

УДК 656.7.025

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Unmanned Aerial Vehicles in Transporting of Consumer Goods and Medicine

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According to experts from the World Bank, the development of drone technology and advanced control systems is one of the main drivers of logistics development. Drones are used not only for filming movies, news stories in hot spots and travel shows, in the work of archaeologists and geologists, in the field of agriculture, to find bombs, rescue people and repair bulky vehicles. Drones are an integral part of the future of the delivery industry.

The idea of using unmanned aerial vehicles (UAVs) to deliver cargo has been around for a long time and, despite certain administrative barriers, is finding favour with many corporations all over the world.

One of the first companies to test new pizza delivery technology by drone was Domino's Pizza, whose first launch took place in Australia.

In December 2016, Amazon, the largest online retailer, conducted its first test delivery using Amazon Prime Air. To date, it is the only company using drones so extensively in the delivery business.

In 2014, Alphabet Corporation's innovation arm announced its drone delivery project called Wings. Its goal was to develop an automated UAV and the infrastructure to use it not only for itself, but also for other companies. The project demonstrated several types of drones built with different aerodynamic designs. However, in 2016, it was reported that

the project was frozen, the main reason being administrative restrictions on the commercial transport of UAV cargoes.

DHL is one of the largest logistics companies in the world that has shown interest in using UAVs for deliveries. The company conducted its first tests using UAVs back in 2013, for which it received official permission from aviation authorities, and the flight area was closed to civil aviation.

The Dutch technical university TU Delft has launched a sophisticated project that aims to provide first aid to people in cardiac arrest. For instance, the drone can save a life with the help of a built-in defibrillator. It is also able to accelerate up to 100 km/h, which significantly increases the arrival time.

In 2016, the Californian company Zipline agreed with the government of the African state of Rwanda to deliver blood donations and medicines using UAVs. One logistics centre is capable of serving clinics within a 70-km radius. The project is operating quite productively and there are several broad plans to use it in Tanzania and the USA [1].

Also worth noting is Matternet, which first used UAVs in 2012 to deliver medical supplies to a refugee camp in Haiti. In 2016, the company participated in a project to deliver HIV/AIDS blood samples to populations in remote villages in the Republic of Malawi. Matternet is currently working with Mercedes-Benz to develop a new type of cargo van, the Vision Van, which can be described as an 'aircraft carrier'. This minibus is equipped with a cargo compartment and drones for cargo delivery. The fact that this is just a concept vehicle aside, its unlikely we'll see the Vision Van hit the road anytime soon.

Moreover, drones are used not only in cargo delivery, but also in warehousing logistics. A prime example is the L'Oreal Company, which uses drones to collect data on all the goods that are in their warehouse in a matter of hours.

It is worth highlighting the advantages and disadvantages of UAVs for cargo transportation.

So, the benefits include:

1. Cost savings. The co-founder of Kiva Systems, a drone development company, estimated the cost of delivering a load of no more than 2kg by drone "last mile": it is \$0.1. In comparison, ground delivery of a cargo of similar parameters ranges from \$2 to \$8. What follows from the savings is a big profit, even with a huge investment. Companies will reach out to each other, using UAV technology to respond to the demand created by fast delivery of goods.

2. Eliminating the "human factor". An example is the military, which has been using drones for a long time and on a regular basis. Therefore, the emergence of unmanned cargo aircraft is a reality. Such vehicles will not need expensive life support systems. Also, drones could be safer, given that most aircraft accidents are caused by 'human error'. Automation of production and logistics chains is the main purpose of drones.

3. Environmental friendliness. Electricity is the only resource necessary for drones to function, unlike vehicles, which are highly polluting. The US government has long lobbied for 'green manufacturing', encouraging this development by imposing high taxes on industrial waste. In contrast, the use of drones is completely environmentally friendly and can be toxic to humans.

4. Flexibility in the supply chain. The autonomy of drones allows for course corrections in case of necessity, force majeure or certain customer requirements due to the high speed of response to changes in order conditions.

The disadvantages of using UAVs include:

1. Privacy and security. UAVs are a major threat to the information security not only of citizens, but also of companies, as their flight altitude is quite high and in fact the law does not encourage the expansion or dissemination of one of the most efficient and environmentally friendly types of logistics process optimization and cost reduction.

2. Bills. There are a number of draft laws that strictly restrict the flight of drones in airspace. Registration of these vehicles at state level is also required, and this procedure is also necessary for drones owned by people who use them not only for commercial purposes, but also for entertainment. However, there is a limit to the technical characteristics of the vehicle that exempts it from the need for registration. Nevertheless, in most countries legislation is the main limitation when deploying logistics processes using drones.

3. Problems during traffic. So far, there are several examples of drones being unsafe for nature. For example, birds can get caught in the blades of drones, resulting in the death of a bird, as well as damage to the machine itself.

4. Risks. UAVs are subject to certain risks due to theft, shooting at them, etc. The main problem with this is that the drone's location can only be determined from its last position because of blind spots if a camera is used.

5. Collision with nature. Changes in weather conditions entail changes in the timing and speed of the drone's flight. It is necessary to predict the days of possible deliveries if the country's climate is variable [2].

In conclusion, the use of UAVs will develop not only in the transport of goods, but also in logistics in general. This technology will become one of the most in-demand in the near future due to its high delivery speed, long-term savings, automation of logistics processes and, what is more, will be more environmentally friendly.

References:

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2. Russian Drone [Electronic resource]. – Mode of access: <https://russiandrone.ru/> – Data of access: 09. 03. 2021.