

USE OF UAV EQUIPMENT IN THE TERRITORY OF THE SLOVAK REPUBLIC

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Abstract: *The main motivation to write the article was to clarify the issue of UAV for the needs of the implemented project at the Faculty of Management and Informatics. The aim is to describe the current state of use of UAV vehicles in the Slovak Republic, including the identification of specific implementation assumptions and risks. The article used methods of secondary data analysis in the form of orientation and content analysis and summarization of knowledge in the discussion. The use of UAV vehicles is a trend that is continuously developing in the Slovak Republic, where the decision of the Transport Authority no. 2/2019, which affects the use and proper operation of drones. The sectors that prefer these facilities the most are construction, energy and agriculture. Associated partial areas of use are also services, production or geodesy, which focus mainly on the acquisition of photos, videos, mapping and photogrammetry. The common aspects are mainly mapping, monitoring and photogrammetry. Constraints include lack of awareness, information, attitude to change, bureaucracy, low state or financial support and personal data protection. By setting assumptions and implementation risks, it is possible to propose a set of recommendations for their mitigation or complete elimination. UAV implementation is influenced by local, cultural and technological aspects of Slovakia. The research of the selected issue will continue in the following research activities through a thematically oriented project on UAV at the Faculty of Management and Informatics in Žilina.*

Keywords: *unmanned aircraft vehicles, UAV, technology, Slovak Republic, legislation, trends*

JEL Classification: *M15, O32*

1. INTRODUCTION (PURPOSE OF ARTICLE)

The UAV is an autonomous aeronautical device that is operated remotely without a crew. The equipment consists of the following parts [1]:

- receiver,
- gyroscope,
- inertial measuring system,
- magnetometer,
- barometer,
- ultrasonic based safety sensors.

The UAV is controlled from a ground station, which contains a control unit, a receiver, a transmitter and a pilot. The higher level of UAV is the so-called UAS (Unmanned aerial system), which has implemented high-quality hardware and software. UAS are mainly used in America and Europe. In the military field, unmanned aerial aircraft navigated without RPAS (Remotely piloted aircraft system), which operate on the basis of video, thermal imaging, hyperspectral camera and laser sensors, are preferred [4]. In Slovakia, the vast majority of used UAV equipment for the area [1]:

- aeronautical agroanalysis,
- inspections,
- mapping,
- measurement of volumes and areas,
- photo and video production,
- geodetic 3D models, etc.

The technology platform consists of an aeronautical, control and processing module, including peripheral equipment (camera, camcorder, lidar) [2, 3]. Legislative conditions valid for the use of drones in the territory of the Slovak Republic are regulated by the Decision of the Transport Authority no. 2/2019 of 14 November as follows [4, 5, 6]:

- drones must not fly at night, spray chemicals into the air, endanger property, other persons or animals,
- it is necessary to observe permitted flight altitude and a radius,
- The pilot must maintain direct visual contact with the UAV equipment.

2. RESULTS

In 2020, primary research on the current situation of perception and use of UAVs in the Slovak Republic was carried out as part of teaching at the Faculty of Management and Informatics. At that time, there were 78 holders of UAV aviation certificates in Slovakia. 48 of them were involved in the survey and 58 companies were also contacted, which could potentially use UAVs in their business. These were mainly companies in the field of energy, construction, agriculture, telecommunications, insurance and large manufacturing plants. 65 respondents participated in the questionnaire survey (Figure 1) [7].

Use of UAV Equipment in the Territory of the Slovak Republic

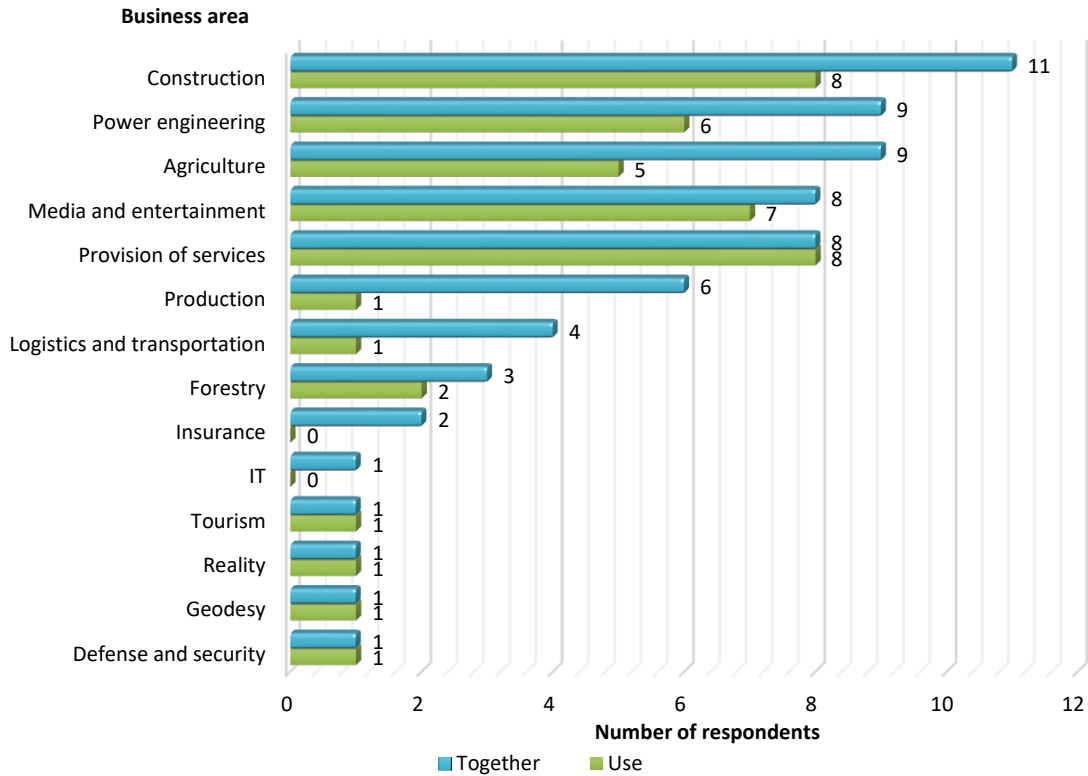


Figure 1 Composition of respondents, source: [7]

The survey shows that most companies that use UAVs use them over a longer time horizon of 3 to 5 years (Figure 2) [7].

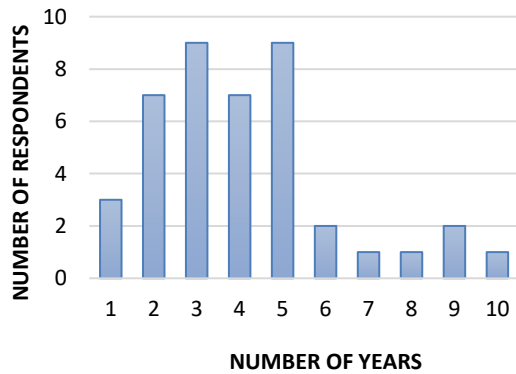


Figure 2 Answers to the question about the length of use of drones, source: [7]

UAV vehicles are most used in construction (88%), energy (54%) and agriculture (45%). The use of drones in individual partial parts in Slovakia is found in the following table [7].

Respondents from the survey said that they prefer to use UAVs in aerial photography, live images, distribution processes, terrain mapping and agricultural analysis. The biggest restrictions on the implementation of UAVs in the Slovak Republic include [7]:

- lack of information,
- bureaucracy,
- high costs,
- legislation,
- invasion of privacy,
- noise,
- technological possibilities, t. j. low load capacity and short flying range.

Table 1 The most important areas and processes of using drones in Slovakia

Areas	Processes				
	Imaging	Photo and Video	Monitoring	Mapping	Photogrammetry
Construction	x	x			x
Energy			x		
Agriculture			x	x	
Services		x		x	
Production		x			x
Geodesy			x	x	x

modified source [7]

Table 2 The most important assumptions and risks

Assumptions	Risks
Stakeholder cooperation	Low interest in the issue, weak communication of benefits
Lifelong learning	Negative attitude to change and new technologies
Positive attitude to change and innovation	Traditional / too conservative thinking
Finance	Insufficient state support
Suitable communication channels	Limited financial sources of applicants

Source: own processing according to [7]

3. DISCUSSIONS AND CONCLUSIONS

UAV represent a world technological trend, which has also begun to develop in Slovakia. The lack of information needs to be addressed by raising awareness of the issues examined, e.g. in professional magazines, media, television and social networks. It is advisable to eliminate bureaucracy with online applications and simple forms, which will not impose high administrative demands and requirements on all parties involved. Legislative conditions need to be adapted simultaneously to the situation in the Slovak Republic and to the current situation in developed European countries. At present, the legislation is very complicated and hinders expansion of UAVs in the Slovak Republic. The state should give more support to pilot courses (education) and enlightenment in this area (change of thinking). Technological possibilities are not at a very satisfactory level, as UAVs still have low payloads and short range, are relatively noisy and often invade privacy, which is mainly addressed abroad, for example, by well-marked maps of areas where UAVs can move. On the other hand, especially in Asian countries, the process of expanding and using drones is at very good level. A win-win solution for all stakeholders would be to create a community where users can share their opinions, expectations, recommendations, observations or advice. Sharing real examples of the use of drones in practice would significantly benefit their spread in

Slovakia and the economic benefits that their use will clearly flow from this. The main implementation assumptions and risks of using drones in the Slovak Republic are described in Table 2.

The main findings of the article include the gradual, slower development and implementation of UAV facilities in Slovakia, the use of which is preferred especially in the field of construction, energy and agriculture. The trend of utilisation UAV should be constantly expanded and strengthened, in particular by eliminating negatives, meeting the above assumptions and seizing opportunities in the form of positive UAV implementation benefits and communicating them to the public and potential applicants, depending on location, cultural and technological aspects. The researched issue will be the subject of future research activities in a new project at the Faculty of Management and Informatics in Žilina.

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