

Division and Regulation of Drones in EU and Hungary

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Abstract- This article provides a broad overview of the types of unmanned aerial vehicles, i.e. drones, their areas of use and the legal regulation of their use in Hungary and the EU. Based on the analysis, the article systematically surveys the knowledge, Hungarian laws and regulations related to drones. The article presents the most important legal issues related to the use of drones, such as personal and data protection rights, aviation safety regulations and property rights. It also pays particular attention to the framework for private, commercial and public use of drones. It discusses in detail the rules for the flight altitude and flight envelope of drones, and stresses the importance of maintaining a safe distance from airports, populated areas, people and buildings. It also explains the importance of drone registration and data protection rules. The authors conclude by looking ahead to the future of drone regulation, the challenges facing legislation and the potential legal consequences of the rapid development of drone technology. They draw attention to the need for future regulation to be able to keep pace with technological developments while continuing to ensure safety, protection of personal data and responsible use of drones.

Keywords- Drone, UAV, Regulation, Types of drones.

I. INTRODUCTION

Nowadays, more and more companies are thinking about using the potential of the drone truck logistics system in the field of fast last-mile delivery services. In the system, a truck and a drone serve customers in parallel within predetermined delivery time intervals. Since the uncertainty of the ground traffic network can not only fail a service promise, but also put the drone in danger, when planning the route plan, it is necessary to focus on mitigating such risks [1].

Drone delivery is a fast delivery method that has received a lot of attention from universities and various companies in recent years. However, due to limited battery and payload capacity, which can reduce system efficiency, it is better to coordinate ground vehicles and drones to take advantage of the trucks' high capacity and the drone's high speed.

According to authors Teimoury and Rashid, as a limitation of realistic package delivery systems, the presence of customers is only sometimes deterministic. For example, the customer places an order from an e-retailer, but due to various probable reasons, he cannot be present at home to use the service. They point out that the sustainable hybrid truck-drone delivery model they present is stochastic with customer presence. Their results highlight that truck-drone coordination reduces completion time, operating costs, truck emissions, and social penalties [2].

Balassa et al examined the pros and cons of using drones in last-mile delivery systems in terms of sustainability and CO₂ emissions and energy consumption. As commercial drones develop rapidly, the use of such devices in last-mile shipping and delivery can offer many opportunities to increase

service flexibility, reduce delivery time, and also reduce CO₂ emissions and energy consumption. A discrete event simulation was used to investigate how the assistance of drones in parcel delivery services could affect the sustainability aspects of such services in terms of CO₂ emissions and energy consumption in an urban environment. Based on factory parameters, a vehicle-based delivery scenario is compared with a drone-assisted scenario under ideal conditions.

According to the results, within the simulation parameters, it is possible to reduce CO₂ emissions and energy consumption in last-mile delivery services with the help of drones, but several environmental, technological and financial constraints must be taken into account and incorporated to determine whether such a development is worthwhile from the point of view of the last-mile delivery company [3].

Traceability and the management of bulk products and inventories play a fundamental role in today's world. Each piece of stocked products carries value, so inventory management is key. Effectively implementing inventory management practices to understand and manage flow processes is strategically vital. Furthermore, certain tasks of inventory management require significant human resources, such as inventory and picking. Under the auspices of the "Logistics 4.0" concept, innovation provides an opportunity to improve processes by increasing automation and technical support for manual work performed by people.

Among such promising technologies are drones, which are becoming increasingly popular for monitoring warehouse inventory. Drones can be used in many ways during inventory control [4-6].

The explosive spread of drones in recent years presents serious challenges to regulators and legislators worldwide. These tools have revolutionized many industries, including logistics, filmmaking, agriculture and more, bringing incredible flexibility and efficiency to workflows. At the same time, the lack of regulation of drones raises significant security and data protection concerns that must be addressed. If we are aware of these issues, the importance of drone regulation is indisputable. There is a need for legislators to develop regulations that balance the promotion of technological

progress with the protection of community interests, including security, privacy and legal certainty.

In addition, effective regulation also plays a role in maximizing the potential benefits of drone technology while minimizing potential risks. In the following, we present the regulation which plays significant role in this new and dynamically developing field [7]. It is important to note that regulation must take into account the characteristics and distribution of drones.

II. DIVISION OF DRONES

Unmanned aerial vehicles, or UAVs (Unmanned Aerial Vehicles), can vary widely in size, shape, functionality and use. The following types are most often found in the literature:

- **Mini- and Micro-UAVs:** These drones are usually small in size (as small as the palm of your hand) and are often used for hobby or commercial use, such as aerial photography. But they are also used for military purposes, for example for reconnaissance in closed spaces.
- **Tactical UAVs:** These are medium-sized drones often used by the military and police for tactical tasks such as reconnaissance and surveillance. These drones are often able to stay in the air for long periods of time and provide real-time image and data transmission to operators on the ground.
- **MALE (Medium Altitude Long Endurance) and HALE (High Altitude Long Endurance) UAVs:** These larger drones are often capable of long-distance and high-altitude flights. HALE drones can stay in the air for days and fly at high altitudes where few other aircraft can operate. These are often used for long-range reconnaissance, surveillance or as a communication platform.
- **Fast Drones:** These drones can fly at high speeds and are often used for military attacks. These include, for example, the Predator and Reaper drones used by the US military.
- **Underwater drones (UUV-Unmanned Underwater Vehicles):** These drones are used to explore and monitor the underwater environment or for deep-sea research.
- **Cargo drones:** These drones are heavy-duty and are commonly used in the transportation and logistics industry for short-haul delivery of goods and shipments [8].

In addition, drones can be classified according to the way they are controlled, such as remotely controlled,

semi-autonomous or fully autonomous UAVs. Drones can also be classified based on their power source, such as electric, gasoline, or gas powered drones.

During the literature research, we came across the terms "unmanned toy aircraft" and "unmanned state aircraft" several times. "Unmanned toy aircraft" often refers to hobbyist drones or RC (Radio Controlled) models. These toy devices are smaller in size and are usually designed for users who enjoy flying or photography as a hobby. There is a wide range of hobby drones to choose from, from very simple, inexpensive models to very advanced and more expensive versions.

Most drones have built-in cameras that allow users to take photos and videos from the air. Popular examples of these toys are drones from DJI, Parrot, Syma, and Hubsan, which users use for recreational activities such as photography, videography, or simply enjoying flying.

However, there are rules and regulations that determine where and how these drones can be used to keep them safe for both users and others. Such rules usually specify maximum flight altitudes, flight areas, and how far they must be from people, buildings, airports, etc. It is important that anyone using a drone knows and follows these rules.

The regulations regarding the use of drones may be different in every country, but in the European Union, including Hungary, they operate based on the rules of the European Union Aviation Safety Agency (EASA).

These rules take into account various factors, such as the weight of the drone, the way it is used (e.g. commercial or personal use), the location of the flight, etc. Some important regulations:

- **Flight altitude:** According to EASA rules, drones are generally not allowed to fly higher than 120 meters above the ground, unless they are specifically authorized to do so. This means that if, for example, someone takes real estate photos with a drone, their drone cannot rise higher than 120 meters. However, there are special cases where this restriction can be changed, for example with a permit or if the drone belongs to a certain weight category.
- **Flight Zones:** Drones cannot fly close to airports, military installations, hospitals, prisons, etc. Even a

hobbyist drone pilot who only flies in the local park should ensure that his drone is not flown near such areas.

- **People and buildings:** Drones must keep a certain distance from people and buildings. For example, if you are flying a drone at an outdoor event, such as a concert or sporting event, you should ensure that your drone does not fly too close to people or buildings. According to EASA rules, the minimum distance that must be maintained is usually 50 meters, but this may vary depending on the location.
- **Registration and insurance:** In Hungary, drones must be registered with the National Transport Authority, and the drone pilot must have adequate insurance. For example, if someone provides drone services, such as aerial photography or videography, they can only do so if their drone is registered and has the necessary insurance.

These rules are general guidelines and can be interpreted differently in different situations, so it is always recommended to study local rules and regulations as well. It is always important for drone pilots to be aware of and follow local and national regulations regarding the use of their drone.

"Unmanned State Aerial Vehicles", also known as UAVs (Unmanned Aerial Vehicles) or drones, are flying devices that do not require a human pilot on board. These machines perform a variety of functions, from surveillance and reconnaissance to offensive operations, disaster relief, conservation duties, and more. Unmanned aerial vehicles are controlled by operators on the ground or operate using autonomous systems based on pre-programmed instructions. With remotely piloted UAVs, the pilot is on the ground and controls the vehicle, often using a real-time video stream provided by the drone's on-board camera.

In the case of autonomous UAVs, the vehicle flies on a pre-programmed route or can navigate and perform tasks with the help of artificial intelligence. The term "government" means that these UAVs are used by some state-government agency. This may include the military, police, border patrol, fire brigade, environmental agencies and other similar organisations. Their use can be varied and depends on which government body uses them. In the military, drones are often used for reconnaissance, target identification and even attack. Police can use

drones to monitor crime, mass events and traffic safety, or to search for missing persons.

Fire departments can use drones to coordinate firefighting operations or monitor the spread of a fire. Environmental agencies can use drones to monitor wildlife, check deforestation, etc. The use of government unmanned aerial vehicles is beneficial in many cases, because they are able to reach dangerous, hard-to-reach places without having to risk human life.

However, they also raise ethical and legal issues, especially in the areas of personal data protection and warfare. Here are some questions:

- **Privacy:** Drones can capture high-resolution images and videos, which raises serious privacy concerns. Taking pictures and videos with drones easily violates people's privacy if the footage is taken or used inappropriately. Privacy laws usually require people to consent to having pictures or videos taken of them, but this can be difficult to enforce when using drones. There is also the question of how the information recorded by the drones is stored and used.
- **Warfare:** Drones are often used for military purposes, including reconnaissance, targeting, and attack. This raises many ethical questions, including the increase in civilian casualties and the "facilitation" of warfare. Because drones are controlled remotely, the pilots do not risk their lives, which reduces the costs of war, but can increase the likelihood of wars. Also, there is the question of how fair and discriminating drone strikes can be (ie focus only on military targets and minimize civilian casualties).
- **The question of ethical responsibility:** If a drone causes an accident or damage, who is responsible? The pilot who controls the drone? The manufacturer who made the drone? Or the software developer who wrote the drone's navigation algorithm? This is a particularly important issue for self-driving drones.

The issues mentioned above are just a few examples of the ethical and legal issues surrounding the use of drones. As technology develops, new questions may arise that legislators and professionals will have to answer.

III. THE MAIN FRAMEWORKS OF THE HUNGARIAN LEGAL REGULATION OF DRONES

There are several laws regarding the Hungarian regulation of drones. Let's review them in outline. The most important is Act XCVII of 1995 on air transport. The law containing detailed regulations for unmanned aerial vehicles. According to the law, Hungarian airspace - with the exception of unmanned toy aircraft - can be used for UAS operations carried out by unmanned aircraft in cases where airspace is designated over a populated area [9,10].

The exception to this is that in Hungarian airspace, a legal entity under the Media Act is entitled to carry out a UAS operation over a populated area without designating an ad hoc airspace in order to fulfill its public service media service duties, and also in the interest of environmental protection, a UAS operation can also be carried out in restricted airspace, subject to prior notification of the government office [10].

In our country, the Department of the Aviation Supervisory Authority of the Ministry of Construction and Transport issues the ad hoc airspace use permit. Registers must also be kept on unmanned aircraft systems and aircraft system operators, which also falls under the jurisdiction of the Ministry of Construction and Transport - Transport Authority [11]. Initiating the procedure is the responsibility of the owner and operator. Pursuant to the law, Hungarian state aircraft, unmanned state aircraft and, in specific cases, the operator of the unmanned aircraft are registered by the military aviation authority [10].

The 38/2021 (II.2.) government decree also important, which states that unmanned state aircraft can be classified into the following categories based on their maximum take-off weight including payload: A1, A2, B1, B2, C, D, E categories. In the case of categories A1 and A2, the maximum take-off weight does not exceed 4 kilograms, in the case of categories B1 and B2 it exceeds 4 kilograms, but does not exceed 25 kilograms. In the case of category C, the maximum take-off weight exceeds 25 kilograms, but does not exceed 150 kilograms. Category D weighs more than 150 kilograms, but

does not exceed 600 kilograms. The weight of category E exceeds 600 kilograms. Various obligations and conditions are defined based on the mentioned categories [12].

The topic is affected by Act C of 2012 on the Criminal Code, which is 422/A. Section 1 of the Act defines it as Prohibited Data Collection, if anyone who observes and records another's apartment, other premises or a fenced area with the unauthorized use of an unmanned aerial vehicle, commits an offense punishable by imprisonment. If someone makes the recording made in this way available to the general public, the penalty is imprisonment for up to 1 year. Both acts can only be punished on a private initiative [13].

It is also worth mentioning the Misdemeanor Law, the Act II of 2012, which defines as violation of private residence in § 166, "anyone who enters another's apartment, other premises, or a fenced area belonging to them against the will of the resident or owner, or stays there by deception, as well as anyone who prevents someone else from entering their apartment, other premises or a fenced area belonging to them, commits a violation. (1a) Anyone who, during the unauthorized use of an unmanned aerial vehicle, makes an unauthorized audio or video recording of another's apartment, other premises, or a fenced area belonging to them, commits an offence. (2) Misdemeanor proceedings for violation of privacy rules can only be initiated by a private individual."

However, one more aspect of the law affects the question, this is the "Unauthorized activity with an unmanned aircraft" contained in § 229, which punishes the person who uses an unmanned aircraft over a residential area without authorization. Due to this rule violation, the administrator of the disaster prevention agency is also entitled to impose an on-the-spot fine [14].

IV. EU REGULATIONS ON DRONES

Our country has been a member of the European Union since May 1, 2004. The European Union obligates us to legal harmonization, according to which the legal regulations of all member states must be harmonized with EU standards. The organization is also special among international organizations because it created its own legal

system. Stricter rules than those adopted by the Union may be adopted, but they are not contrary to it. In relation to drones, the Union created Decree 2019/945 and Decree 2019/947 [15]. These include the following rules:

Regulation 2019/945 [16] (COMMISSION REGULATION BASED ON AUTHORIZATION (EU) 2019/945, (March 12, 2019) on unmanned aircraft systems and third-country operators of unmanned aircraft systems), deals with the identification of economic operators, conformity assessment procedures [15].

The decree provides for the obligations of operators, unmanned aircraft systems, which are called unmanned aircraft systems (UAS), manufacturers and importers, and distributors. According to the regulation, "unmanned aircraft (UA)" means "any aircraft that operates without a pilot on board, or that is designed to do so, and that is capable of being operated autonomously or by remote control." Commission Implementing Regulation (EU) 2019/947 (May 24, 2019) [17] on the rules and procedures for unmanned aircraft contains definitions, establishes the minimum age of remote pilots and, in Article 3, categories of drone operations. According to this, "a) UAS operations belonging to the "open" category are not subject to either a prior operating permit or the operational statement issued by the UAS operator before the operation;

- "special" category UAS operations require an operating license issued by the competent authority in accordance with Article 12 or a license obtained in accordance with Article 16, or in the circumstances specified in Article 5(5), a statement made by the operator of the UAS;
- UAS operations belonging to the "licensed" category are subject to the certification of the UAS according to the delegated regulation (EU) 2019/945, the certification of the operator and, where appropriate, the authorization of the remote pilot..." [15].

V. CONCLUSION

Unmanned aerial vehicles, i.e. UAVs, cover a wide range in size, shape, functionality and use. Its types include small mini and micro UAVs, tactical UAVs, long-range and high-altitude MALE and HALE UAVs, high-speed drones, underwater drones, and cargo

drones. They can be remotely controlled, semi-autonomous or fully autonomous, and their energy source can be electric, petrol or gas. "Unmanned toy aircraft" refers to hobbyist drones or RC models that are usually used for recreational activities such as aerial photography. Their use is subject to strict rules that all drone pilots must follow.

"Government" UAVs, or "unmanned government aerial vehicles," refer to use by government agencies. These devices can perform many functions, such as monitoring, reconnaissance, carrying out attacks, disaster prevention, or nature conservation tasks. They can be controlled remotely or autonomously, on a pre-programmed route or with the help of artificial intelligence.

The widespread use of drones requires legal regulation. In Hungary, the regulations introduced by the European Union Aviation Safety Agency (EASA) in 2020 apply to the use of drones. These rules take into account various factors, such as the weight of the drone, the type of use (commercial or personal use), the location of the flight, etc.

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