

LAST MILE DELIVERY BY DRONES

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Transportation is one of the core foundations of global economies, consisting of a variety of individual networks and their interconnections that are designed to meet people's and goods' mobility needs. Transportation systems are made up of a large number of physical and organizational components and are characterized by a high level of inherent complexity that's why very often organization infrastructure and logistics of a city can't always keep up with increased consumer demand. One option of solution would be to use ecologic and effective drones for urban deliveries.

To start with, transportation of goods from distribution points to consumers in the cities is very widely developed and we cannot imagine our life without it. The issue of delivery of the last mile in the cities is a complex and tough, the search for its solution is complicated by the following factors. Inadequate infrastructure, entry limits, and pollution are the primary causes of problems for freight vehicles. As a result, freight trucks interrupt traffic and cause even more confusion. Environmental issues such as pollution, loud sounds, disturbance, and physical impediment are both exacerbated through freight transportation. It also poses a safety risk, as freight vehicles are a major cause of accidents due to their height, maneuverability, and on-road loading/unloading operations. Urban products transportation is a significant and steadily increasing source of oil demand, posing energy consumption and pollution issues [1].

According to the information above, we can make conclusions that road transport is not so effective, environment friendly and economically good for deliveries around the city comparing with drones. Hopefully, there are other modes of transport which can fit better to the last mile deliveries in terms of city. The concept of using Unmanned Aerial Vehicles (hereinafter-UAV) [3], or drones, for last-mile distribution is gaining momentum within this last stage. The use of drones to transport goods has the ability to reduce shipping costs by minimizing the need for a driver or truck, minimizing congestion, and reducing delayed deliveries due to the limited delivery time. Some major benefits of drone delivery may be realized. Drone distribution paired with mobile phone apps to ensure traceability and coordination, from the perspective of customer choice, may provide requirements to meet the maximum demand likelihood. Robotic distribution could also mitigate the need for urban transportation, resulting in less traffic and lower pollution. There have already been some concerns raised about drone safety and noise pollution [2].

However, there are some baggage of disadvantages of Unmanned Aerial Vehicles deliveries through the residential and commercial zones. The major contributing impediment to delivery drones is a regulatory rather than a technical one. Many

countries have rules prohibiting commercial drones from flying in such regions. Because of current aviation regulations, certain regions are totally off-limits to drones. Drones are still an imbalanced logistics option due to the various regulatory obstacles that must be resolved. Due to restricted battery technology, a single drone delivering a single package to a given location will only fly a little more than three kilometers. Furthermore, while cargo UAVs have a capacity of just five kilograms, delivery vans can transport hundreds of kilograms at once.

Luckily, every year a couple of enormous companies around the world take a choice of using drones for deliveries. Since Amazon CEO Jeff Bezos revealed plans to build Amazon Prime Air in 2013, he became one of the first businesses to make headlines for drone distribution. The carrier's goal was to distribute merchandise to consumers by drone in 30 minutes or less. In December 2016, Prime Air flew its first parcel to Cambridge, England. However, as of 2019, the system has not yet gone live and is only being evaluated in a variety of places around the world [4].

Talking about Ukraine, we don't have some significant examples of using drones for small deliveries in city areas. But according to the regulations on the use of airspace of Ukraine, they have allowed the usage of drones. If drones are needed for commercial purposes, countries' aviation authority may grant permission. In result of such news, there is a big hope that in near future Ukrainian logistic and commercial organizations will take an advantage of UAV's usage.

Eventually, there are several different forms of deliveries in the world, each with its own set of terminology, but the challenge that vendors face today is addressing issues with last-mile delivery. When we consider technical advancements, we will see that drone delivery has risen to the top of the list. In spite of all restrictions in UAV's usage, drones have a great potential in deliveries in terms of city and they will be the most convenient mode of transport for short distances deliveries for sure.

References:

1. Organization for economic co-operation and development (OECD), Delivering The Goods: 21st Century Challenges to Urban Goods Transport, 2003, p. 7-17, Available at: <https://www.itf-oecd.org/sites/default/files/docs/03deliveringgods.pdf>
2. Hassanalain, M., & Abdelkefi, A. (2017). Classifications, applications, and design challenges of drones: A review. Progress in Aerospace Science, p. 91. Available at: <https://doi.org/10.1016/j.paerosci.2017.04.003>
3. Goodchild, A., & Toy, J. (2017). Delivery by drone: An evaluation of unmanned aerial vehicle technology in reducing CO2emissions in the delivery service industry. Transportation Research Part D: Transport and Environment, p. 61. Available at: <https://doi.org/10.1016/j.trd.2017.02.017>.
4. Singireddy, R. S. R., & Daim, T. U. (2018). Technology Roadmap : Drone Delivery – Amazon Prime Air. In T. Daim & C. L. EJ (Eds.), Infrastructure and Technology Management. Innovation, Technology, and Knowledge Management (pp. 387–412).