UAV – Areas of Use and Its Impacts on The Environment

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Abstract

The current situation in the field of business innovation is focused on digital data. Everything we can count, and measure helps us reach a better solution. Business decision-making is the most important activity, and digital data helps you make the right decisions. UAVs (Unmanned aerial vehicles) are a new area for capturing more information about a situation and then making decisions faster and with greater confidence. However, innovations in this technical area also raise several questions. One of them is the real impact of these technologically efficient solutions on our environment. Our paper deals with the analysis of the application of UAV in various areas of the business environment. The aim of the study is to provide an overview of theoretical approaches to the issue and to specify the application of the UAV platform in the areas of business. Secondly, the study deals with the sustainability of individual components and thus in general also UAV solutions in terms of environmental impacts on our environment? Analytical methods, such as the analysis of available theoretical sources and approaches to UAVs, but also the method of induction, deduction, implementation, comparison of available solutions from practice, it was possible to provide a critical view of the issue in terms of environmental sustainability by case studies. The article clearly presents studies aimed at measuring the effectiveness of UAV technology as a substitute for common practice in the field of delivery. At the same time, however, we mention significant differences in the practical use of UAVs in individual business areas.

Keywords: UAV (Unmanned Aerial Vehicles), Drones, Sustainability, Environment, Business.

Introduction

This study is focused on current situation in UAV impacts on the business area. The main goal of the study is analysing theoretical background of this topic and shows possibilities for use drones and others UAV parts in business area. Second aim of the study is to understand what the needs of function drones is.

What are the by-products in terms of drone production and what parts of the drone composition represent, on which components are UAVs dependent and without which their function is not possible? The study considers the effects of the function of such a form in production, analysis but also in services. What is important to realize as risks in the given issue in terms of UAV sustainability. The study is delimiting technical analysis of drone/UAV – from what drone consist of – technical parts, but of course what is the most important for the function of these type technics.

The paper discusses several studies that address the effectiveness of drones and their application to individual business areas, especially the area of delivery services and delivery of packages directly home. This trend has been a much-discussed topic in recent years, and for this reason this issue has been considered essential when looking at its usefulness in practice.

Cite this Article as: Mária Demjanovičová, Michal Varmus and Radoslav Jankal "UAV – Areas of Use and Its Impacts on The Environment" Proceedings of the 37th International Business Information Management Association (IBIMA), 30-31 May 2021, Cordoba, Spain, ISBN: 978-0-9998551-6-4, ISSN: 2767-9640

UAV Market Introduction

Wing Drones – Delivery

The American company Wing, which is a subsidiary of Alphabet Inc., which develops drone-based freight technology. Wing was established in 2012, with its first drone delivery in 2014. The company will therefore focus on delivery services via drones. The company currently provides delivery services in only three countries, namely Australia, Finland, and the United States. Delivery of the package works based on an application in which the customer selects the required goods, the company picks them up, packs them and then attaches them to a drone. At the same time, the customer can check where his package is currently located and when it will arrive at the pick-up point throughout the flight. The customer does not have to worry about the safety of the package as the company designs its drones so that they are as durable as possible and carry the package stably. (Wing.com, 2021)

Wing is constantly communicating and working with national governments to further expand its delivery services through drones. As already mentioned, Wing provides its services in 3 countries, but only in some smaller parts of the city, and it is the expansion of the delivery area that is the effort to negotiate them with governments. Drone delivery is faster and more environmentally friendly than using road transport, which means that Wing seeks to reduce carbon emissions and thus its environmental footprint. (Wing.com, 2021)

Fly Zipline Drones – Insurance

With more than $ 1.2 billion in San Francisco, California, Zipline focuses on the distribution of medical supplies in underdeveloped countries such as Ghana, Rwanda, the Philippines, India, and Nigeria. In addition to blood transfusions, drones also supply frozen plasma. Since May 2019, the company has taken care of more than 65% of blood supplies in Rwanda. (cnbc.com, 2019) During the current COVID-19 pandemic, the company is helping to replenish supplies of vaccines, drugs, and consumables. (Flyzipline.com, 2021)

The company also wants to focus on home delivery for ordinary people. Towards the end of 2020, Fly zipline announced a partnership with the Walmart retail chain in Arkansas since 2021. Initially, they want to deliver products from the "health and wellness" section and, over time, expand into general goods. With this step, Walmart and Zipline would like to speed up delivery times within one hour of ordering and help reduce emissions. (finance.yahoo.com, 2020)

Drone control is provided by autonomous control using GPS coordinates, so the drone does not need a pilot when flying. By moving the GPS circuits from the aircraft to the battery, the unnecessary delay was eliminated, and the take-off time was further reduced. The drone has a duplication of some components, which is one of the main measures in case of failure. The drone has two engines, but it is also able to fly with one and two activation units. In the event of a more serious failure that is not resolved by duplicate units, the drone automatically activates the parachute, lands safely on the ground, and locates its position using GPS coordinates.

Sense Fly drones – agriculture

Sense Fly deals with the development of industrial drones that are adapted to demanding environmental conditions. The company offers proven drone systems that simplify the collection and analysis of geospatial data, helping experts in geodesy, agriculture, engineering, and humanitarian aid make better decisions faster. Thanks to innovations in robotics autonomy, machine vision, computational distribution, and artificial intelligence, it is creating a new generation of drone technology. Sense Fly was founded in 2009 and is a commercial subsidiary of the Parrot Group. The company employs more than 100 people across five continents. The company's headquarters are in Switzerland and other branches in New York, Florida, Shanghai, and New Zealand. (sensefly.com, 2021)

The complex agricultural environment combined with intensive production requires the development of robust systems with short development times at low costs. The unstructured nature of the external environment increases the chances of failure. In addition, the machines are usually operated by less technically skilled workers. That is why safety and reliability are important.

Farm management is a complex activity involving dozens of operations, the performance of which is conditioned by many factors. These factors influence farmers' decisions regarding the selection and application of seeds, fertilizers, pesticides and include information on weather conditions, expected precipitation, air and soil temperature, etc. This data provides sensors that run certain software algorithms that optimize the corresponding agricultural processes on automated farms.

Another potential domain for the agricultural IoT application concerns resource monitoring and management. Modern agricultural technologies benefit greatly from the use of the Internet of Things in the field of storage security. For example,

equipping silos and elevators with sensors makes it possible to monitor indoor environmental conditions and warn people of excessive heat or humidity that can be harmful to stored grain, or to send alerts if there is a risk of fire.

Methodology

Based on the methods of analysis of theoretical approaches and the definition of individual UAV components, it is possible to describe and understand the impacts of UAV components on our environment. Through analytical methods such as induction, deduction, or comparison, it is possible to define the potential risks of implanting UAV innovations into individual business activities. A description of currently available studies that address the issue of the impact of drones on the environment will provide the study with an overview of real data, which is a major factor in the decision-making innovation process.

The aim of the paper - General overview of UAV and its use in the business area.

Research question – Is the UAV platform a more effective solution also in terms of environmental impacts on nature, or only in terms of streamlining production and work processes?

The study evaluates the currently available literature and its definition of UAV and its possibilities in practise by case studies from business area. This area is divided by different approaches, but its understanding is uniform. The article will provide an overview of the definition of UAV and defines the individual technical components of drones and their use in business practice as a real component of the production, analytical activities of the company. This theoretical and technical approach will therefore provide a basic view of the issue of UAV in the field of business and its impact on the natural environment.

Theoretical Background

Unmanned Aerial Vehicles (UAVs), known as drones, create opportunities for new businesses / start-up's and primarily create completely new opportunities in the field of analysis and data collection from various fields. Whether it's image innovation for the film industry or entirely new possibilities for emergency services, drones bring several new options that reduce risk but also increase work efficiency. (Zrakova, Kubina, Koman, 2017) This is a relatively new technology that has begun to develop significantly. Only in 2016 did the Federal Aviation Administration (FAA) issue rules regarding the commercial use of drones, for the first time someone defined the legal conditions and restrictions for the use of drones in business but also for their use for other purposes. Since then, the UAV has achieved the highest growth. (Uzialko, 2018) In practical terms, the FFA has only relaxed some of the original restrictions that required permits and introduced restrictions, such as a ban on flights that go beyond visibility or at night. The FAA has previously considered exemption requests on a case-by-case basis. These 2016 regulations set out the general conditions that are globally applicable. (Uzialko, 2018)

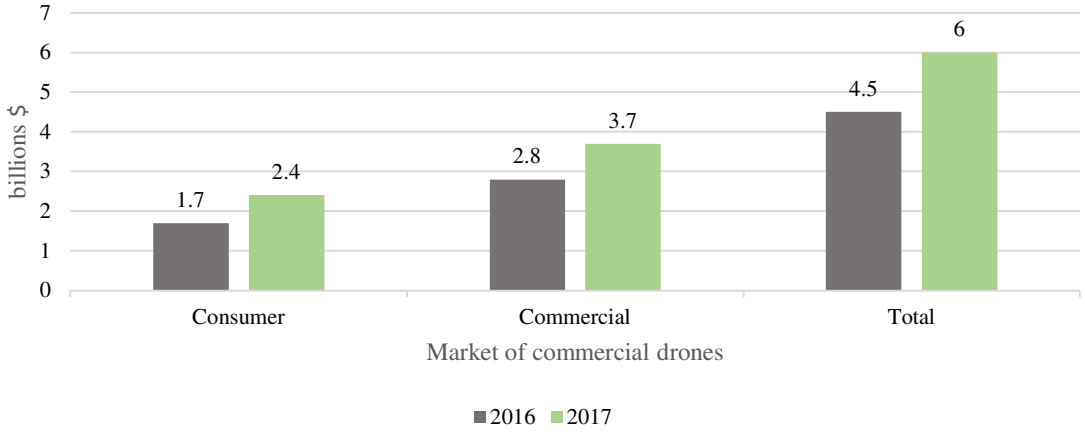

Figure 1: Drone Market Revenues by Sector

(Gartner, 2017)

According to a Gartner survey, the market for commercial drones in 2016 was $ 2.8 billion, with only 110,000 million units sold. In 2017, sales of commercial drones were estimated to increase by up to 60% to 170,000. Although private-driven drones dominate unit sales (94% of the market), they account for only 40% of the total UAV market.

UAV

UAV (Unmanned aerial vehicles) represents a flying object - a drone without a human pilot, and accordingly the name UAV - Unmanned Aerial Vehicles was created. Drones are a technical form of robot typically typed remotely by a pilot who is not

physically involved in the movement of the drone. However, completely autonomous drones are already in the implementation stage. (Bangkui, Yun, Ruiyu, Qiqi, 2020)

The term UAV (Unmanned Aerial Vehicle) refers to an unmanned aerial vehicle, often referred to as a drone. The drone is the main part of the UAS (Unmanned Aerial System), which also consists of a control station and any element that allows flight. They are usually controlled in two ways - either by the pilot, who controls the drone by means of a control station on the ground just at the time of flight, or by software, which does not require additional assistance from the pilot (i.e. their movement is automated). Over the last 10 years, the UAV industry has been one of the fastest growing. The use of drones in the military (especially the US military) and the increase in sales of commercial drones certainly play a big role in this, but they also find their use in other sectors - for example in agriculture. (Narayanan, Ibe, 2015)

Drones were originally created as safer and cheaper alternatives to military aircraft, which by default necessarily needed a crew for their function. Even today, drones are still used in the military industry segment. But their purpose has changed significantly from a consumer market perspective. Drones are also perceived as a toy and leisure entertainment, or an effective helper in various areas of business. Thus, their media and business efficiency began to show significantly. (Kubina, Koman, 2016)

The drones differ in shape and size, but the main elements of the core (battery, microcontroller, motor, sensors) are essentially the same. As drones are manufactured with components for smartphones, investment in these parts over the last 10 years has led to lower drone prices and increased availability for the entire market. (Koman, Kubina, Holubčik, Soviar, 2018)

Drones

Drones can be considered smart devices with the ability to fly or otherwise move in the airspace. Unlike most development technologies, such as innovations in big data, drones are valuable for combining mobile hardware and an Internet connection. Drones are called mobile sensors, which makes the Internet, or any other environment or entity using data obtained by drone, more intelligent. They can serve as a platform on which to build different applications, software and business models. The market began to provide everything that the drone could use in large quantities, which made these conveniences and improvements available. From drone mapping software to flight planning software, drone insurance, and markets where people find drone pilots. This new segment has created a new platform that is creating new markets with interest from several industries. (Gartner.com 2017)

The Current Situation – Application for UAV In Business Area

There are more than 1 million registered drones in the United States alone. Most of them belong to people who fly with them for fun, but they are increasingly being used commercially. Companies, including Amazon, UPS, Google, and DHL, are already exploring ways to deliver drone packages instead of trucks.

Smithsonian magazine conducted research measuring how this shift would change the way the US uses energy and the resulting effects on the environment. Research has shown that in some cases, the use of electric drones instead of trucks or diesel vans could reduce energy consumption and greenhouse gas emissions. In other cases, however, the use of lorries - especially electric ones - would be more efficient and cleaner. (smithsonianmag.com, 2018)

The US electricity sector has rapidly switched to generating electricity with lower greenhouse gas emissions. However, the transportation sector is still largely powered by petroleum-derived fuels and is currently the largest source of greenhouse gas emissions in the United States. About 1/4 of transport emissions, equivalent to 415 million metric tons of carbon dioxide, come from medium and heavy goods transport - daily consumption vehicles. Reducing the need for freight transport by supplying some electric drone packages could save fuel and potential carbon emissions. (smithsonianmag.com, 2018) However, all these results are proposed only under the assumption that the intermediaries of such transport will use the so-called UAV-drones to charge. clean energy, ie solar, nuclear, etc. (smithsonianmag.com, 2018)

Findings

UAV is increasingly used in various areas of business as a tool for streamlining certain steps in the analysis, but also to ensure the results of employees' work or product results.

Drones are increasingly used in areas where help is needed but cannot be provided due to external influences, so they are used to deliver medicines and vaccines to remote or cut-off areas. They are also used wherever collections of movements are required, such as when making films or recording sports events, etc. Conservationists and farmers quickly used them to control crops, illegal logging, animal tracking and mapping forests or other external areas that represent a large area that cannot be physically monitored at such times. For example, the Aero botany project in the Peruvian Amazon rainforest. Building inspections, evidence, monitoring of storms, etc. Despite the benefits, some countries have banned them altogether. This is because drones also have several negative aspects, which will be analysed below. (energysavingtrust.org.uk, 2020)

Analysis of business potential for UAV

UAV application in a business area is reality. But if is the conversation set on the future view of this innovation the application of the UAV components is huger like in first view. In the next paragraphs are named a few possibilities how to use UAV in practice in the business area.

UAV In Insurance Sector

UAV represents one of the ways to simplify insurance. And not just the insurance industry, but the area of evidence in individual insurance situations. Insurers began experimenting with unmanned aerial vehicles (UAVs) about five years ago (2016) and considered them useful in adjusting property claims. Since 2016, when the FAA relaxed regulations on commercially used drones, more insurance companies have begun to use them. Drones can soon be as ubiquitous in insurance companies as computers and cell phones. (Bonner, 2018) However, this view is somewhat focused only on the benefits and ease of use of drones, it is important to realize that the legislation on the use of drones is increasingly restrictive and also "piloting" the drone is not entirely simple and its failure can be dangerous. for all who are in the vicinity of the flying object, which in this case is a drone.

Table 1: Some of the purposes that insurance companies use or may use drones according Bonner

WORK ACTIVITY	DESCRIPTION OF ACTIVITIES
Roof damage inspections	One of the most common uses of drones by insurers is roof inspections. Roof inspections are notoriously demanding and dangerous. In the drone version, this control is less dangerous for the insurer.
Additional damage checks	Drones are useful in controlling damage to large structures, such as warehouses, large external boilers, etc.
Disaster inspections	Drones are valuable in controlling areas affected by a major disaster, such as floods or earthquakes.
Insurance inspections	One of the uses of drones is to perform property insurance checks. Drones are especially useful if the insured property is extensive or difficult to reach. For example, a crop insurer may use a drone to inspect agricultural crops.
Fraud monitoring	Drones can also be used to deter insurance fraud. In the event of a hurricane or other event, some policyholders bring actions for damages that existed prior to the event. Insurers can refute some claims by comparing pre-event drone camera images with post-event images.

(Bonner, 2018)

UAV in agriculture

It is the field of agriculture that has the greatest opportunity to profit from drones and unmanned technology in several ways. In fact, many in the UAV industry cite agriculture as a huge area of opportunity for unmanned technology. Drones can not only save farmers money by helping them to identify in time the problem of plants, animals, but also the weather and other influences that significantly affect the whole process of agricultural activity. In each of these cases, the use of drones helps to speed up otherwise time-consuming projects and thus significantly increases the efficiency of the operation of this area of industrial production. (Ferroa, Grassia, Seclìb, Maggiorea, 2016)

UAV in architecture

Architectural companies and building contractors also benefit from the application of drones to the company's activities. Like real estate professionals, architects can use images and shots of real estate to create 3D renderings of the structures that are being designed. It is a very cheap and fast creation of aerial photographs, which provide architects and builders with essential materials for their work. (Uzialko, 2018)

UAV in delivery

Drones in the field of parcel delivery are the subject of the greatest debate in the field of research articles. Efficiency is addressed in comparison with delivery through standard transport companies - commercial vehicles, vans, trucks.

Although drone transportation is still limited to a fairly low maximum carrying weight (55 pounds including the drone itself), drone delivery is another promise that seeks to put into practice.

UAV as a service

Drones-as-a-Service is a unique concept promoted by Measure. The company's goal is to reduce the risks and costs associated with using drones for business by providing "turnkey drone solutions" to entrepreneurs and businesses in all bands. "The

measure was specifically designed to help customers avoid capital expenditures and operational risks in creating their own drones and purchase support for drones in a way that better matches their operational and cost profiles," said Brandon Torres Declet, CEO and co-founder. in a statement. (Uzialko, 2018)

UAV in emergency

Drones have presented themselves in the field of emergency services, especially for medical needs, as a new opportunity in saving lives. Using drones to observe a difficult situation or to deliver medical supplies to victims who are stranded could increase the ability of emergency response physicians to provide care in difficult situations. (Adamsa, Friedlandb, 2011)

UAV in Mechanical Engineering

Mechanical engineering is an area in which drones are used for complex projects such as oil pipelines, transmission cables and maintenance inspections.

UAV in Monitoring and Environmental Conservation

UAV technology can be used to monitor the ecological environment. UAVs are discreet and can monitor animal populations without disturbing them. This type of monitoring offers important insight into conservation activities, migration monitoring, habitat management and flood assessment, which is particularly useful on the coast.

UAV in marketing and media

Media production is increasingly linked to the creation of unique content. I can create drones. It is still a unique platform that is not widely available and thus creates content that is unique. In the past, aerial photographs were only available to large intelligence companies that could afford an intelligence helicopter. (Demjanovičová, 2020) Now, not only can local journalists and small media easily capture aerial footage for news, but a private individual can also create unique aerial view content for their social networks.

UAV And Education

Of course, new technologies bring the need for education and training. Companies like DART drones not only train people on how to fly UAVs, but also educate them about FAA regulations and specific use cases. It is important to realize that the development of this area should also be reflected in the field of university education, as the market will demand this experience.

UAV as next level of innovation – internet, data collecting

Another opportunity to take advantage of the drones and the overall features that drones bring was confirmed when Facebook bought Titan Aerospace, a solar drone company, to use UAVs to connect to the Internet. Facebook director Mark Zuckerberg's proposed plan is to bring Internet access to the developing world using the Aquila drone, which has just completed a successful test flight (2019). Google and Amazon are examples of other large corporations that have also invested in the drone industry. Zuckerberg has issued a statement illustrating the promise of drone technology in expanding Internet access around the world. (Uzialko, 2018)

The study of supply efficiency by energy saving trust

Based on research by Stolaroff and his research team, delivery services were performed using drones with standard vans. Drones appear to be very environmentally friendly for small and light packaging compared to almost any supplier alternative - including bicycles and e-Cargo supplies. However, the impressive statistic is based on the drone being able to carry a package weighing a maximum of 500 g or less.

The study states that an 8 blades drone that can carry up to 4.5 kg / 10 pounds is very effective. The Achilles' heel of the drones is mentioned by their lithium battery source, which allows only short flight times of up to 30 minutes and a range of up to 4 km before recharging. Here, however, it is debatable whether the 8-blade drone meant the number of blades or the number of engines. While an eight-blade drone can be a 4-motor drone with lower energy consumption, and in the case of 8 motor drones, it is a higher weight, but also more power. The study reported the number of bleads, but not the engines. This can be considered debatable.

The study further describes the efficiency of deliveries - commonly used to transport packages. In the case of the research, a standard supply producing polluting gases was used. In the end, however, the mode of delivery by delivery turned out to be more efficient. The delivery has an output of 4.27 kJ / kg / km, while your average drone delivers the goods at 8.2 kJ / kg / km. Thus, the idea of using alternative sources of charging the drones and thus reducing their load on the environment was opened, it would be a self-propelled drone - however, the efficiency has so far reached 31.6%. So solar panels are not an effective solution to the problem of drones and their charging. (energysavingtrust.org.uk, 2020)

The study of supply efficiency by Smithsonian Magazine

The issue of parcel delivery was also addressed by research published in SMITHSONIAN MAGAZINE, which also compares the efficiency of parcel transport by drone and delivery. The realization that the drone fights gravity by its own

power, but still has lower energy consumption per kilometre than the van. At this point, however, it is important to realize that the delivery will take a much larger number of packages than a drone. The study therefore recalculates the efficiency of drone transport with the efficiency of delivery transport. It primarily addresses emissions generation in this process. (smithsonianmag.com, 2018)

Different vans can run on diesel, natural gas, electricity, or petrol, each with different energy and emission characteristics. We have also included the environmental impacts of the production of these fuels and the production of batteries for electric vehicles. The energy needed to convert oil into diesel can add an additional 20 percent or more of greenhouse gases to the amount generated by burning fuel. And while battery production is improving, battery production is still producing carbon dioxide. (Energizer Battery Manufacturing Inc., 2010) We then calculated the amount of greenhouse gases emitted. Combustion of a gallon of diesel emits about 10 kg of carbon dioxide, but emissions from electricity vary by region. It depends on how it is made. Some energy production areas burn more coal and natural gas, while others have fewer fossil fuels and rely more on nuclear, hydro, wind, and solar energy.

Combining all the factors, the study found that the delivery of packages with small drones may be better for the environment than the delivery with trucks. On average in the USA, the delivery of a truck results in about 1 kg of greenhouse gas emissions. In California, the delivery of a small package of drones would result in about 0.42 kg of greenhouse gas emissions. This is a saving of 54% of the 0.92 kg of greenhouse gases associated with the package delivered by trucks in this state. In a high-carbon Missouri, the improvement would be smaller - only 23 percent lower - but still better. Small drones were more efficient than any truck or van, whether they were powered by diesel, gasoline, natural gas, or even electricity. (smithsonianmag.com, 2018)

The study of economic return of UAV by Gartner

New case studies are regularly published, which show cost and time savings and emphasize higher accuracy and quality when using UAV technologies. Agriculture was considered the first major market for commercial drones, but prices and economic dynamism around higher returns and return on investment mean that the market for commercial agricultural drones is not growing at the rate of other commercial drone markets. Gartner (2017) predicts that by 2020, the high cost sensitivity of the agricultural market will limit drone adoption to 7 percent of commercial market growth.

Delivery drones continue to attract the attention of the news media but will not be a major factor for several years. The return on investment as an innovative parameter for the entrepreneur has not been proven in terms of drone costs, operating costs and one delivery to customers. (Gartner, 2017)

Discussions

Based on available studies and analysis of literary sources and expert opinions, motivation regarding innovations in the field of UAV technologies is high and is also noticeable in studies. Each study tries to prove higher efficiency in the application of UAV technologies, but in the research the results are not significant at all. It is important to be aware of by-products in the production of drones and their components.

An interesting innovation from a functional point of view was presented by the French company Drone Volt, which decided to design a tilting spraying system for a drone in agriculture. This drone can not only locate pests (as in the case of eBee AG) but can also destroy them. Using the right pesticides, the technology will deal with the nests of Asian hornets and other insects, which are fast becoming a stable nuisance in Europe. The technology works with a camera that monitors the nest and sprays the system at the same time. (Kalvapalle, 2021)

In the field of innovation, a new trend is to prevent discrimination against people with disabilities by equipping these people with valuable skills in developing areas. The HandiDrone program was developed for this purpose. People who have mobility problems learn how to pilot drones. This opportunity offers them the opportunity to enter the labor market and experience control over how they can fly virtually using FPV (First Person View) technology. (Martin, 2021)

Another space is in the connection of artificial intelligence and drone technology, which came together and created the so-called SeeTree drone. AI is used to calculate the yield obtained from a single tree in a map design designed by a farmer to be able to analyze in advance how many crops they are able to harvest. This system would be suitable for strategic planning of expansion and measurement of production. The drone takes off into the sky and creates the so-called an intelligent network for trees and farmers can thus control the health and fertility of every single tree. (Hemsworth, 2021)

Research to date also suggests that drones could be used to pollinate flowers soon. This approach could prove useful in compensating for the declining bee population. (Cbinsights.com, 2020)

Drones in agriculture are a much-discussed topic in environmental circles in terms of scaring birds and other local game, which is subsequently expelled from these areas. The Meta Fly drone is a revolutionary piece that draws design inspiration from nature and provides enthusiasts with a biometric experience. Thanks to the synthetic wings, the drone can fly with a

similar level of accuracy as a bird. This allows the drone to fly not only outdoors but also indoors; it can precisely avoid obstacles and withstand impacts. This innovation also meets the requirement of designers to balance futuristic solutions with natural aesthetics. (Hemsworth, 2019)

UAV companies are constantly on the market in terms of speed and strength of these devices. What is important to consider is that the materials for constructing drones are constantly evolving. Carbon fibres have been used so far because of their lightness and durability. However, the use of drones in agriculture and harsh conditions requires going further. Russian engineers decided to build a closed armoured drone, whose body consists of only two connected so-called. carbon shells. This two-piece model has much greater strength, battery life and weather resistance because all electronic components are closed. The round shape also allows it to be aerodynamic in all directions. (Carbonfibergear.com, 2016)

From the point of view of ecology, the use of ecological materials is also an interesting solution. Many of the plastic components of the drone can be made from recycled materials or using 3D printers and bioplastics. (Cbinsights.com, 2019) Merket and Bushell describe a range of drone threats, in the forms of surveillance, smuggling, kinetic (i.e. collision), electronic and distraction. Ways - solutions to these threats include all non-destructive means (such as software intervention, UAV vs UAV, ground-based capture/interference, and bird-based methods) and destructive (including electromagnetism, lasers, firearms, and missiles (Solodov et al., 2018). Some airports are working to manage drones in their airspace (e.g. Sichko, 2019; Mackie and Lawrence, 2019). Lots of these methods are reactive or defensive – with negative afford. More proactive and preventative methods of management would be warranted. Current regulatory approaches are looking to assign responsibility to the operator, which is, a concern for both consumer and driver - operator (Liu and Chen, 2019).

The effectiveness of drones is not feasible with respect to the individual industries in which their capabilities are applied. The fact is that, for example, in agriculture, a drone with its sensors aimed at collecting data in a specific area can be a direct change for better decision-making. On the contrary, e.g. In services such as insurance, this is only a partial step that requires too much investment in terms of the value of the business. The article be the promotion of drone services as a realistically applicable model for work efficiency. To ensure the piloting of the drone, it is necessary to comply with a number of conditions that relate not only to the technical competence of the pilot, but also the license from the point of view of the government, as well as licenses and permits for flights, etc. This does not yet include software and accessories. In any case, just procuring the drone and its software is difficult, but it also continues to be maintained. Lithium Polymer, Lithium Ion batteries are types of usable batteries for drone operation. (Faktorová, 2006) This is an unsustainable process in their production and subsequent consumption. Even if sustainable energy is used in the case of charging, their recycling is too demanding and burdensome for the environment.

Colin Smith, Certification Manager for Freight Transport and Retrofitting of Clean Vehicles (Green Vehicles) at the Energy Saving Trust, said: and not from renewable sources. "If you are charging in a country with a more fossil-intensive electricity supply, such as Poland, it is not as CO2-efficient (to charge), but in countries such as France with a higher level of nuclear energy or Norway with a higher number of renewable energy sources. Here in the UK, we account for about 25% of renewable energy production. The higher the degree of renewable energy (or decarbonization) in the charging source, the better. (energysavingtrust.org.uk, 2020)

Colin continued: "Drones are likely to find specialized applications, such as delivering vital drugs to remote areas or areas where vehicles cannot reach, and there is a need to change people's behaviour. "Home delivery is considered a growing (energy) problem, and people should probably start asking themselves the question, “Do I really need it to be delivered tomorrow and right to my door, or can it be picked up from a central location a few days later?” "It almost goes full circle where we used to hand over and pick up packages. We can't deliver everything - we'll create less carbon by clicking and gathering. Free delivery really doesn't exist, and the worst delivery is a failed "nobody at home, tuned to stock" delivery. (energysavingtrust.org.uk, 2020)

Conclusion

Like any energy model or model of efficient operation in certain areas of business, estimates based on studies may vary depending on the assumptions used. An important factor is the amount of space needed to store drones in the case of delivery services and the amount of energy that drones consume, as well as the carbon footprint of the electricity used, depending on the city where the innovation is being implemented. On the other hand, in the field of agriculture, the number of drones and take-offs themselves is minimal and the results are maximum compared to delivery. At this point, therefore, the question remains which segments are an effective area for the implementation of such an innovation and especially which need it.

When more companies start using drones, parcel delivery will be one of their tasks. To maximize potential environmental benefits, companies should focus on using smaller drones charged with low-carbon electricity to deliver light packages and to limit how much storage space is reserved for drone delivery. Heavier packages are probably best suited for efficient, often electric, land vans. The biggest gains will come from improved energy efficiency of warehouses and a significant reduction in the amount of electricity produced from carbon-intensive fuels. In any case, the noise generated by drones and how this will affect humans has still not been resolved. (smithsonianmag.com, 2018)

None of the analysed studies has directly confirmed that UAV technologies are a significant shift in the efficiency of operations in the business environment. This is a very highly dependent parameter with respect to the segment in which it will be used. The result of innovation depends on the cost of implementation, but also on the impacts that this innovation will have. In the case of the implementation of drones, it is necessary to think about the environmental environment. If the drone is to make work more efficient, but on the other hand to increase the carbon footprint is inefficient. For its sustainable operation, it is necessary to use alternative energy - such as nuclear energy, hydropower, solar energy, etc. If it draws energy from fossil fuels, then in large quantities this innovation is more of a step backwards. However, it is important to note that it all depends on the use segment and the result of this innovation.

The article provides a basic overview of the issue through practical examples of the use of this platform in individual business segments. Secondary data from the processed studies point to the energy intensity of this technology, but due to the statistical procedure in the calculations, it is not possible to determine the general effectiveness of UAVs as a substitute for specific and available solutions. From our point of view, the UAV platform represents a technological innovation, the implementation of which into the business environment must be developed custom. It requires a feasibility study based on accurate statistical comparisons of the results before and after the planned implementation of the innovation. However, the UAV is definitely the future in data collection in the field of agriculture and mapping analytics needed to support decision-making in business management.

Acknowledgements

This publication was realized with support of the Operational Programme Integrated Infrastructure in frame of the project: Intelligent systems for UAV real-time operation and data processing, code ITMS2014+: 313011V422 and co-financed by the Europen Regional Development Found.

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