# UAV TECHNOLOGY TO SUPPORT MANAGEMENT DECISION-MAKING IN THE INDUSTRY

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**Purpose:** The aim of this article is to define and approach the concept of UAV and its use in industry and decision support in business.

**Design/methodology/approach:** The methodology of the article consisted of comprehensive analysis of the theoretical concept of UAV technology within the case study framework.

**Findings:** Result of this analysis provides an evaluation of the state for implementation as support for decision-making and management of companies that will use this trend in the future.

**Practical implications:** With the progress of science and technology, the individual components of this technology have gradually evolved and become more and more accessible. UAV technology represents great potential in the production processes of factories or smaller factories.

**Social implications:** UAV (Unnamed Aerial Vehicles) technology has been evolving for decades. However, its civilian use and industrial use have only come in recent years. UAV technology represents great potential in manufacturing processes, support other technological trends, such as IoT, 5G, AI, Factory 4.0.

**Originality/value:** The presented paper provide not only practical but also theoretical conclusion to management of production processes of factories or smaller factories.

**Keywords:** management, decision making, UAV technology.

**Category of the paper:** Research paper. Case study.

## 1. Introduction

UAV technology can help a large number of businesses. With the gradual advancement of science and technology, it is slowly reaching every sector. The possibilities of using UAV devices are expanding every day. It is thanks to this expansion that there is room for further use. This chapter focuses on the current possibilities of using UAV technology.

The mentioned technology offers many possibilities for use in several spheres. Drones currently have the greatest use for military purposes. However, in addition to military purposes, UAV technology has potential in personal life, humanitarian aid, rescue services, businesses and much more. Until recently, companies used drones mainly for video production and photography, especially for marketing purposes, but there are many other possibilities of UAV technology that represent potential for companies in almost every industry. From agriculture to Internet access, drones are a multi-purpose tool that offers the potential to transform some of the most important ways in which humankind works (CALU, 2021).

As already mentioned, UAV technology has a wide range of uses. Thanks to its capabilities, it is used in many industries. In addition to the military, drones are often associated with other industries.

Farmers use drones to collect data on their crops and then use them to improve their yields. UAV technology is widely used in the agricultural industry. In 2018, more than 30% of farms used UAV technology. However, this percentage increases every year. This testifies to the usefulness and possibilities of this technology. Drones in agriculture save costs by being able to identify failing plants in time and carry out crop inventories. Thanks to the mapping and analysis of agricultural land, it is possible to choose the right places for planting new plants. UAV technologies are relatively widespread in agriculture and the possibilities of their use are constantly expanding (Radoglou et al., 2020).

Environmental protection is one of the sectors in which UAV technologies are widely used. One of the main ways drones help protect is by providing detailed vegetation maps that help monitor forest work and map water to better understand how water moves in the area. Drones have also been invented to shoot seeds out of the air, which could aid in reforestation at carved sites (Dronegenuity, 2021).

Mining companies use drones to obtain data on mining activities in real time. Thanks to surface surveys, it is possible to plan and optimize explosion designs in the initial stages of mining. Thanks to drones, maps of mines and tunnels are also created during subsurface mining. These maps lead to increased security and can also help companies find ore that would not otherwise be found (Wingtra, 2021).

In oil and gas extraction, UAV technologies are mainly involved in security operations. In this type of mining, drones help increase workplace safety by providing inspectors with a tool to gather high-quality visual data inside assets that are critical to the oil refining process, such as FCC tanks and units. and risers (Force Technology, 2021).

Drones are used in the chemical industry to improve internal inspections by replacing inspectors in the collection of visual data. These are data that are collected mainly in large objects used in chemical processes (Flyability, 2021).

As part of electricity generation, UAVs help with workplace safety and process control. This control is dangerous for employees and for that reason it is appropriate to use UAV technology. In power generation, drones also help inspectors reach areas that would otherwise be difficult to access. Drones can also help nuclear power plants by replacing inspectors in collecting visual data on key assets such as reactors. As a result, inspectors do not have to risk their health during routine inspections (Flyability, 2021).

Construction companies and architects use UAV technologies to increase the efficiency and safety of individual construction processes. Mapping and surveying work on construction sites can be quite time consuming if you need to do this work manually. Drones help accelerate these efforts and allow construction companies to provide real-time progress maps and surveys that can help them plan projects as well as improve ongoing projects, leading to significant savings (Ayemba, 2021).

Logistics is one of the most well-known industries in which UAV technologies are used. Drone delivery to the consumer does not yet have to multiply anywhere in the world, but it is a great benefit for commercial drones. The best-known company that actively uses UAV technologies to deliver goods to consumers is Amazon. In 2019, Amazon began testing its Prime Air service. It is a delivery service where a fleet of drones delivers goods to consumers. Several companies focused on the sale and transport of goods have begun to respond to this trend. Wing and UPS have obtained approval from Amazon. However, their logistics solutions are only in preparation and testing. However, Prime Air currently only runs in certain locations. The disadvantage of delivery via drones is mainly short range. Larger parcels also fail to transport these drones efficiently, and for this reason this form of goods transport is still very limited (Song et al., 2018; Hasanalian, Abdelkefi, 2017).

Online food ordering and delivery allow fast casual restaurants to reduce their physical location and reduce real estate costs, but delivery costs still reduce profits. Some restaurants try to use drones for faster and cheaper delivery. Domino entered into a partnership with the Flirtey startup in November 2016 to make the first commercial delivery of pizza using drones (TNW, 2021).

The use of drones in warehouses has been increasing in recent years. Large warehouses focus on increasing efficiency by investing in automation and robotics. However, it is not easy, as the cost of warehousing operations represents 30% of the total logistics cost. Furthermore, it is difficult to obtain a skilled workforce, the growing demand for customer service and the

growth of e-commerce have intensified the need to increase the efficiency of warehousing operations (Falco et al., 2019).

Indoor drones help inspectors enter the city's sewer systems to collect visual data. This data can be used to identify the source of the problem or to evaluate the condition of the infrastructure as part of the regular maintenance process (Flyability, 2021).

Drones have also been used in recent years by law enforcement agencies, fire brigades and search and rescue services. Police use drones to help them better understand the situation and map densely populated areas, firefighters use drones to collect thermal data to determine where they should focus their efforts, and search and rescue workers use thermal and visual data from drones to find people. missing in the wild (Silvagni et al., 2016).

For years, high-end drones have been used to take aerial photographs for films instead of helicopters, which are more expensive and cumbersome to work with.

Insurance companies always deal with damage, especially after big storms. Drones help insurance companies deal with roof damage complaints much faster by allowing setters to collect visual data from the sky instead of climbing ladders. Insurance companies also use drones to reconstruct accidents, on the basis of which it is possible to simulate how a car accident occurred so that the validity of car-related insurance claims can be verified (Flyability, 2021).

However, UAV technologies are gradually entering every industry. (Filipowicz, 2021; Gumińska, Kłos, 2020; Zawierucha, 2020) The scope of drones in these sectors will expand more and more. There will be more sectors that will use these technologies. Of course, the industries listed above are not all where UAV technologies are actively used. However, these are the sectors where these technologies are most commonly used and known for. At present, new uses for UAVs are increasing every day, which is why it is difficult to monitor their overall development across all sectors (Mahmoud, 2021).

Drones open up new opportunities and increase efficiency in industries. They have proven to be incredibly powerful and versatile industrial tools capable of completing a wide range of applications. Industry professionals are increasingly using drones to improve and optimize industrial processes, as well as to increase operational efficiency. Drones can be used during various phases of the company's life cycle. With almost unlimited visibility, data collection and analysis capabilities, automated drones are valuable to several industries. Drones are uniquely qualified to capture aeronautical data for consistent use in large industrial facilities, enabling fast and seamless data collection to support informed business decision-making processes.

UAV technological trend is currently gradually developing into new industries. The aim of the work was to define and approach the concept of UAV and its use in industry and decision support in the company from several perspectives based on the analysis of the current environment, the current state and a case study.

The purpose of this article is to make a comprehensive analysis of the theoretical concept of UAV technology within the framework of an orientational analysis of resources and a selected case study. Subsequently, as a result of this analysis, it provides an evaluation of the state for implementation as support for decision-making and management of companies that will use this trend in the future.

The article consists of a theoretical part of a comparison of the current findings of the authors from the subject area of research. subsequently, we will focus on explaining the methodology in which we clarify the approaches to the method of data processing mentioned in the text. after these introductory sections, we discuss specific issues within the framework of the scan results. these results consist of two parts: in the first, we deal with a case study in the selected area, and in the second, we connect the results with the decisions of managers in managing these changes in companies. This is followed by a discussion in which we address the potential of UAV technology for businesses, as well as the benefits of implementing it in a business. The last part of the article is the conclusion, in which we formulate the main result of our text, the limitations of the investigated issue and a view of future research in the given area.

## 2. Methodology

However, the main source of information was scientific databases, providers and users of UAV technologies. Processing information helps to better understand the discussed issue. Methods used to work with information were used for data collection and processing.

Methods used to work with information were used for data collection and processing. The methods used include: Analysis - this method was used in the processing of relevant articles and other resources in order to better understand the issues discussed. these articles were selected based on keywords: UAV technology, UAV, UAV Options, Use of UAV in the company. Synthesis - this method was used to combine relevant information from different relevant sources such as articles, research paper, case studies, reports from organizations and technical reports. Comparison - by comparing information from several sources, it was possible to better understand the issue and select the most relevant information. This was contained in the results of the examination of the theory and the practical part in the result section. Implementation and design - this method was used especially when looking at the technological trend in the future and at the same time in formulating ideas in the discussion and conclusion part of this work.

# 3. Results

This chapter focuses on a case study that was created based on real use cases of UAV technology in the industry. The case study was selected for a better understanding of the issues discussed. The real use of UAV technologies has been going on in companies for several years. The real results of the implementation of this issue may affect its subsequent development, as it is a relatively new technological trend in companies. The case study was selected to better understand how UAVs work.

## 3.1. Autonomous drons intended for the construction sector

The first case study deals with Sundt, which, thanks to Skydio's UAV technology, has been able to streamline its production and control processes, making the company more successful and suitable for government contracts. The case study dates from 2021, from author Delephine (2021).

Sundt, one of the largest construction companies in the Southwest, specializes in a number of construction projects, including transportation, commercial buildings, industry and renewable energy. Drones began to be used in 2013, when a project manager brought a personal drone to the construction site to help with a project that had difficulty documenting construction progress. Using images and videos taken by a drone, he demonstrated progress on the web to his clients, which improved work performance and customer satisfaction. Despite the advantages that this drone proved, there was still great skepticism in the company, and it was not until 2018 that the use of drones began to increase in Sundta.

Reducing the time between the first use case and the scaled uptake of drones is a common challenge for most drone programs, which is often due to the perception of drones as toys and the long time it takes for pilots to be trained. Sundt pointed out that once drones are in place and in operation, almost every stage of the process can benefit from the use of drones, from business development and research to project management and documentation.

But even as companies begin to perceive the value of implementing drones in industries such as construction, they still need to be fought. Most drones need an operator to fly. Safe piloting of a drone requires skill, especially when the user is flying around a construction site with an ever-changing landscape of moving machinery. In order for pilots to have the skills needed to maneuver safely on site, it is necessary to undergo a large amount of training, which takes time. This is one of the many reasons why companies like Skydio consider autonomous flights to be the only way for truly scalable operations. Companies like Sundt are already aware of how Skydio is improving its workflows and enabling it to significantly expand its operations.

One of the initial benefits of using Skydio drones in commercial applications is the speed with which pilots start up. This reduces the time required to run drone programs. Sundt was able to significantly reduce the time needed to train its pilots. Training new pilots on the Skydio

drone has reduced training time by almost half. By halving this time, businesses can implement drones and expect the results to be delivered much sooner.

Delaying flight approval is costly. It takes the pilot time and resources and slows down any production dependent on this data. Even when the drone is ready to fly, the setup time for most manual drones used in construction is 5 to 10 minutes, while Sundt can prepare UAVs with Skydio in 30 seconds to a minute. Thanks to the fast setup time, the Skydio drone is a tool that can be deployed immediately.

Most drones usually require a lot of preparation and calibration, Sundt said. When the time is crucial, whether it is on the construction site or bad weather needs to be predicted, these minutes are absolutely crucial. The workplace is constantly flowing and changing, the ability to capture the moment is essential. The confidence that operators can fly and capture data instantly changes how and when drones can be deployed on a construction site, increasing their value and opening up new use cases.

In addition to these time savings, Skydio AI and computer vision have also made a significant difference in where Sundt can fly. Most drones rely on GPS and magnetometers for navigation. There are often materials on construction sites that interfere with these navigation systems. Because Skydio navigation is based on artificial intelligence and computer vision, it can fly close to objects that would not normally be accessible by manual drones, which rely on GPS navigation and magnetometers. Powerful computer vision and artificial intelligence also allow Skydio drones to get closer than anyone who flies manually would feel comfortable.

The first thing Skydio had to do was overcome our dependence on GPS and magnetometers. To achieve this, they had to come up with a sophisticated vision system. Skydio operates 12 deep networks at the same time, which require a powerful chip. Therefore, it uses NVIDIA Tegra TX2, which is much more powerful than chips used by other drones on the market. This allows the drone to process large amounts of data. From hardware to software, the base is autonomous and allows you to fly in ways that operators would not otherwise be able to do. For example, Skydio can avoid obstacles that are not even visible in the camera record because it is programmed to make rational conclusions about space.

Thanks to Skydi, Sundt has been awarded a contract to work with high-pressure and high-temperature systems. The ability to fly safely in harsh spaces can save workers' lives. With Skydio, Sundt can get to some very tight, claustrophobic and dangerous areas where it is dangerous to send people. Sundt inspects high-pressure and high-temperature systems. If a company uses drones for these inspections, it does not risk injury or death to its employees. Thanks to human inspections, the construction industry has been able to reduce the accident rate over the years, but mortality has remained the same. When something explodes in these environments, workers often do not survive. Because Skydio can fly to these areas, which would not be possible with other drones, and capture important data, this mortality can be effectively reduced. The drone costs about $ 1000, but human life is priceless.

The AI built into the Skydio drone is unmatched by any other drone that SundT has considered. A drone is basically a flying computer. Thanks to the ability to zoom in at a short distance, it has better accuracy, which allows you to create better 3D maps. Because Skydio has partnered with DroneDeploy, the processing times for ortho-mosaic maps or 3D models are shorter than any other drone on the market. This helps speed up the process from drone flying to providing information to the project team, which is appreciated by many Sundt project managers.

Because Skydio is made in America, it allowed Sundt to pursue well-paying government projects that would otherwise be rejected due to Chinese-made drones, such as the DJI. This was a key factor that led Sundt to take advantage of Skydio's technology. Sundt is working on federal work and federal projects, but the United States Department has determined that Chinese-made drones are no longer an option for government procurement. If the company had a Chinese-made drone in its fleet, it would not get the contract. Sundt also pointed out that the support of domestic suppliers had a significant impact on their business operations. Being in the same time zone allowed them to resolve issues faster than foreign customer support and come up with more timely solutions.

Skydio drones have greatly streamlined the operation of Sundt's drones, saving them time and money, while opening up additional revenue opportunities. This talks about how much Skydio is set to change the paradigm in the construction industry. In addition to construction, Skydio's drone capabilities are promising for many industries looking to expand their drone programs. By capturing important and high-quality data in demanding environments and enabling faster drone departures, Skydio is set up to disrupt multiple industries in many ways. (Delepine, 2021)

### 3.2.   Use of UAV to support business decision-making

Decision-making is one of the basic processes of a company and is one of the most important components. Therefore, in order for a company to be successful, it is necessary for the company to operate as efficiently as possible. This chapter focuses on how the UAV technology trend supports business decision-making.

UAV technology represents great potential for companies. This potential can also be used to support decision-making in the company. Thanks to real-time data acquisition and processing, companies have the opportunity to streamline decision-making processes, which has a positive impact on the company's results.

Every industry-focused company faces challenging situations where data acquisition may not be easy. Thanks to UAV technologies, this issue may be a thing of the past. After choosing an efficient technological solution, data collection can be accelerated and streamlined. Drone solutions offer ideal temporal and spatial bridging, so that data reaches decision-makers in near real time. However, UAV technology can pre-process individual data, saving time and costs for

in-house data processing. The processed data then form information that is essential for decision-making in the company (Niles, 2019).

However, UAV technology not only simplifies data collection and processing, but also helps to disseminate it effectively. The platform used by drones has the ability to share data between all stakeholders. This prevents misinformation or low awareness in the company. Thanks to the sharing of this data, all employees can be informed about the current state and other procedures, which significantly increases the efficiency of the company (Equinox's Drones, 2021).

In conjunction with other technological trends, UAV technology also helps with the simulation of models that are the result of decision-making processes. Thanks to sensor data, drones can create a digital version, or even a digital twin, which can then be used to simulate new processes. Creating simulations not only simplifies business processes and saves money, but also helps to anticipate unexpected risks that may arise (Swami, 2020; Pollak et al., 2019; Blaskova et al., 2022).

UAV technology bridges reality with management and decision-making processes anywhere, and provides valuable insights that prevent time and costs from being exceeded at every stage of a company's asset lifecycle. Drone-based solutions are critical to business planning, building and maintaining critical economic assets, such as large-scale transportation infrastructure, mines, clean energy, farms and more. They also help streamline the planning process for these digital twin sectors, reduce overhead management costs during construction through near-real-time monitoring, and extend asset life cycles through preventive maintenance (Jankal, 2014; Ferenc et al., 2017).

## 4. Discussion: potential of the technological trend UAV

As mentioned in the previous chapter, the advantages of UAV technology outweigh its disadvantages. However, it is important that the technological solution is implemented correctly and used as efficiently as possible to achieve the full potential of the technology. This begs the question, what is the potential of the UAV's technological trend?

In general, it can be argued that the potential of this technology depends on the industry in which the technology is implemented. For example, for farmers, this technology has a different potential than for rescue services. The main benefits discussed in the previous chapter represent the potential for businesses. However, the potential of this technology can be formulated and introduced much more generally, taking into account all sectors and businesses,

Thanks to the possibility of connecting drones with any compatible sensors, it brings great potential in data collection. Being able to collect data that was previously difficult or inaccessible can give a business a new perspective that can determine a company's future

development (Swami, 2020). In addition, the versatility of drones allows companies to develop products and services that would once seem impossible. For example, the British company Animal Dynamics has developed a miniature "dragonfly drone" weighing less than 50 g. This small drone is capable of operating in strong winds, which is useful for tracking in remote locations and complex search and rescue missions (Cohn et al., 2021).

Drones have considerable potential to affect marketing function. Current use ranges from small-scale applications in which drones carry advertising banners at public events, through potentially extensive use to provide basic customer service, to the collection of large amounts of information (Flyability, 2021).

UAV technologies change business models by providing alternatives to traditional processes or channel partners. For example, the delivery of consignments via drones is gaining attention, which makes it possible for drones to become an agent and contact point for the customer. This may be especially true for consumers living in hard-to-reach areas, as drones do not have to travel using traditional infrastructure. Drones therefore allow merchants to reach or communicate with customer segments that were previously unreachable. Drones are also integrated into warehousing operations and retail settings. Walmart, for example, has filed a patent for the use of drones to move products between departments. Using drones in this way affects operating costs and benefits customers (Song et al., 2018).

One of the most direct ways drones affect business models is the provision of products and services. For example, Uber is working on the development of human-carrying drones, and the personal drones of the Chinese company EHang are already being tested. These new offers could fundamentally change mobility, including prices, transport structures and standards (Ehang, 2021).

As a distributed technology that can be quickly and flexibly reconfigured and increasingly repaired, it is likely that drones can enhance resilience or the ability to maintain functions and structures. Given today's societal challenges, research is particularly needed to shed light on how drones affect the resilience of business models. For example, drones have the potential as a safe and resilient way to deliver products during the COVID-19 pandemic (Dronegenuity, 2021).

As urbanization continues, cities need to adapt to larger populations and chronic congestion. Urban planning is becoming increasingly important for cities, but it requires a thorough understanding of metropolitan rhythms and flows. Using drones, urban planners are able to better understand their environment and implement data-based enhancements (Mahmoud, 2021).

However, there is great potential for linking UAV technologies with other technological trends. At present, UAV technologies can already cooperate with digital twin technology. This collaboration is based on the fact that a digital twin is created using data from UAV technology sensors, which is used to create simulations. However, the greatest potential is the connection of UAV technologies with the technological trend of the Internet of Things.

Although these technologies overlap in many ways, they are not identical. However, the interconnection of these technologies could yield autonomous drones that would be able to solve problems without operators. The integration of UAVs with IoT networks is a new direction for research and industry. The IoT concept allows things to be connected anywhere and at any time via any network in order to provide any service. This characteristic of IoT allows UAVs to become an integral part of the IoT infrastructure. In UAV-based IoT (UIoT), UAVs can be used for various purposes, such as UAV trajectory planning, IoT ground data collection, data sampling and reconstruction, energy efficient device search. The use of drones can improve various aspects of smart cities, such as data collection, privacy and security, public safety, disaster management, energy consumption and quality of life. In UIoT, UAVs generally collect data from terrestrial sensors and devices through peer-to-peer connections. Therefore, there is no need to transfer data to neighboring nodes, which can reduce power consumption (Lagkas et al., 2018).

The key challenge for 5G and over 5G (B5G) is to ensure ubiquitous connectivity to different types of devices. Unmanned aerial vehicles (UAVs) are expected to be an important part of the upcoming wireless networks, which can potentially facilitate wireless broadcasting and support high-speed transmissions (Comsoc, 2021).

The potential of this technology is really huge. Businesses are provided with benefits that help consolidate their place in the market. The disadvantages that come with this technology hardly jeopardize its potential. The possibilities of use in companies are really large and they are constantly increasing. With the advancement of science and technology, this potential will continue to expand. Whether the companies currently have the maximum potential of UAV technology is questionable, but the use of this technology gives companies a huge competitive advantage, which is crucial for the future direction. The connection of this technology with other technological trends brings a huge potential for further digitization. Such connections lead to the perfect concept of smart city, or even factory 4.0.

## 4.1.  Benefits of implementation in the company

The wide possibilities of modern drones, which are created by connecting devices with new sensors, offer companies advantages. These benefits are crucial for many businesses. Gradual implementation in several competing companies will force other companies to use this technology to maintain their position in the market. One of the factors that determines a company's position in the market is its efficiency. In this case, the efficiency of the company can be increased through the following benefits resulting from the implementation of UAV technology in the company.

The use of drones has great advantages. Drones can enable retailers and other businesses to deliver products and services faster than ever before. Drones offer a more efficient and environmentally friendly way of making small one-off deliveries compared to traditional

delivery vehicles. They can also reduce the amount of manpower and special equipment needed (Mahmoud, 2021).

UAVs are used in many cases due to their advances in security. With their remote control capabilities, drones monitor positions, inform about possible dangers and draw attention to threatening conditions such as oil and gas refineries, pipelines, light sources, etc. Not only that, drone technology is used in the military even during high-risk periods. Their features allow them to obtain real-time data to create and maintain a secure environment. The advantage of greater security can be used in every sector, whether it is agriculture or military purposes.

As the usability of drones increases, so do their prices. UAVs are no longer just for the military, the legal authorities or the elite. As UAVs take over several manpower, vehicles and operating activities in commercial use, many costs remain.

Thanks to their high-resolution cameras equipped with state-of-the-art sensors, UAVs can capture aerial images, aerial videos and collect large amounts of accurate data. The obtained data are transformed into detailed 3D maps and 3D models for complete analysis. 3D mapping is especially important for detecting cracks, damage or other dangerous elements in disaster-stricken areas. Drones, which are paired with high-definition images or 4K video, are known for streaming major events such as entertainment, personal, political, and global affairs. However, high-quality aerial images and 3D models represent a great advantage for every industry (Equinox's Drones, 2021).

UAVs use GPS in their software, so they can be programmed and precisely guided to specific locations. For example, in precision agriculture, drone is used to perform many agricultural duties, such as pesticide spraying, weed identification, crop health monitoring, crop damage, crop evaluation, field soil analysis, irrigation monitoring, etc. This feature of accuracy using GPS saves farmers time and money. However, it is an advantage for all industries, as it is the accuracy of the equipment that increases the efficiency of the company (Mahmoud, 2021).

Thanks to UAVs, obtaining efficient data from hard-to-reach places is a huge advantage for all professional companies in the industry. It is the most suitable alternative to overcome the limitations of traditional methods concerning the safety of workers, especially in hazardous situations, such as radiation monitoring, control of high-voltage lines. Drones also provide more cost-effective access to inspections of these sites (Lagkas et al., 2018, Beninger, Robson, 2020).

Because drones have different technical parameters, several of them can provide controls at high or low altitudes. The versatility of these features allows companies to easily customize the tools for their projects. Drones are suitable for both routine and emergency scenarios, the construction industry respects these advantages, especially developers of buildings for roof inspections. Drones can perform various tasks, such as taking high-quality photos, videos, thermal images, and so on. These data are then immediately transmitted and processed, in contrast to the time-consuming conventional method.

Multiple drone data collection options could inspire widespread changes in data collection strategies, especially if these changes lead to cost savings, increased security and improved analysis. Savings need to be made, for example, in inventory analysis, thermal imaging of pipelines and railways, three-dimensional claims modeling and building imaging. For many companies, drones could offer potential either by optimizing current processes or by offering new growth opportunities. For many companies, drones are fast becoming another part to consider when developing digitization strategies. Thanks to cloud services and Big Data technology, drone data collection capabilities have the potential to radically change the competitive dynamics of the information environment (Thibau, Aode, 2016; Equinox's Drones, 2021).

## 5. Conclusion

The technological trend of UAVs has been evolving for decades, but its use in industries has only been possible in recent years. This use is the result of lower technology prices and the expansion of opportunities offered by this trend. UAV technologies provide a really wide range of uses. Based on the analysis of this technological trend, it can be seen that this technology has a really great potential. The future direction of UAV technology also brings a number of opportunities for businesses. The advantages of this trend far outweigh its disadvantages. This is also evidenced by the industries in which these technologies are used. With the gradual development of science and technology, drones can be expected to reach all sectors and replace workers who are exposed to danger in their work. Among the industries in which this technology is currently lacking, it is possible to include especially manufacturing companies. Whether in factories or smaller factories, UAV technology represents great potential in manufacturing processes. UAV technologies support other technological trends, such as IoT, 5G, AI, Factory 4.0 and the like. Although these technologies are currently incompatible, a revolution in science and technology can be expected once they are interconnected.

The implementation of each new technology comes with certain limitations. Despite the really wide range of advantages, it is important to consider the limitations that can have a negative impact on the company. UAVs can quickly fall into manipulation and invade the privacy of a group or individual. Although many wish to use drones to maintain security, this could undermine numerous individual freedoms on behalf of public security. Other limitations include the following.

Security is an essential element that needs to be prioritized when operating drone technology. UAVs equipped with high-quality sensors detect possible collisions and safely bypass them, which is an important feature. These drone capacities must be similar to those of manned aircraft navigators. It is commendable to hire professional drone service providers who

can operate an aircraft drone without crashing it. Drones operated in densely populated areas have an increased risk of impact or damage to the ground, mainly due to system failure or hacking (Mahmoud, 2021).

One of the major limitations of the growth of drone technology is its vulnerability. Hackers can quickly attack the drone's central control system and become its operator. The primary control system contains important data. Hackers may obtain private information, damage or disclose data to unauthorized third parties (CALU, 2021).

Unlike traditional aircraft, drones are more vulnerable to weather conditions. For example, if climatic conditions are unfavorable, the UAV will not maneuver appropriately or collect reliable data or images. However, there are drones that are more stable and successfully withstand gusts of wind, but their price is higher.

Drones are susceptible to attacks by wild animals and are sometimes dangerous to nature. It is possible that when a drone operator flies in a natural area with a significant number of wild animals, it collapses on a tree or conflicts with a vulnerable animal. Large birds such as eagles regularly attack drones operating in their area (Insurance business, 2019).

The biggest limitations that can result from the implementation of UAV technology in the company is the legislative restrictions. The use of unmanned aerial systems has expanded, but the law is still evolving as it is a new technology in the industry. The specific procedures established for small drones also apply to commercial and recreational uses, but are still unclear in several respects. Rules to regulate the movement of drones and protect property from unauthorized interference are still being prepared in several countries. Thus, UAV technology operates in many companies in the gray zone. There are many ambiguities between government regulations and state or city laws governing the management of airspace, which may cause drone operators to violate rules they are unaware of (Insurance business, 2019).

However, the individual limitations mentioned in this subchapter are not so fundamental as to outweigh the advantages of that technology. If the legislation and position of the company allow it, it is appropriate to use this technology. That is why companies are increasingly using these technologies. Many disadvantages of science and technology will then disappear. Of course, these are not all limitations, but they are the most important ones that should have the greatest impact on decisions about the implementation of UAV technology in the company.

Looking at the technological trend in the future. Give a business a new perspective that can determine a company's future development.

With the progress of science and technology, the individual components of the mentioned technology gradually developed and became more and more available.

In recent years, UAV technology has begun to expand into industries. It is therefore conceivable that this technology will spread to several industries in the future. With the progress of science and technology, new sensors will be created that will be compatible with UAV devices. It is thanks to this connection that the possibilities of UAV devices will expand considerably.

By expanding the portfolio of UAV technologies, drones will gradually become more and more familiar to companies. Over time, businesses in several industries will use UAV technologies.

However, businesses will need to determine whether they will operate their own drones or outsource them. Factors such as the investment horizon, the need for data security, and the desired speed of development will influence this choice. A business could opt for in-house drone operations and data analysis if they are concerned about ownership issues or security. In this case, the business is willing to invest significant funds up front and wants to take a "learn by doing" approach. For example, French rail operator SNCF uses an in-house drone program to increase safety and maintenance through network surveillance.

## Acknowledgements

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