverse areas in the future. Drones have recently been spotlighted as a driving force for the development of the aviation industry.

However, as with all new technologies introduce, if there is splendid development, negative effects and risks are always able to emerge. The same goes for drones. In particular, drones are aircraft without pilots and always have risks of injuring or inflicting damage to other people, so regulations on that are necessary. Furthermore, since UAM is based on the transport of passengers, strong regulations are especially essential to ensure the safe operation of drones.

So far, through a comparative legal review of the US and EU drone law systems, we have examined the problems of the Korean drone law, and whether drone law can be applicable to the UAM. Since drone law itself is based on aviation law basically originated from the international norms, so comparative legal research is considered essential, not optional, in drone law research. I think that the UN ICAO model regulation represents the current international legal status of drones exactly and clearly.

In other words, although the ICAO model regulation was created based on the laws of the United States, Canada, Australia and other states,[413] the regulation will serve as a legislative model for other countries.[414] Again, this will provide new input and inspiration to the ICAO

[413] *ICAO Model regulations 101, supra* note 48 at 1.

[414] *Ibid* at 1 Description.

model regulation through the national application, which will lead to the development of drone legislation.

I believe that the same process will be repeated for legislation of UAM. The Air and Space law is like a large organism, influencing each other, and progress promotes another progress. This is why I am convinced that the research on Korean drone laws and UAM laws will help develop other countries' legislation and ICAO's model regulation.

For the development of drone and UAM laws, this process will have to continue under the each state's legal regime.

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