TRANSPORT & *LOGISTICS:*
the International Journal

Article history:
Received 02 February 2019
Accepted 17 June 2019
Available online 19 June 2019

ISSN 2406-1069

Article citation info: Akdemir, A., Karakus, G., Polat, L., A research on the benefits of drone usage in industry by determining companies using drone in the world. Transport & Logistics: the International Journal, 2019; Volume 19, Issue 46, June 2019, ISSN 2406-1069

A RESEARCH ON THE BENEFITS OF DRONE USAGE IN INDUSTRY BY DETERMINING COMPANIES USING DRONE IN THE WORLD[1]

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Abstract:
Aviation that has been arisen in accordance with flying request that is existing inside of people, has not only made life easier by making a great contribution to humanity, it has also accelerated globalization by reducing distances between countries. It is seen that the growth rate of aviation industry has reached the undreamed level when it is looked back on. Today, the last point in aviation is unmanned aerial vehicles that are self-ventilating and move in desired coordinates without any on-board pilot. For those vehicles, there are two different control systems are developed. In the first type of control, an unmanned aerial vehicle (UAV) moves according to instructions of a remote control. UAV that moves with a remote control is named as drone, it can be used personally. In the second one, there is a flight plan that is programmed and placed inside of UAV before flight. Recently, drones have started to be used in unimagined areas and utilize specific, important benefits for any industry. Within this framework, it is aimed that to determine the usage areas of drones in enterprises. In the scope of the study, literature review was carried out and application examples were researched. The companies using drone were identified and their purpose on using drone and the contribution of this use to the company were examined. In this study, drone users and drone usage purposes were mentioned in the world, and pre-drone and post-drone situation comparisons were discussed[1].

Key words:
Aviation, Drone, Drone in Business, Unmanned Aerial Vehicle

[1] This study was presented as a summary in "National Congress of Transport and Logistics - 2017 Istanbul" and published in the book of abstracts.

INTRODUCTION

Technology, which plays an important role in social development and is an indispensable factor in each aspect of life, has played an important role in the emergence of the concept of globalization [1]. It has also become an important area for countries to show themselves in the world arena and to provide an effective precedence among other countries. In the technology which is followed by all around the world and shaped according to the conditions of each day, the current point is Unmanned Air Vehicle (UAV) concept which is derived from the unity of many mathematical sciences [2]. When it comes to the concept of UAV, firstly, it is said to have been introduced by Pythagoras. Pythagoras also has the idea of an autonomous mechanism [3]. Essentially, it is accepted that the idea of UAV encountered today emerged as a flying torpedo during the First World War in the early 19th century [4]. Immediately after the emergence of the idea, the advancement of technology and the fact that countries have made numerous leaps in this area have played an important role in the acceleration of the concept of UAV and a global concept.

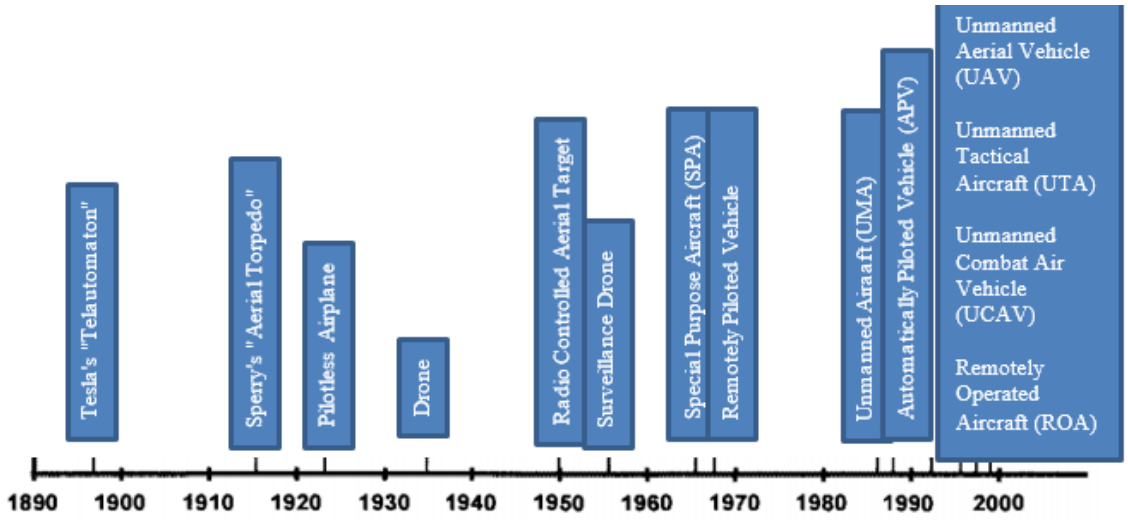

Fig 1 *Chronology of Names Applied to Robotic Aircraft.*
Source: [34]

American Institute of Aeronautics and Astronautics generally defines unmanned aerial vehicles as vehicles that do not carry a flight controlling pilot, with a built-in autonomous flight system built into it, or vehicles that work with an electronic signal supplied by a remote controller. According to this definition, unmanned aerial vehicles are examined in two different groups in terms of their control systems [5]. A previously planned movement plan is placed in the drones moving with a built-in autonomous system and the vehicle moves in the indicated directions. Apart from the linear rules in designing this control system, it is a very difficult control design, since there are many other rules that are needed to be implemented reliably [5]. Unmanned aerial vehicles with built-in autonomous command system are mostly used in military [6]. This usage in the military has brought a new dimension to the defense and attack strategies of the countries. In Figure 2, UAV whose type is named as *MQ-1B Predatory UAV* with built-in flight plan is shown.

The second control mechanism for unmanned aerial vehicles is the system that operates according to the commands of a computer or a remote. Vehicles with this system are called drones [7]. Drones are used in different areas, institutions and organizations for

different purposes, also when certain conditions are met can also be used individually. This type of UAV is shown in Figure 3.

In this study, it is aimed to give information about unmanned aerial vehicle called drone and to contribute to the effects of delivery for logistics enterprises. The aim of our study is to show the different usage areas of drones and to expand the horizons of enterprises to use new technologies and to enable them to keep up with the technology age.

Fig. 2 *UAV with built-in flight plan (MQ-1B Predatory UAV)*
Source: [35]

Fig. 3 *Flying UAV with remote controller*
Source: [36]

1 METHOD

The aim of this study is to determine the usage areas of drones in enterprises. The literature review was carried out within the scope of the study and the studies that are related to this topic carried out in the academic literature were examined. After this stage, drone application samples were investigated. Companies using drones were identified and the purposes for which they used the drone and the contribution of this use to the company were examined.

2 DRONE USAGE AND ITS USAGE AREAS

Unmanned aerial vehicles that move in the direction of the signals received by a remote control or other controllers are taking their place in more and more areas today, since they can be used regardless of their age, gender, occupation and institution. People do not

have to design a drone for themselves, they can own a drone for a small amount of fee through stores or the internet [8].

Such an easy availability of drones can increase individual usage, however can have a negative effect about the moral structure of society when used as a hobby [9]. The countries have introduced the necessary laws and regulations so that these vehicles, which are used as hobby, do not disturb the peace of the community. For example, The National Transportation Safety Board of the United States stated that the drones, which were used personally, would be considered as aircraft and they would be subject to Federal Aviation Administration regulations and American Aviation Law [10]. This approach has had similar effects on other countries, and other countries have taken the necessary measures to prevent moral problems in society.

Drones such as unmanned aerial vehicles with a pre-programmed built-in autonomous system have been also manufactured for military purposes. But because of its functionality and ease of access, it has different application areas [11]. The first usage areas of drones are defense and attack areas which play an important role in bringing UAV technology to the current level. Although the usage in these areas has positive effects on drone technology, it has caused serious damage to global peace in the global sense [9]. However, on the other hand, drones in the application areas of the UAVs other than the mentioned defense industry have a great positive impact. These areas that where UAV technology provides convenience and are used actively are listed below [9, 12, 13].

- Videography / Photography,
- Agriculture,
- Marketing,
- Disaster Management
- City / State Affairs,
- Education,
- Insurance,
- Aviation,
- Meteorology,
- Tourism,
- Engineering,
- Public Service Organizations,
- Mining,
- Cartography,
- Construction.

As can be seen above, drones that take place in almost all the private and public institutions would benefit to humanity by using in many working areas in coming years.

3 DRONE USAGE IN TURKEY

With the advancement of technology, numerous successes in the aviation industry have accelerated globalization, and also in this way, aviation has been a focal center of the countries. In aviation, unmanned aerial vehicle trend seen as a final point has managed to dominate the entire world, Turkey is no longer behind this technology, either. The first UAV was introduced in Turkey in the early 90s thanks to the vehicles brought from abroad [14]. In the following years, many unmanned aerial vehicles have been built by our country's engineers, and it continues consistently.

As unmanned aerial vehicle in drone sector Turkey has adopted as a result of a rapid adaptation process. Due to the drone can be easily reached via the Internet, purchases have

increased from abroad. In this regard Turkey Statistics Institute stated that the drone imports in the first months of 2017, 7 million dollars [15]. Based on these figures, it is understood that drones are not only used for military and commercial purposes however also as a hobby in our country. Because of the interest of every sector from 7 to 70, domestic drones are made and UAV competitions are organized in various institutions.

The arrangements made for not disturbing the social peace of the drone used by individuals as a hobby, has received a legal status in Turkey in February 2016 (SHGM 2016). In accordance with this instruction, people who have drones with a maximum take-off weight of more than 500 grams have to register to the General Directorate of Civil Aviation and they have to obey the rules determined by the institution [16]. In this way, the use of drone has been taken under control and it is aimed to prevent the events that will disrupt the moral order.

4 DRONE USAGE IN INDUSTRY

The technology, which shows its effect in all areas of life, has fully proven its existence in the development of industry to ensure efficiency at maximum levels, and has established a direct interaction for the economic development of countries [17]. In order to survive in a changing competitive environment, today's enterprises must follow the innovations brought by technology and use it according to customer needs and expectations [18]. The drone, which is the last trend in the world of technology mentioned in this study, has brought a great innovation to the enterprises and has provided a lot of convenience especially for the businesses operating in different sectors. The drones are being used for different purposes mentioned in the first chapter in the business areas that are not similar to each other. In this study, especially the use of drone in the logistics area, which is one of the important actors of the supply chain, has been discussed and sample cases are examined.

Although logistics is defined as storage and transportation for the undamaged delivery of the product to the destination [19], it is much more than that. Logistics is the function that covers all storage and transportation processes from the raw material supply to the transportation of intermediate products to the transportation of the finished products from the distribution channel members to the end customer. Nowadays, increasing the importance of speed and cost factors in the scope of competitiveness has increased the importance given to logistics in parallel. Technological developments have played an important role in the development of logistics and the sector has come an important way with the development of new transportation methods. In the recent years, Drone has been had a part of the logistics sector. End of this, there is an argument whether that more fast, safer, more economical transportation with drones are possible or not.

5 LOGISTICS COMPANIES THAT USE DRONE AT THEIR DELIVERY

5.1 United Parcel Service (UPS)

The first small package delivery company, American Messenger Company, founded by American entrepreneur Jim Casey, expanded into the United Kingdom in 1919 and became the United Parcel Service [20]. Although UPS is renowned as a package delivery company, it is one of the leading companies in the world in private transportation and logistics services. UPS has taken this leadership trait both from the environment and by the needs of the modern age, and from shaping its corporate structure and processes with needs and technology-

oriented. UPS has taken the necessary measures within the scope of environmental impacts and has brought great benefits for the enterprise [21].

UPS has also followed developments in the field of technology, and it turned a hand to the use of drone technology in package delivery. First attempts were made in a rural area in the state of Florida in the United States. In the test application, the packages placed in the drones made by the Workhorse Group were brought to a certain point by the battery-powered electric truck, and truck stopped. The drone, which departed from the stationary truck and whose route was determined, took the burden attached to it to the designated target. The drone who made the delivery to the destination came back to the truck and completed the mission [22]. The drone used by the UPS Company can carry up to 4 kg when delivery operation. As a result of the tests, UPS, which provides package transportation services with the achievement of the desired targets, has succeeded in bringing a new dimension to the logistics service.

5.2 DHL

Founded in 1969 in the United States, the company was the first logistics company to carry out package transportation with an aircraft [23]. This logistics that made for the first time by airline accelerated the transportation of the package and greatly reduced the delays. The majority of DHL shares, which have made great progress since its establishment, are took by Deutsche Post in 1998, and it became a European-based logistics company. This package transportation company is one of the fastest logistics companies today due to its transportation by using its own aircraft [24].

DHL, which has succeeded in getting out of traditional logistics by adding airplanes to modes of transport, has further enhanced its company profile by incorporating drone that is one of the biggest inventions of technology. The drone named DHL Parcelcopter aims to carry medical supplies and equipment to areas that are difficult to reach [25]. This was achieved by using the drone delivery system that is shown in Figure 4 between two banks there a river flows between them in the city of Bonn, Germany, in 2013 [26]. DHL, which attaches great importance to the use of drone in logistics, has taken an important step in the sector by initiating the use of autonomous unmanned aerial vehicles by strengthening its technical infrastructure in 2016 [27].

Fig. 4 Drone used for logistics of DHL
Source: [38]

5.3 Amazon Prime Air

Amazon, developed by Jeff Bezos, a computer scientist in 1995, is the biggest e-commerce site of our day [28]. This company that integrates with the Internet technology offers its customers the opportunity to shop from their own computers and the storage and

stock service for the stores within its structure. Amazon is also responsible for the logistics activities of the products, because of the demands of the storage and distribution. Amazon's works are examined in academic literature and lectures as a case study. Amazon has successful steps in the logistics business. Finally, it did not fall behind the package delivery of drone and entered into the sector, it has established a subsidiary company called Amazon Prime Air [29].

The introduction of this company to drone technology was announced to the public in a speech made by Bezos in a program [30]. The first trial on this subject was successfully carried out in Cambridge, UK in December 2016 [31]. The packages to be moved were brought to the nearest distribution branch where they are placed into the drone and driven by a controller from within the company. This mentioned drone of Amazon Prime Air is shown in Figure 5. The drone, which delivered the package to the designated target, was directed back to the branch by the controller [31]. Amazon Prime Air that took courage by this experiment has aimed to improve itself in drone and to extend the use of drone in logistics within the company. The biggest obstacle in achieving the company's goal is the fact that the use of drone in business administration in the United States is not legally accepted. However, Amazon Prime Air negotiates with the necessary units and makes necessary efforts to make this situation legal [32].

Fig. 5 *Drone used for logistics of Amazon Prime Air*
Source: [37]

6 CONCLUSION

When ahead days where flying cars were not imagined, the companies that use the developing technologies prioritize are one step ahead of the competition. The logistics sector, which has increased the point of providing a significant advantage for the enterprises that will provide competitive advantage such as speed, cost, customer satisfaction and profitability, has to revise the processes in line with technological innovations. The innovative practices of the international logistics companies, which are at the point of understanding that logistics, are not just shipping, should be followed and applied by our country's enterprises.

In this research, it is observed that the usage of drone has made great promises for the future of the logistics companies and would provide various benefits to the company. It is foreseen that the biggest benefit is the speed in package transportation, however it will also provide cost advantage to enterprises. For example, UPS, one of the most important enterprises in the logistics sector, has indicated that they could prevent the loss of $ 50 million thanks to drone usage, after comparing their data with required software [33].

Another advantage of using drone is that it is easily accessible to customers in hard to reach areas. An important finding obtained from these researches carried out within the scope of this study is that in order to transport the logistics enterprises with the drone, the transported package must develop the necessary technical infrastructures to ensure the

security. Another important point is that in order to enable enterprises to operate on this issue, governments are required to make arrangements for drone, legalize their commercial use and open a new door to use technology in logistics.

It is seen that the usage areas of drones are becoming widespread and provide various advantages to the enterprises. It is inevitable that the prevalence will increase considerably with the elimination of the negativities (security, privacy, intervention in natural life) related to drones that provide important commercial benefits. In addition, it should be taken into consideration that it will provide important advantages for social development.

The usage of drones to deliver humanitarian aid in any difficult situations such as war, natural disasters and geographical transportation barriers is an indication of how important and vital this technology is. Japan, which advocates that technology should be for the benefit of the society, aims to use drones to improve community welfare rather than commercial purposes. For example, by using drone transportation to areas that cannot be reached in a natural disaster necessary information can be provided. In this way, experts and authorized people could get data and according to these data, they try to find solutions. Planned to reach all humanity, Society 5.0 advocates the ability to drone to meet the needs of people living in rural, remote areas.

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