



Evaluation of Flight Permissions of Unmanned Aerial Vehicles in Turkey

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Abstract

The fields of application and types of Unmanned Aerial Vehicles (UAV) have expanded more and more. As a result of this expansion, countries' applicable legislation, as well as generally accepted rules, are changing. Otherwise, uncontrolled UAV use is very prone to damage to other aircraft, structures, or people. Therefore, this research comprises a qualitative review as well as a comparative analysis of professionals who have worked with UAV piloting and operations for years, as well as the industry and other institutions involved. In addition, the Turkish UAV industry and applications were probed. In Turkey, the number of UAV pilots and registered UAVs is increasing at a rate of 55 percent each year. The clear and evolving nature of the regulations, as well as the training institutes' use of a large and qualified workforce, encourage individuals to pursue UAV training. UAVs, on the other hand, are likely to be developed to meet insurance and flight permission requirements.

Keywords: UAV, Legislation, Flight Permission, UAV Training

Türkiye'deki İnsansız Hava Araçlarının Uçuş İzinlerinin Değerlendirilmesi

Öz

İnsansız Hava Araçlarının (İHA) kullanım alanları ve kullanım çeşidi her geçen gün artmaktadır. Bu artış beraberinde her ülkenin ilgili mevzuatları geliştirmesine ve genel kabul görmüş kuralları getirmesine neden olmaktadır. Aksi halde kontrolsüz İHA kullanımının diğer hava araçlarına, yapılar veya insanlara zarar verme olasılığını artıracaktır. Bu nedenle çalışmada Türkiye'de uzun yıllardır İHA pilotluğu ve işletmeciliği yapan kişilerle sektörün, diğer kurumlarla olan karşılaştırmalı analizi ile niteliksel değerlendirmesi yapılmıştır. Ayrıca Türkiye'deki İHA sektörü ve İHA uygulamaları anlatılmıştır. Türkiye'deki İHA pilot sayısı ile kayıtlı İHA sayısı her yıl yaklaşık % 55 artış gözlenmektedir. Mevzuatın açık ve sürekli gelişiyor olması, eğitim kurumlarının fazla ve yetkin kişilerden oluşması insanların İHA eğitimi almalarını teşvik ettiği görülmüştür. Diğer taraftan İHA'ların sigortalama ve uçuş izin konularında gelişmesi beklenmektedir.

Anahtar Kelimeler: İHA, Mevzuat, Uçuş İzni, İHA Eğitimi

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1. Introduction

Unmanned Aerial Vehicles (UAV) that do not have a pilot onboard and are controlled and guided by a ground control station are characterized as future systems (Kurt and Un, 2015). They were originally designed for military purposes (Keane and Carr, 2013), and they are now widely used for civilian applications (Ateş, 2021; Fidan and Ulvi, 2021). The following are the most often used military domains of use (SSM, 2015):

- Reconnaissance / Surveillance support
- Defence
- Target Simulation
- Electronic War
- Special / Specific Missions

As in the case of military applications, civilian use is specifically developed for image capture and processing such images in accordance with the intended purpose [SSM,2015; Doğan and Yıldız, 2019]. Civilian applications include mapping [Turner et al., 2016; Deliry and Avdan, 2021; Fraser et al., 2016; Gonçalves and Henriques, 2015; Zıba and Yılmaz, 2019), firefighting [Akhloufi et al., 2021; Eugenio et al., 2020; Ghamry et al., 2017], precision agriculture (Ahmad et al., 2020; Candiago et al., 2015; Akkamaş and Çalışkan, 2020; Ceylan and Uysal, 2019), cargo transportation (Faust et al., 2017; Beloev, 2016), and location and intervention in emergency cases (search and rescue operations, seismic research, and so on) (Akhloufi et al., 2021; Moumgiakmas et al., 2021; Stöcker et al., 2017; Pajares, 2015; Zimroz et al., 2021; Wang et al., 2022; Saif et al., 2021). It is projected that in 2035, there would be 2,500 urban air mobility vehicles, 16.667 freight delivery drones, 58 inspection drones, and 44 hobby drones in the skies of Paris at any particular time, despite the contemporaneous presence of 156 commercial airplanes (ICAO, 2021).

With the application of UAVs in several civilian fields of applications in various industries, the UAV market is anticipated to expand significantly. According to a 2020 UAV industry research, the UAV sector, which had a 20-billion-dollar output in 2020, is expected to grow at a rate of 15% per year from 2021 to 2027 (Global Market Insight Inc., 2021). UAVs, which are used in a variety of industries for a multitude of civilian applications, significantly boost the global manufacturing supply.

As a result, it is expected that UAV technology will grow in popularity and propagate in the future. With technological developments and sensor downsizing, the capabilities of easily accessible systems such as the UAV's body, autopilot, and ground control stations have significantly expanded. Such a low-cost technology has become much more effective in practical applications, opening up new potential in scientific and commercial industries.

Finally, UAV traffic has been increasing in the sky, necessitating a focus on improving the security considerations for UAV flight operations and efficient use of the airspace (Savas et al., 2021). Risks and hazards that may affect not only the users of any specific airspace but also the people on the ground and the properties, should be reduced or eliminated during UAV flight operations (ICAO, 2021).

Aviation safety is a system comprised of rules and regulations. Accidents and incidents in the past paved the way for the establishment of norms and standardization. Each nation is

sovereign and is responsible for standardized structuring, legislation, and regulation (Beté at al., 2021). Therefore, explicit legislation is required for all nations in order to plan and operate UAV flights.

Various institutions and organizations, both military and civilian, are currently conducting researches to develop regulations for the safe and efficient flight operations of UAVs (DeGarmo, 2004). The International Civil Aviation Organization (ICAO) regards UAVs as an important vision for the sustainable development of global civil aviation. ICAO highlights existing safety standards and environmental impacts during air traffic management (ATM) integration for this purpose (Abeyratne, 2014). In 2017, the European Union Aviation Safety Agency (EASA) issued its first comprehensive regulation, focusing on air traffic management and navigation services for UAVs (EASA, 2021). The Federal Aviation Administration (FAA) made substantial progress in developing technical and regulatory standards, policy guidelines, and operational procedures for efficient UAV flight operations (FAA, 2020).

UAV flight operations in Turkey are evolving in line with global developments. This paper presents a comparative analysis of the operational concepts and regulations for the smooth, efficient, and most importantly, safe UAV flight operations in our country.

The procedures to be followed for acquiring civilian UAV flying permits, on the other hand, are examined in a thorough manner that differs from the literature. The study includes a comparative analysis of people who have been involved in UAV piloting activities and operations in Turkey for a long time, as well as the industry and other organizations involved, along with a qualitative assessment. Furthermore, the UAV industry and UAV applications are addressed.

The following is how the article structure has been organized: The second section of the research examines the local UAV legislation. The methodology is covered in Section III of the study, while the discussions and opinions are presented in the last chapter.

2. Regulatory Structures of UAVs

In the contents of the International Civil Aviation Convention (DOC 7300) executed in Chicago on December 07, 1944, any aircraft operating in the absence of a pilot within the air vehicle is defined as an "Aircraft without a pilot." Today, such air vehicles are referred to as "unmanned" rather than "without a pilot" (ICAO, 2017). An unmanned air vehicle is one that is operated without the involvement of a pilot. Therefore, all of the air vehicles in use today can be remotely controlled by the pilot (ICAO, 2015).

The ATM's principal function is to perform flights safely and efficiently (ICAO, 2016). Currently, it is unavoidable that the capacity of the airspace will be reduced as a result of the inclusion of UAV flights. This instance necessitates several constraints to ensure safe and transparent travel. When implemented to reduce traffic congestion and manage traffic flow, the constraints are procedurally acceptable (Pérez-Batlle at al., 2015).

The aviation authorities established a cooperative approach for the safe and efficient flight of unmanned aerial vehicles (UAVs) and took significant steps to develop legislative

guidelines in order to reduce the costs incurred by the industry and the state (Savas, 2019).

The operational requirements of unmanned aerial vehicles are governed by the provisions outlined in the International Civil Aviation Organization's (ICAO) DOC 7300/9 (2006). According to Article 8 of the Document, "each contracting State undertakes to ensure 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". Where minimum safety standards are necessary, each state should amend its laws and regulations in accordance with the ICAO annexes (ICAO, 2015; ICAO, 2006).

Although the regulations for UAV flight operations are defined for reserved air spaces (ICAO, 2015), the interest exhibited in various applications of UAV (both military and civilian) use led to their integration into non-reserved air spaces (Ferreira et al., 2018).

The integration of UAV systems is envisioned by ICAO as a significant vision for the sustainable development of global civil aviation. A Panel Committee, RPAS, was established in 2014 to ensure UAV system harmonization and global collaboration (ICAO, 2015). According to ICAO, UAV flying activities should neither reduce present aviation safety levels nor should they skew manned aviation safety or efficiency (ICAO, 2017).

ICAO has defined a time frame for addressing the issues such as airworthiness, certification, human performance, licensing and

training, see and avoid systems, air traffic management, environment, wake turbulence, frequency spectrum, command and control, and communication from 2012 through 2030 within the scope of the Aviation System Block Upgrades (ASBU) and makes every effort to resolve issues related to the integration of UAVs into civil airspace step by step (Radu, 2021). "Integration" refers to the future when UAVs will be able to fly in airspace without the need for specific arrangements (SESAR, 2021).

In 2016 and 2017, EASA issued its legislative proposals for unmanned aerial vehicles in European airspace (EASA, 2016; EASA, 2017a; EASA, 2017b). According to the legislation, three categories (open, specific, and certified) have been added to the unmanned civil aviation regulations. The categories cover the risks posed by various UAV operations to people and property on the ground.

As with the previously stated toy UAVs flying over unpopulated regions within the range of Visual Line of Sight (VLOS), operations with low risks are classified as "open." The "certified" category includes operations that involve high risks equivalent to manned aerial vehicles, such as UAVs or unmanned transports. The UAV certification and remote pilot license provide safety in the certified category.

The operations involving the two samples fall under the purview of the "specific" category (Table 1).

Table 1. UAV Operational Categories

	Open	Specific	Certified
Level of Risk	Low	Medium	High
Authorization Needed	None	Approval based on specific operational risk	Authorization from NAA / EASA

UAV pilots must hold a remote pilot aircraft certification issued by the FAA in USA. The UAV pilot, as with all of Part 107, has not completed his training within 24 months, these qualifications are the privileges of approval. It can go two ways (FAA,2020):

- The candidate must pass a knowledge test from the FAA.
- If the candidate has the Part 61 pilot program (other than the student pilot), he/she must complete the flight once in the last 24 months and the knowledge fields specified in Part 107 " Small Unmanned Aircraft System Training" may be enlarged.

In the USA, a candidate who wishes to become a UAV pilot must be at least 16. Besides the relevant standards - it must meet the health standards that should be taken into account for UAV pilot training. No one may operate an UAV in prohibited or restricted areas unless they have obtained permission from the relevant local aviation authority (FAA, 2021).

The local aviation authority, Directorate General of Civil Aviation (DGCA), has revised versions of the UAV rules and Instructions for Unmanned Aerial Vehicles to guarantee that UAVs operate efficiently, seamlessly, and safely in Turkey (SHT-IHA). The instructions were revised for the fourth time in 2020 to define the procedures and principles for air traffic services and

UAV operations, including the importation, sale, registration, and recording of UAVs to be operated in Turkish airspace, as well as the qualifications of the professionals who will operate such systems (DGCA, 2021a).

According to the UAV legislation, the UAVs that can be operated for civilian purposes on Turkish territory are classified into four groups based on their maximum take-off weight:

- UAV 0: 500 gr (included) <MTOW <4kg ,
- UAV 1: 4 kg (included) <MTOW <25kg ,
- UAV 2: 25 kg (included) <MTOW <150kg,
- UAV 3: 150 kg (included) <MTOW < more

In Turkey, UAVs weighing 500 grams or more are documented. If any UAV intends to fly in Turkish airspace, regardless of its weight, it must obtain a commercial flight permit, which DGCA will issue up to 5 days before the flight. The UAV industry in Turkey is introduced in the next chapter, followed by the permission processes required under UAV law.

2.1. Regulatory Structures of UAVs in Turkey

In 2016, Turkey passed its first UAV legislation. As a consequence of the events and problems faced in 2016, there have been four revisions up until today. With the introduction of the

first legislation in 2016, UAVs weighing 500 kg or more must be registered on the UAV registration system. UAVs may be used in Turkish airspace for two purposes: sports/amateur (recreational) and commercial (included also research and development use) usage (Figure 1).

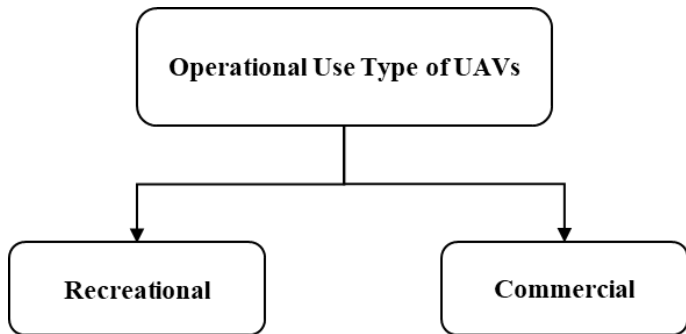


Figure 1. Operational Use Type of UAVs

Furthermore, those who wish to pilot in Turkish airspace must also be certified by recognized training institutions. Such

institutions might include both universities and private institutions (Figure 2).

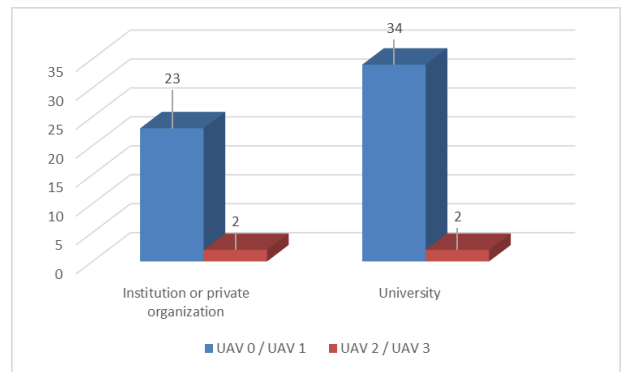


Figure 2. UAV Flight Training Organizations in Turkey

The authorized training institutions and organizations are given above. Such training varies according to the UAV categories. While UAV 0 and UAV are the certified training, UAV 2 and UAV 3 are undergraduate programs. The table below lists the various types of training courses and hours (Table 2).

Table 2. Training Hours of UAV Pilot Training

Hours	UAV 0	UAV 1	UAV 2	UAV 3
Theoretical Training	13	26	85	140
Practical Training	1	2	3	4
UAV Flight Training	2	4	36	54
Total Training	16	32	124	198

For non-commercial operations, a sports amateur function has been included for those who will be operating UAV flights. They hold the sports/amateur certificate as a result of an online exam after enrolling in the UAV registration system.

The DGCA issues data for the UAV registration system at specific intervals. The number of UAV pilots and registered UAVs in Turkey from 2016 to 2020 may be used to analyze the UAV industry (Figure 3). As can be seen, both have been increasing at a rate of approximately 55 percent every year. The most important reason for such a rise is the growing need for UAV operations in agriculture, air cargo, and aerial photography.

2.2. Maps Showing the Flight Zones

The most notable development in UAV regulation in Turkey is the Map of Flight Zones created with the adoption of the modifications in 2019. As a result, it has been intended to perform UAV operations systematically by distinguishing between UAV flights based on security issues. Turkish airspace is divided into three zones, as seen in Figure 4, with three zones colored red, green, and white.

- Zone subject to specific permit (Red)
- Zone subject permission (Colorless)
- Free Zone (Green)
- Zone restricted to those with secret authorization (Confidential)

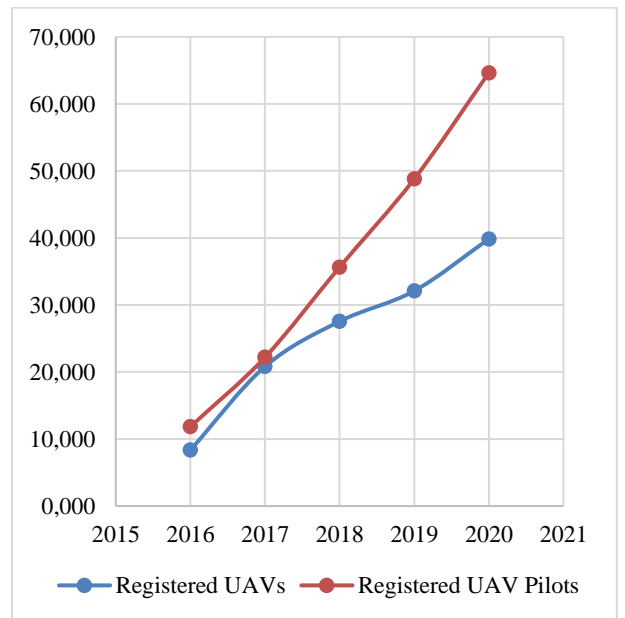


Figure 3. Numerical representation of the UAV industry in Turkey

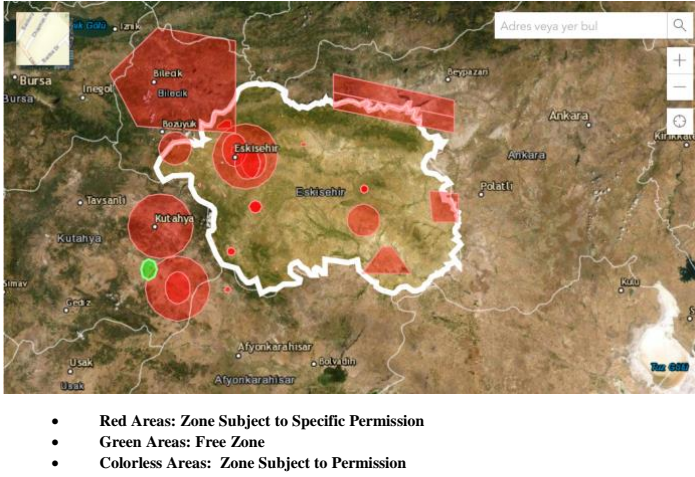


Figure 4. Map of Flight Zones

2.1.1. Zone Subject to Specific Permission (Red Areas)

These are the zones specified by the competent organizations (military-civil), with an authorization issued for flying operations under particular conditions. It is illegal to operate UAVs in any category without first performing a risk assessment and obtaining permission from DGCA. These are the zones that come under this classification:

- Regardless of altitude, the distance from the runway corner to the nearest airport must be less than 5 nautical miles (9 km),
- Regardless of altitude, the core region with a radius of 5 nautical miles (9 km), including the landing/take-off areas published on the General Directorate's official website, heliport, helipad, airpark, and navigational aids,
- 400 feet and up
- "Forbidden, Restricted and Dangerous Sites" included in Section 5.1 of ENR of Turkish AIP,
- The vicinity of the key structures, facilities, and assets such as military buildings and facilities, prisons, fuel depots, and filling stations, weapon/cartridge factories and depots, and so on,
- The zones notified by NOTAM.

2.1.2. Free Zones (Green Areas)

It refers to zones below 400 feet (AGL) that have been verified by the UAV pilot/user and do not require any coordination with the relevant agencies because the user has been affirmatively confirmed by the relevant organizations (military-civil)

2.1.3. Zones Subject to Permission (Colorless Areas)

Except for the free zone (green), zones subject to specific permission, and flight prohibited zones, these are the zones where flying operations may be performed through NOTAM notice if any confirmation is issued by the relevant organizations (military-civil) as a result of the coordination.

2.1.4. Flight Prohibited Zones

It refers to the zones designated by the relevant authorities and organizations as restricted for aircraft operations and for which no application for a flight permit is requested.

Note: Among the relevant organizations and entities specified above are the governmental agencies to which permit applications are submitted, the State Airports Administration, and military units.

The airspaces over which the aforementioned sports/amateur and commercial flights will be performed by UAV pilots through UAVs are given below. Sports and amateur UAV pilots will be permitted to fly only in specified free zones after providing information to the relevant governmental authorities and submitting an online application through the UAV registration system. Commercial UAV pilots, on the other hand, will be permitted to fly by submitting an application for a permit anywhere within Turkish airspace (Figure 5).

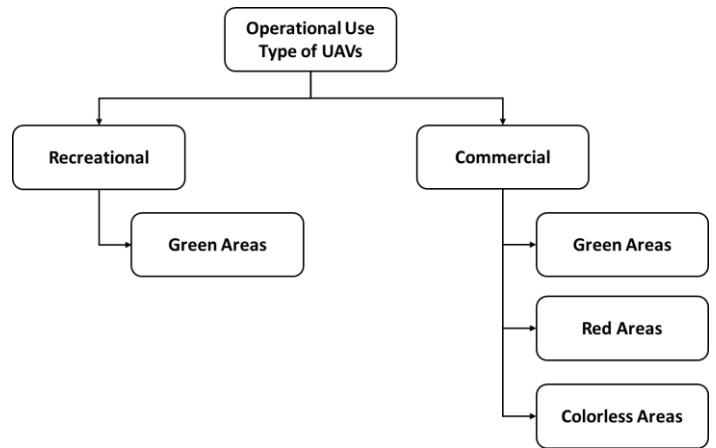


Figure 5. Airspace Matching of UAV pilots

The maps depicting flight zones in Turkey are developed by the relevant governmental entities, including the General Directorate of State Airports Authority (DHMI), military units, and the DGCA. There are now around 1000 designated green sites and approximately 300 of them have been approved. As a consequence, as of the date of this study, there are open spaces for aircraft operations across Turkey (in all provinces).

2.3. Flight Permission for UAVs

2.3.1. UAV 0 and UAV 1

Except for commercial activities, applications for permits may only be submitted for free (green) zones if the conditions outlined in the Legislation for UAV flying operations are observed. The permission request will be made through the UAV registration system and approved after an automatically generated risk analysis. It is prohibited in this classification to fly in spaces restricted by the senior governmental authority at the location.

Commercial UAV pilots must make an application through the UAV registration system for all types of flights (sports/amateur-commercial) for their flying operations at the spaces that require approval 5 business days before the flights. Commercial UAV pilots may submit an application through the Form of Request for UAV Flight Permit (FR-19) (DGCA, 2021b), which is available on the DGCA's website, for flights over the spaces that require specific permission (red) 10 business days prior to the scheduled flights, with a clear explanation of the reasons for flight.

Applications for permission for flights to be operable at an altitude of fewer than 400 feet that are made using the DGCA's

UAV registration portal (Figure 6) are scrutinized by the relevant governmental authority, and if deemed to be appropriate, a NOTAM is issued. If a flying permit is obtained, the operator/pilot/person must follow the rules indicated in the Turkish AIP as well as any other provisions stipulated (DGCA, 2021a).



Figure 6. UAV Registration Portal (DGCA,2021c)

Applications for flights at an altitude of more than 400 feet at the spaces subject to permission will be made using the Form of Request for UAV Flight Permit (FR-19) (DGCA, 2021b), which will be available on the Directorate's official website at least 10 business days prior to the scheduled flights, with a clear explanation of the reasons for flight.

2.3.2. UAV 2 and UAV 3

To assure the required coordination of all types of UAV flight operations to be performed on all airspaces (green, red, and white), applications must be filed with the Directorate General at least 10 business days prior to the scheduled flight, using the Form of Request for UAV Flight Permit (FR-19). Following a satisfactory response from the relevant civilian and military units on the application, the aforementioned airspace will be communicated to all airspace users through NOTAM. The flights will not operate if the relevant organization rejects the application or if the DGCA does not accept it. If the flight is authorized, the operator/pilot/light UAV operator must adhere to the Turkish AIP conditions as well as the other rules.

Although there appear to be some variations depending on the UAV category, the following steps must be completed to receive a flight permit:

1-UAV pilot must have the UAV pilot certificate / UAV pilot license

2-UAVs should be registered (The UAVs less than 500 grams may apply for permission using FR-19 Forms)

3-The UAVs should have insurance (which is compulsory for commercial use but not for sports/amateur use).

2.3.3. UAV 2 and UAV 3

UAV pilots operating in Turkish airspace must obtain a Turkish ID number. Foreigners may, however, obtain permission for their UAV flights if necessary. In this case, foreign operators/pilots must apply for a permit to fly in Turkish airspace through diplomatic channels within 20 business days before the scheduled flight, using the Form of Request for UAV Flight Permit (FR-23) (DGCA, 2021d) available on the Directorate General's official web site (DGCA, 2021a).

The original documents listed in the form of a request for a flight permit must be submitted to the Directorate General during the application stage. Following that, the insurance requirements for using the UAV should be fulfilled.

Following an affirmative response from the relevant civilian and military authorities, all airspace users will be made aware of such airspaces through a NOTAM. If the necessary entities or the Directorate General reply unfavorably, no flight clearance will be issued.

If the flight permission is obtained, the operator/pilot/person must follow the provisions outlined in the Turkish AIP, as well as the other requirements. The flights will be accompanied by at least two Turkish UAV pilots who have been authorized/licensed by the Directorate General. If the zone to be flown over is subject to specific permission (red) or any permit, a risk assessment should be performed for whatever reason.

2.4. Conditions for UAV Flights

2.4.1. UAV 0 and UAV 1

- Flights may be conducted in clear weather between dawn and sunset (at least half an hour after sunrise and half an hour before sunset) and at a distance of at least 2 kilometers under only visual meteorological conditions.
- The UAV should be within the pilot's visual line of sight and not exceed 500 meters horizontally (VLOS - within the visual line of sight).
- The height of 400 feet (AGL) (120 meters) above ground should not be exceeded. (Flights over 400 feet may be permitted if a special application permit is obtained.)
- Flights should be executed at a minimum of 50 meters away from people and structures.

2.4.2. UAV 2 and UAV 3

- UAVs in this category are considered to be aircraft that also perform VFR flights by air traffic procedures. As a result, the UAV flights are carried out in line with the provisions of the Turkish AIP and any additional rules that may be adopted.
- No VFR flights operate at night (except for the provisions stipulated in the legislation)

3. Methodology

The study is qualitative research focused on UAV operations in Turkey. The responses of participants who have previously been UAV pilots (and have been working as UAV pilots for a long time) on UAV rules and applications establish the requirements for qualitative research. The regulation and applications of UAVs in Turkey are analyzed and compared to those of the International Civil Aviation Organization (ICAO) and the European Union (EU).

The interviews were used in this exploratory and qualitative study, and the persons interviewed were selected using the snowball sampling technique (Dudovskiy, 2021; Chamuah and Singh, 2021; Chamuah and Singh, 2020). Based on the literature survey questionnaire for UAV regulations, insurance, and flight permits, the literature was studied both online and offline. The literature survey questionnaire consists of a set of questions designed in such a way that an in-depth survey was conducted, with all questions written in English.

To achieve the study's objectives, a complete interview was conducted in addition to the interviews conducted according to a comprehensive schedule. The questions consist of a set of open-ended questions in the English language.

Following the completion of all of these procedures, the following questions were posed: What is the characteristics of Turkey's civilian UAV legislation? What are the main issues with civilian UAVs? What are the rules' implications for UAV users and operators?

The snowball sampling technique was used to pick the persons to be interviewed since the qualities of the samples are seldom found and difficult to discover (Dudovskiy, 2021). Farmers, scientists, researchers, mapping engineers, archeologists, press members, media members, and consultants who provide services to such businesses were among those interviewed. The opinions of UAV pilots on the civilian UAV sector in Turkey are covered in the next chapter.

4. Discussion and Conclusion

The fields of application and number of UAVs are expanding on a daily basis. Such increases pave the way for the establishment of applicable national laws as well as the generally accepted regulations that are proposed. Otherwise, uncontrolled use of UAVs may exacerbate the likelihood of damage to other air vehicles, structures, and people.

Therefore, the study comprises a qualitative assessment as well as a comparative analysis with the participation of UAV pilots and operators as well as other organizations. In addition, the Turkish UAV industry and UAV applications are being examined.

The UAV industry in Turkey is expanding in lockstep with global advancements. The most important reason for this is Turkey's expertise and ease of access to the use of UAVs. Furthermore, private entities in Turkey (search and rescue, ministry of agriculture and forestry, municipalities, and so on) are pioneering in the use of UAVs by the general public.

In contrast to other countries, the UAV registration since 2016 and autonomous operation of the current UAV system has been praised by UAV operators. Registries, purchases and sales, monitoring of flying zones, and flight permissions may all be easily carried out with a UAV system. UAV pilots, on the other hand, who desire to fly over restricted areas or at altitudes more than 400 feet must apply for a flight permit using the FR-19 Form. However, with the implementation of the upcoming revision (which is expected to be enforced in 2022), it is planned to carry out these operations online.

It has been found that the most challenging issue for UAV pilots is obtaining a flying permit. The flights are being postponed due to late responses to the application for a flying permit and the insurance firms' reluctance to insure the UAVs. During the flying permit process, the entities express their views. However, delays in responding to inquiries among entities result in late responses to applications for flying permissions. As a result, the DGCA will provide shorter response times through legislative modification.

On the other hand, clear legislation and a plethora of qualified professionals hired by training companies encourage people to pursue UAV education. This demonstrates that the sector is moving in the right direction.

All of the suggested research topics were satisfactorily addressed and summarized in this paper. The present state of civil UAVs and their applications in several industries (agricultural, entertainment, security, advertisement, education, mining, and construction) has revealed through digitalized data that they reflect a constructive ecology. The delays in purchasing, operating and service authorization, supervision, and surveillance of the civil UAVs arising from the entities involved are the challenges that require swift adoption of the new technologies.

Furthermore, the fact that each revision is performed almost every year reveals how dynamic the sector is in Turkey. As a result, the regulations may foster innovation via accountability and responsibility, and they may occasionally exceed them. The rules accelerate the pace of industrial innovation.

Given that manned aerial vehicles attained their current level of security in about 100 years, we should note that the UAV industry has advanced at a rapid pace since 2016.

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