Survey on Awareness of Drone Legislation in the Slovak Republic

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Abstract **– The increasing number of drones flying over buildings, fields, and people's heads raises questions about safety, privacy, and the existence of regulations regarding their technical parameters, public space rules, restrictions, and requirements for their owners' authorization. Drones are being used by various organizations, defense and security forces, researchers, as well as civilian population. The purpose of this article is to draw attention to the fact that the use of drones is not indifferent to either the European Union or the Slovak Republic. The European Union is gradually unifying legislative procedures and regulations for the use of drones and setting conditions for their users, who must also comply with European rules for the operation of unmanned aircraft systems. The questionnaire research was primarily aimed at finding out the level of knowledge among students about the legislation on the private and educational use of drones.**

Keywords **– Drone, legislation, research, safety, flying.**

1. Introduction

The long-term increasing trend of sales of drones for commercial and recreational purposes directly increases the pressure to create related legislation that will establish clear rules for their safe use.

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The European Union has entrusted this agenda to the European Aviation Safety Agency (EASA), whose task was to suggest and unify the conditions for the use of drones in the common airspace for all member states. The result of this effort is the delegated regulation of the EU 2019/945 and the implementing regulation 2019/947, which define the drone user registration system, UAS (Unmanned Aerial System) device classes, and procedures for their safe operation. Although these rules came into validity on December 31, 2020, their implementation varies among individual EU member states. Slovakia did not manage to launch such a system by the given deadline, so the legislation is regulated by the decision of the Transport Authority No. 2/2019, which determines the rules of flying in Slovakia and largely copies this European regulation. We will partially address the legislative adjustment in the following lines [12].

2. Legislation

In the following lines, we provide only a very brief overview of European and Slovak legislation dealing with drones and their use.

2.1. European Drone Legislation

Unified European rules for the operation of unmanned aerial systems came into effect on the last day of 2020. Their aim is to harmonize the regulations of individual national authorities responsible for airspace management and create a common system applicable to all member states. This not only results in the clarification of requirements imposed on drone operators but also simplifies their activities. This approach also contributes to the development of the drone economy and strengthens technological advancement. Some of the key points brought by European legislation include:

- Maximum height of 120 meters from the highest obstacle
- Operator and drone pilot registration system
- Definition of drone classes based on their technical parameters and operational limitations
- Categorization of drones
- Marking of drones with certification labels [6], [12].

2.2. Legislation of Drones in Slovakia

Flying drones, most commonly in the form of compact quadcopters with cameras, is becoming increasingly popular in both recreational and professional spheres. Although many pilots operate their machines flawlessly, they were unaware of the applicable rules for a long time and therefore violated the legislation by flying. Drones and their pilots must adhere to the legal regulations that have been in effect since January 1, 2021. Despite the fact that unified European rules for drone operations came into effect on December 31, 2020, they have not yet been implemented in any way in Slovakia. In the Czech Republic, as well as in most EU countries, the system is already functioning, but it is not possible for Slovak citizens to register in any other system than the (non-existent) Slovak system, as registration must be done in the country where the pilot/operator has permanent residence or where the company is registered. This transitional state has a negative impact, especially on Slovaks who want to fly a drone in the territory of other member countries. Therefore, the decision No. 2/2019, in which the Transport Authority defines the categories of drones and the rules for their operation, currently applies to drone users. Several of these rules already mirror the pan-European rules, so the main issue lies in the absence of registration and online exams. It is expected that both legal regulations (European and Slovak) will be harmonized in the period of 2022/2023. Until then, drone operators should follow the aforementioned decision of the transport authority [6], [9].

2.3. General Rules for Drone Flying

Irresponsible drone operation can result in collisions with other flying objects (helicopters, airplanes, and other drones), damage to people, their privacy, property, cultural heritage, or disruption of the balance of protected natural areas [7], [13]. Just as road traffic has its rules, flying drones also have certain safety settings. Their aim is not to cause inconvenience to pilots but, on the contrary, to strive for coordinated and safe drone operation. The following rules for unmanned aerial vehicle (UAV) operation apply to all UAV pilots regardless of the category they belong to:

a) Maximum Altitude

The maximum altitude for flying drones is set at 120 meters above the highest obstacle within a 30-meter radius. If you want to fly in an uncontrolled ATZ (Airport Traffic Zone), similar rules apply, but it is necessary to inform the airport operator about your flight.

b) Visual Line of Sight (VLOS) Flying

In general, when operating a drone, it is necessary to maintain continuous visual contact or a maximum horizontal distance of 1000 meters (whichever comes first). Maintaining visual contact with the drone ensures safe operation and quick response to unforeseen events. The use of goggles or remote stations without direct visual contact (Behind Visual Line of Sight, BVLOS) is legally allowed in Slovakia only in the case of a dual-pilot formation, where one pilot manually operates the drone while the other visually monitors it. However, such operations need to be coordinated with the Transport Authority.

c) Permission for Flying Near People

Even though it may not seem so from some videos on the Internet, it is not advisable to fly a drone in close proximity to buildings and people. The reason for these measures is primarily safety, not only in terms of health protection but also as a measure to preserve privacy. There is a general prohibition on flying over people without their consent. Therefore, if you wanted to capture footage from a concert crowded with people from a high altitude and flew over their heads, anyone from the crowd could complain to the police, who would most likely intervene and take necessary steps to initiate the appropriate proceedings with the transport authority. This would probably lead to significant financial penalties. [1]. Regardless of the law, flying over people is not responsible. Whether we like it or not, technology can fail and seriously injure someone. Drone flying is also prohibited over roads where it could endanger traffic participants [3], [9]. When flying a drone, there is an obligation to comply with the prescribed distances for takeoff and landing, from people and buildings, and from inhabited areas. In this case, the maximum takeoff weight of the drone is 7 kg. Below that weight, you must maintain a "safe" distance, and above that, specific values are determined. The "safe" distance is not explicitly specified and is up to you to determine. Remember that you are solely responsible for the drone, and it is in your interest not to endanger anyone. In other relevant materials from the authorities, the safe horizontal distance is described as twice the height. We also recommend following this procedure [6], [8], [9].

d) Good Visibility

This rule is related to the previous one. In the case of fog or heavy rain, it is impossible to maintain visual contact with the drone at greater distances. Therefore, flying in the dark is also prohibited. However, with the permission of the transport authority, it is possible to fly in the dark for aerial work purposes.

e) Maintaining a Safe Distance

In general, it is strictly forbidden to fly over gatherings of people. For drones up to 900 g, a safe distance from people and objects must be maintained (not defined in meters). If it is a drone with a maximum takeoff weight exceeding 900 g, you must maintain a horizontal distance of at least 50 m from uninvolved persons.

f) No-Fly Zones

As a drone operator, you become part of the aviation traffic, which has its safety rules. You cannot violate no-fly zones near airports (more information below), military bases, certain cultural heritage sites, and protected natural areas. Failure to comply with these restrictions can result in fines.

g) Hierarchy of Airspace

Other flying devices such as airplanes, helicopters, or hot air balloons are always given priority over drones. The maneuverability of drones allows the operator to move outside the flight path of other objects.

h) Prohibition of Dropping Objects and Chemical Substances

If you plan to use a drone for activities such as agricultural chemical spraying, you need permission from the transport authority.

i) Flying Under the Influence

Just like a car driver, a drone pilot is prohibited from flying under the influence of psychotropic substances. If an accident occurs due to this, the pilot will be held accountable by the relevant authorities.

2.4. System for Registration of Drone Operators and Pilots in the EU

Every private or legal person operating a drone becomes part of the aviation operation. In order to increase safety and prevent potential collisions, European Union Aviation Safety Agency (EASA) has introduced a registration system for operators of unmanned aircraft systems (UAS). Practically anyone who wants to fly a drone and is at least 16 years old needs to register. This can be done online through the portal of the responsible national authority. The registration process is simple, intuitive, and involves filling in basic personal information such as the individual's or legal entity's name, surname, company name, email, and mobile phone number. After successful login to the system, the applicant will receive their unique registration number (which includes the country code + 12 digits), which they will use to label all their drones.

The operator's registration is valid throughout the EU for the period specified for a specific category. After its expiration, it is necessary to renew the registration [9], [11]. Operators of drones labeled as C0 are exempt from registration. These are small drones weighing up to 250 g that are not equipped with a camera or any other sensor capable of collecting personal information. We will discuss drone classes later in the article [9].

2.5.The Current State of Drone Usage in the Slovak Republic

The worldwide trend of increased interest in using drones has not bypassed the Slovak Republic. The increased interest is positively reflected in the profits of sellers [2]. However, the problem arises from the lack of knowledge and weak awareness regarding the legislation of their usage and the associated safety issues. The data used for the monitored period was obtained directly from M. R. Štefánik Airport in Bratislava (MRŠ). The total number of recorded drone flights in the airspace of the Slovak Republic during the period of September and October 2022 was 21,678. The airspace of Milan Rastislav Štefánik Airport in Bratislava was selected for data collection, as Bratislava is the capital city of the Slovak Republic, and MRŠ Airport is the largest airport in Slovakia. In this location, 3,253 drone flights were recorded. According to the current legislation in Slovakia, it is mandatory to coordinate flights above 30 meters above ground level [6].

Table 1. Operation of drones in the airspace of the Slovak Republic

Operation of Drones in the Airspace of the Slovak Republic: September - October 2022	Number of Fligths
Total number	21 678
Total number in Bratislava (BA)	3 253
In BA above 30 m AGL	2 541
In BA above 120m AGL	986
In BA above 500m AGL	98
In BA to 3,7 km from ARP Airport	155

The total number of flights in the airspace of M. R. Štefánik Airport in Bratislava during the specified period in 2022 was 3,253. Out of these, 2,541 flights required coordination, but only 155 drone flights were actually coordinated and reported, which amounts to only 6% of the total. This situation represents a potential safety issue and a possible threat, as shown in Figure 1.

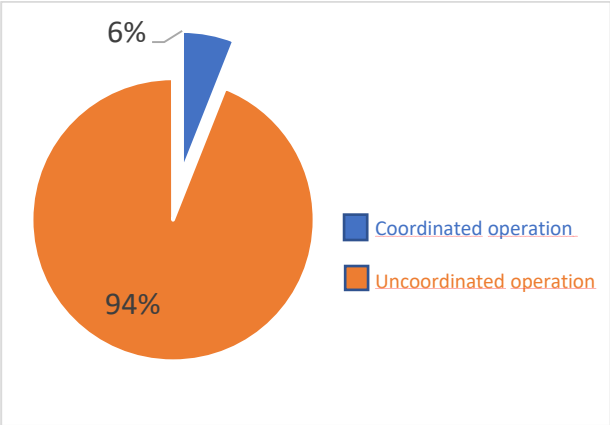

Figure 1. The total share of drone flights in CTR Štefánik subject to coordinating

These numbers set the ground for the idea of finding out how students at the Faculty of Aeronautics at TUKE perceive drones and what level of knowledge they have regarding the legislation in this field.

3. Methods and Study Design

During June 2023, a survey focused on knowledge in the field of legislation regulating the use of drones for non-commercial purposes in the Slovak Republic was conducted among first-year students of Air Transport Management at the Faculty of Aeronautics, Technical University of Košice. The survey was conducted on a sample of 57 respondents aged 18 to 19, including 31 males and 26 females. The sample was selected considering that they may become drone users and, according to the legal order of the Slovak Republic, they are legally responsible for their actions. The main goal was to gather information about their current level of legal awareness regarding drone use and to implement the results into educational materials and the teaching process at the Faculty of Aviation. The respondents were informed in advance about the content and purpose of the questionnaire. Since the survey was anonymous, it was not necessary to obtain informed consent. The questionnaire was distributed in printed form on the premises of the faculty, as it was primarily focused on the knowledge of drone legislation among students of the Faculty of Aviation. The task of the survey respondents was to anonymously answer 10 closed-ended questions with the options of "yes," "no," and "maybe." The questions were divided into three categories. The first category consisted of general questions (Q1 - Q3), the second category consisted of questions related to legislation associated with drone usage (Q4 - Q7), and the third category of questions (Q8 - Q10) focused on the criminal liability arising from the violation of regulations in force in the Slovak Republic.

After evaluating the questionnaire, a brief discussion took place with the students, where they were given the opportunity to ask questions or express their comments and opinions on the given issue.

4. Results

The aim of the survey was to determine the level of knowledge among students regarding the legislation governing the use of drones for private, non-commercial purposes in Slovakia. We also investigated whether they have personal experience with using a drone and whether they are drone owners themselves. It turned out that 86% of the respondents have personal experience with drones, while 14% of the respondents have no experience (Q2). Regarding ownership, 11% of the students claimed to own a drone, while 89% do not own one (Q3). In the questions related to legislation, we asked whether the respondents believe that their knowledge of the legislation regulating drone use is sufficient. As seen in Figure 2, only 14% of the respondents are satisfied with their knowledge, 44% do not have sufficient knowledge, and a significant 42% are unable to assess their level of knowledge (Q4). From the additional discussion, it emerged that students have knowledge as occasional drone users. None of the students engage in drone piloting for profit or environmental monitoring purposes.

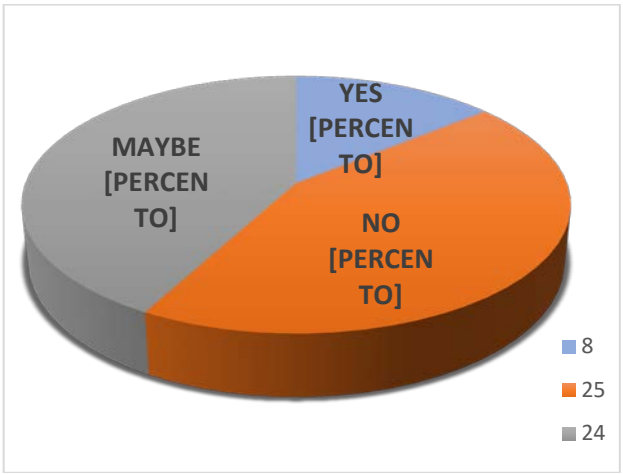

Figure 2. Level of knowledge regarding the legislation regulating the use of drones in Slovakia, Q4

As of 2023, the Slovak Republic has not determined which authority should administer the registration system for drone pilot registration. However, the survey results indicate that 61% of respondents believe that drone pilot registration should be a requirement. Another 25% of respondents do not consider registration necessary, and 14% were unable to express their opinion on this issue, as shown in Figure 3.

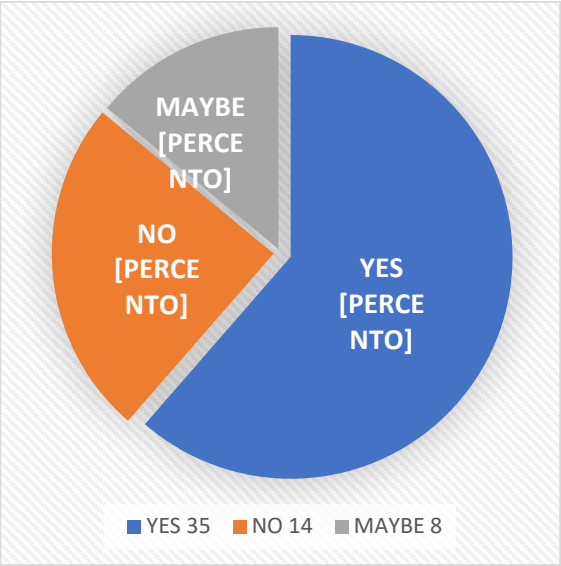

Figure 3. Need for registration of used drones in Slovakia, Q 5

From these numbers, it can be inferred that respondents have a general awareness of the necessity of drone pilot registration. However, it is crucial to reduce the number of those who were unable to express their opinion and those who disagreed with the need for registration. In the context of this question, we were interested in whether students have knowledge about the height restrictions for drone flights. As we can see in Figure 4, 81% of respondents are convinced that there are restrictions that regulate the allowed altitude for drone flights and the conditions that must be met during these flights. Another 12% of respondents believe that there are no restrictions, and 7% were unable to express their opinion.

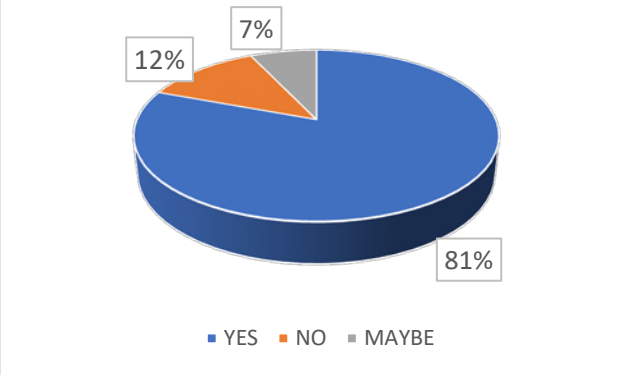

Figure 4.Restrictions on the altitude of drone flight in the Slovak Republic, Q 6

The category of legislation was concluded with the question of whether it is necessary to obtain a license or qualification for legal operation of a drone in Slovakia (Q 7). According to EU regulations, pilot registration is not required for drones weighing less than 250g that are not equipped with a camera or are classified as toys.

Otherwise, pilot registration is required from the age of 16. The Slovak legislation has currently concluded that drones and drone pilots who do not use unmanned aircraft for commercial purposes are not obligated to register, meaning they do not require any license or qualification. Our survey showed that 56% of students believe that a pilot license or qualification is required for legal drone operation, 23% believe that no license or qualification is necessary, and 21% were undecided or unable to provide a clear answer, as shown in Figure 5.

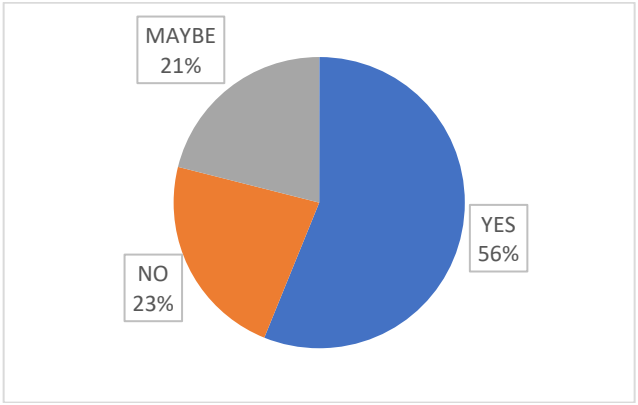

Figure 5. The need for a license or qualification for drone pilots for legal operation in the Slovak Republic, Q 7

Finally, at the end of the survey, we also addressed questions related to the criminal and legal responsibility of drone pilots in Slovakia (Q 8 - Q 10). As we have mentioned several times, our legislation is based on EU regulations, but it has not yet implemented these regulations. However, this does not mean that violating the rules is without consequences. On the contrary, the Civil Aviation Authority of the Slovak Republic has the authority to confiscate a drone and impose a fine of up to €300 for non-commercial flying offenses (§ 53 of the Civil Aviation Act) [14]. Our respondents were asked whether it is prohibited to pilot a drone near airports (Q 8). As many as 65% answered "yes," 17% answered "no," and 18% were unable to provide a clear response, as shown in Figure 6.

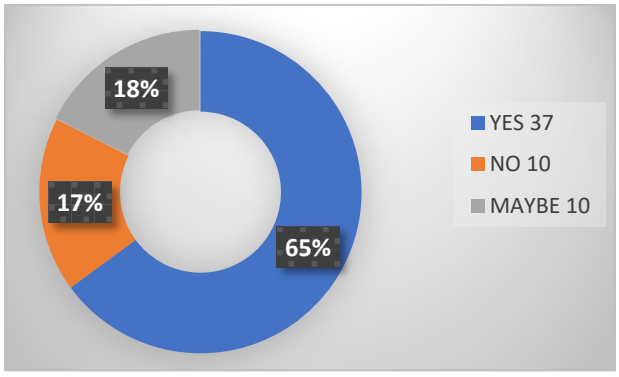

Figure 6. Prohibition of using drones near airports in Slovakia, Q 8

Despite the fact that 65% of respondents consider flying a drone near an airport to be prohibited, Figure 1 shows that only 6% of the recorded flights were actually coordinated. In the context of the continuously evolving General Data Protection Regulation (GDPR) question, we were interested in how drone pilots perceive privacy breaches and data collection (Q 9). As we can see in Figure 7, 25% of the students were convinced that the legislation does not regulate the protection of personal data of individuals when using a drone, 19% could not express their opinion, and 56% of the respondents are aware that any audiovisual recording from a drone is subject to the law on the protection of personal data if it can lead to direct or indirect identification of individuals.

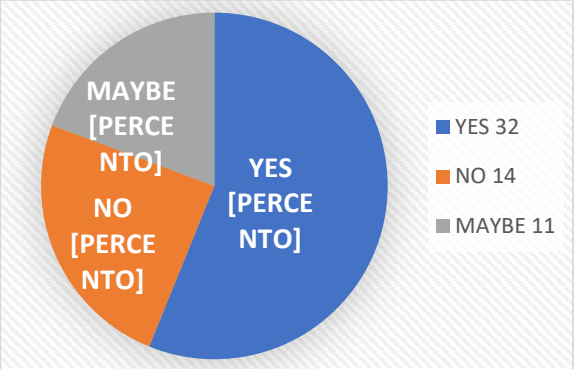

Figure 7. Legislatively regulated questions regarding privacy and data protection when using drones, Q 9

The dissemination of such recordings without the consent of the individuals involved is prohibited and therefore subject to sanctions under applicable laws [6], [12]. Closely related question was also the issue of sanctions for violating drone flight rules, from which we can assume that respondents who are aware of the legislative regulations regarding drone flights (Q 9, Figure 7) also have knowledge of the sanctions resulting from their violation. 60% of the respondents are aware of the consequences in the form of sanctions, 23% were unsure, and 17% of the participants believed they could fly a drone without the risk of a fine.

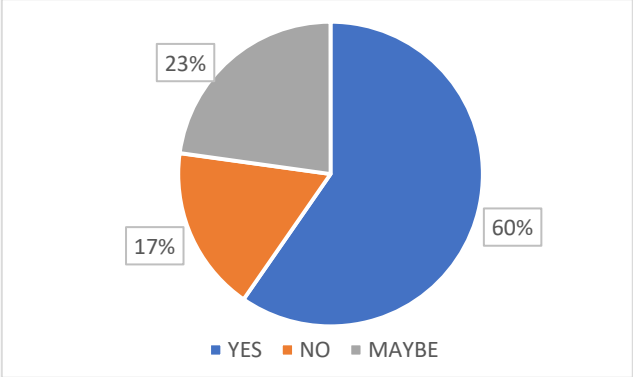

Figure 8. The sanctions related to the violation of rules applicable to drone piloting, Q 10

Whether we consider drone piloting as a hobby or as a job opportunity, we must keep in mind that a remote pilot is obligated to constantly visually observe the surroundings, obstacles, air traffic, and avoid other air operations based on the principle of see and avoid.

5. Discussion

The questionnaire survey conducted at the Faculty of Aviation, TUKE, among first-year students of the Aviation Management study program was carried out as a pilot data collection to assess the level of knowledge regarding the legislation governing the non-commercial use of unmanned aerial devices, specifically drones, in our case. The increasing trend in the availability and prevalence of these devices is reflected in many areas of social and professional life [10]. The outputs of using drones are often stunning, providing opportunities to obtain seemingly unattainable data. However, many people are unaware of the obligations and rights associated with using such devices. We are often confronted with questions regarding the use of drones from the students themselves, whether during lectures or when writing their final papers. We were interested in whether these questions were a result of ignorance or uncertainty associated with a subjective interpretation of the legislation. From the results, we have learned that more than half of the students have the necessary information. However, it has been problematic that partially implemented EU regulations have caused confusion for many. For example, the non-existent registry of drone pilots or the registration of unmanned aircraft devices (drones) that are known more as toys for non-commercial purposes. The results also indicate the need to improve students' awareness through lectures within subjects that focus on legislation and unmanned systems. It would also be appropriate to create study materials, presentations, and an online course that students could complete. Our intention is to continue monitoring the level of their knowledge, repeat the survey, compare the results, and verify whether our proposals were beneficial [4]. Until then, we can draw inspiration from the functioning system of real-time drone tracking, which is successfully operating in the USA, and gradually implement it into our conditions.

The growth of unmanned operations in airspace and the development of unmanned aircraft economy lead to the need for integrating Unmanned Aerial Systems (UAS) operations into existing Air Traffic Management (ATM) systems. Harmonizing manned and unmanned operations requires a high level of safety, exchange and sharing of flight information, and defining clear competencies for Air Navigation Service Providers (ANSPs), U-Space operators, as well as VFR/IFR pilots and UAS operators.

The implementation of a drone tracking system using transponders utilizing various technologies (ADS-B, LTE) is expected to significantly contribute to this goal. Since 2022, there have been significant changes in the rules for operating unmanned aircraft systems (UAS) in the United States. The Remote ID Standard has been implemented, aiming to increase the accountability of drone operators and enhance airspace safety. These changes also aim to expedite processes leading to the utilization of autonomous operations, Beyond Visual Line of Sight (BVLOS) flights, and the integration of various applications within airspace services. The European Union Aviation Safety Agency (EASA) is moving in a similar direction [5]. Commission Implementing Regulation (EU) 2021/664 defines the so-called Network Identification Service A, which is responsible for processing data on unmanned aircraft system (UAS) operations: • Operator's registration number • Unique serial number of the unmanned aircraft • Geographical location of the UAV • Geographical location of the UAV operator or the take-off location. It is based on the Commission Implementing Regulations (EU) 945/2019 and 947/2019, which define Direct Remote Identification (DRI) - a system that should ensure the local transmission of information about the operated UAV, including its identification (ID) label. These provisions state that if a drone does not have a built-in transmitter that meets the required technical standards, the drone operator is obliged to equip the drone with an equivalent external module. This applies to pilots operating in all categories and subcategories of operations [9].

6. Conclusion

Based on the analysis of data from students, we have gained insights into the potential level of public awareness regarding the use of drones for non-commercial purposes. The survey results indicate that students have knowledge of drone usage legislation, but they are also confused by the lack of consistency between the European Union and Slovakia. As we have not found a similar survey conducted previously, our goal for the future is to conduct a comparative survey with the possibility of involving the general public. This opens up an opportunity for discussion not only within the premises of the Faculty of Aviation at TUKE but also with the relevant authorities in this field. A challenge for us will be the preparation of study materials, an online course that students can take, as well as the integration of this topic into lectures of study programs that deal with unmanned aviation legislation.

References:

[1]. Al-Rabeei, S.A.S., Korba, P., Hovanec, M., Šváb, P., Rácek, B., Spodniak, M. (2021). Analysis of Aviation Pollution in the Selected Regions of the World. In Perakovic, D., Knapcikova, L. (eds) *Future Access Enablers for Ubiquitous and Intelligent Infrastructures. FABULOUS 2021. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, 382*. Springer, Cham. Doi: 10.1007/978-3-030-78459-1_17

[2]. Andrejiova, M., Grincova, A., Marasova, D., & Koščák, P. (2021). Civil Aviation Occurrences in Slovakia and Their Evaluation Using Statistical Methods. *Sustainability*, *13*(10), 5396.

[3]. *Decision no. 2/2019 from 14.11. 2019, which determines the conditions for the flight of an unmanned aircraft and declares a ban on the flight of specified categories of aircraft in the airspace of the Slovak Republic. (2019).* Letectvo. Retrieved from: http://letectvo.nsat.sk/wp-content/uploads/sites/2/2020/02/Decision_No_2-2019_EN_2_FINAL.pdf [accessed: 05 June 2023].

[4]. Džunda, M., Dzurovčin, P., & Melníková, L. (2022). Anti-Collision System for Small Civil Aircraft. *Applied Sciences*, *12*(3), 1648.

[5]. Dzunda, M., Dzurovcin, P., & Melniková, L. (2019). Determination of flying objects position. *TransNav: International Journal on Marine Navigation and Safety of Sea Transportation*, *13*(2).

[6]. *Podmienky vykonania letov. Dopravný úrad SR*. (n.d.) Letectvo. Retrieved from: http://letectvo.nsat.sk/bezpilotne-letectvo/podmienky-vykonania-letov/ [accessed: 08 June 2023].

[7]. *Nariadenie Európskeho parlamentu a Rady (EÚ) 2016/679 z 27. apríla 2016 o ochrane fyzických osôb pri spracúvaní osobných údajov a o voľnom pohybe takýchto údajov, ktorým sa zrušuje smernica 95/46/ES (všeobecné nariadenie o ochrane údajov).* (2016). Eur-lex. Retrieved from: https://eur-lex.europa.eu/legal-content/SK/TXT/?uri=celex%3A32016R0679. [accessed: 10 June 2023].

[8]. Removicikova, L. (2020). *Drony a legislatíva – podmienky používania pre profesionálov aj laikov*, Podnikajte. Retrieved from: https://www.podnikajte.sk/zakonne-povinnosti-podnikatela/drony-legislativa-podmienky-pouzivania [accessed: 15 June 2023].

[9]. *Pravidlá používania dronov, Legislatíva Prevádzky Dronov V EU a Na Slovensku*. (n.d.). Mamdron. Retrieved from: https://mamdron.sk/legislativa/ [accessed: 12 May 2023].

[10]. Rozenberg, R., Tobisová, A., Seňová, A., Ižaríková, G., Blaško, D. (2021). Assessing environmental and health impact: Fires in civil aircraft. *International Review of Aerospace Engineering, 20(2),* 51-63.

[11]. *Specific Category Standard Scenario*. (n.d.). Dutch Drone Academy. Retrieved from: https://www.dutchdroneacademy.com/en/specific-category-standaard-scenario-01-opleiding/ [accessed: 03 July 2023].

[12]. *Letecké aplikácie*. (n.d.). Ústredný kontrolný a skúšobný ústav poľnohospodársky v Bratislave Retrieved from: https://www.uksup.sk/oor-letecke-aplikacie [accessed: 07 July 2023].

[13]. *Zákon č.18/2018 z. o ochrane osobných údajov a o zmene a doplnení niektorých zákonov*. (2017). slov-lex. Retrieved from: https://www.slov-lex.sk/pravne-predpisy/SK/ZZ/2018/18/ [accessed: 10 July 2023].

[14]. *Zákon č. 143/1998 Z.z. o civilnom letectve (letecký zákon) a o zmene a doplnení niektorých zákonov*. (1998). slov-lex. Retrieved from: https://www.slov-lex.sk/pravne-predpisy/SK/ZZ/1998/143/ [accessed: 10 July 2023].