

Drones in Production, Supply Chain and Logistics

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Abstract – Drones are known as Unmanned Aerial Vehicle (UAV). This article shows the drones in Production, Supply Chain and Logistics. First there was discussed construction of the drone, which the most important elements are frame, propellers, engine and system of power the electronic control. Then there were discussion about drones used for Military, Agriculture, Delivery system in Germany, Police, for taking photos and filming etc. The primary peril of utilizing the drones is the fall of an drone from an extraordinary tallness, which might be expected release of the battery, harm caused by climate conditions (low air temperature, precipitation), hitting in a deterrent (tree, building, high-voltage line). An essential danger related with the broad utilization of non military personnel rambles is connected with security and the privileges of residents.

Key Words: UAV, Frame, Propellers, Precipitation, Broad utilization, drones.

1. Introduction

Recent worldwide media attention has put Unmanned Aerial Vehicles (UAVs) in the spotlight.

Their many different applications make for great headlines –

1. They are being used for military purposes.
2. For development of aid work in Africa (Matternet),
3. For parcel delivery in Germany (DHL Packets).

Some organizations are using UAV's specifically because of this high level of interest. The world's largest online retailer, Amazon and the world's largest logistics company DPDHL are testing UAV delivery systems.

1.1 History

- Drones were initially used only by armed forces.
- The Austrian army first developed these vehicles for war purposes & they attacked Venice in 1849 with unmanned air balloons filled with explosive.
- Unmanned pilots appeared after WW1.
- Elmer Sperry of the Sperry Gyroscope Company developed the Hewitt Sperry Automated Airplane. It was the early version of today's aerial drones.
- The US army turned Standard E-1 planes into drones. Larynx was one of these planes.

- The first mass-produced aircraft was the concept of Reginald Denny, a famous Hollywood actor. He pursued his interest in remote-controlled drones and set up Reginald Denny Company. This company produced the radio plane, which he improved for the US army in WW2.
- The US army used these aircrafts as target drones during the Cold War. These drones were also capable of collecting radio-active data.

1.2 What Is A Drone/Quadcopter?

- Drones belong to a class of aerial vehicles known as UAV's (Unmanned Aerial Vehicles).
- These devices can take to the air without human pilots. This feature makes drones **flying robots**.
- Encompassing both quadcopters and planes, drones have software-controlled flight plans integrated into their systems. These systems work with GPS to guide and track their movements.
- The quadcopter is a newer Unmanned Aerial Vehicle.
- As its name implies, quadcopters depend on four fast-turning rotors to give it thrust. Two rotors spin clockwise and two rotors spin counter-clockwise.
- To help the process, quadcopters are equipped with two sets of identical, fixed pitch propellers. Flyers achieve control of the quadcopter by changing the speed of its rotor discs using remote control transmitters.

2. Current Developments in Industry?

- Technology has advanced quads and drones dramatically. In the past ten years, companies such as Heli-Max, Blade, Walker, Parrot and DJI have produced mini drones which use up-to-date computer technology for aerial photography and flight control.
- In the mining industry, for instance, drones have completely transformed the way rock stockpiles are measured.
- Drones are also preventing costly delays on building sites by collecting data and sharing them with the cloud for all subcontractors.

- The ability of drones to monitor progress in industries like rail or energy, where revenue generating activities often need to be put on hold for inspection by humans to occur safely.
- And then there are ocean drones like Liquid Robotics' Wave Glider, which are being used to gather real-time data on currents and weather that are essential to oil and gas companies, meteorologists, the navy and geologists.
- With drones helping to predict weather, improve safety and efficiency in oil and gas, utilities, construction, mining and railways, and save companies significant amounts of money, it's no wonder that the technology is in high demand.

- Nowadays Drones are incorporated with laser guided missiles to carry covert military operations.
- RQ - 1 Predator, MQ - 1 Predator, MQ - 9 Reapers, MQ - 1C Gray Eagle, Predator C are some of the examples of Drones used by the US Military.

3.2 Drones for the inspection of power transmission lines

- Traditionally power lines were inspected with the help of a helicopter which involved participation of 2 pilots, a man with a thermal camera and an assistant.
- Power line maintenance for electric utility companies is expensive, dangerous, and time consuming.
- The main method for fault detection in power lines is thermal hot-spot recognition. These hot-spot areas generate more heat than the surrounding equipment and are thus visible on the thermal camera.
- Therefore, a drone attached with a thermal camera is used for inspection of power lines.

4. FAA Regulations

FAA stands for Federal Aviation Administration.

- In US, it is now required for all drone users, including hobbyists, to register drones weighing over 250 grams – a bit over half a pound.
- A drone can't fly higher than 400 feet
- Can only fly during daylight hours

4.1 FAA Regulation For Commercial Drones



Commercial Drones

- Pilot must be at least 16 years of age.
- Pilot must possess a remote pilot airman certificate before flying drones.
- Weight of the drone must be within 55 lbs.
- Drones under visual line-of-sight.
- Must be flown only during day-time
- Can be flown at an utmost speed of 100mph.

4.2 Amazon Prime Air

- Drone delivery has many advantages that position it as the future of distribution:

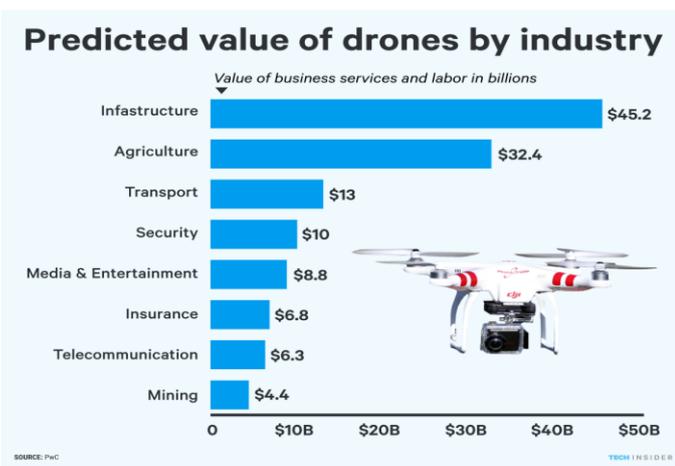


Chart -1: Value of Drones

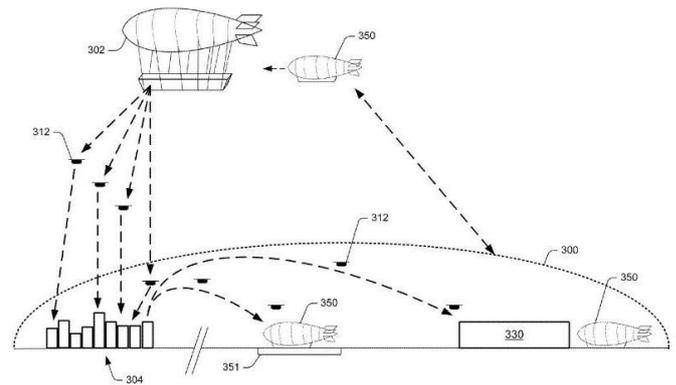
3. Types of Drones

- Depending upon the need or applications drones can have variable size and design.
- Here we are going to discuss various types of drones and for ease of understating they are categorized into four basic sections:
 1. Power used
 2. Based On Structure Of Wings
 3. Numbers of propellers used inside
 4. Size
 5. Flying range
 6. Equipment

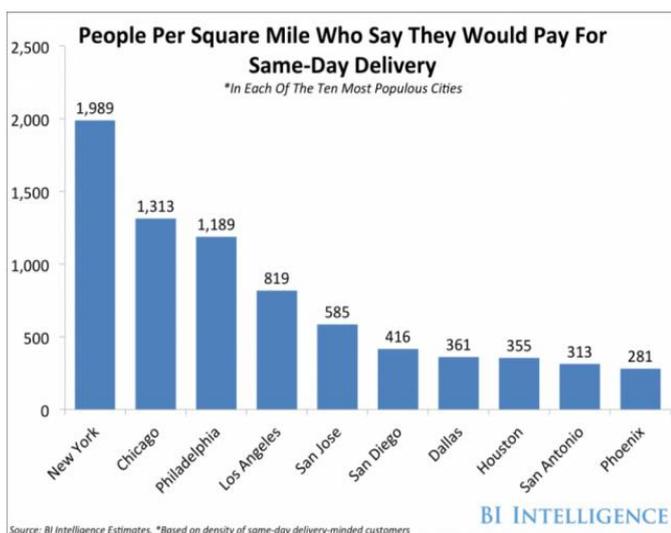
3.1 Application of Drones in Military

- Drones are used mainly for surveillance purposes. Drone can be used to protect the lives of the military personnel in case of wars.
- The main drone use overseas in war zones is reconnaissance of unknown areas, enemy tracking, and force protection.

- **Fast delivery:** They can fly in a straight line to their destination.
- **Delivery to difficult-to-access areas:** Drones are ideal for delivery of medicine and healthcare supplies to remote or undeveloped areas.
- **Reduced costs:** Automated drones significantly reduce the human labor costs for delivering packages.
- **Increased competitiveness:** Companies who offer speedy drone deliveries will have a vital edge on their competitors.
- **Environmental friendliness:** Drone deliveries have minimal environmental impact compared with traditional deliveries by road, rail, or air. This will be valuable for companies who want to enhance their 'green' credentials.



4.3 Need For Drones In Logistics



5. Amazon Logistics

- Amazon wins patent for a flying warehouse ("airborne fulfillment center" AFC) that will deploy drones to deliver parcels in minutes.
- Amazon has been awarded a patent for a giant flying warehouse.
- Drone or Unmanned Aerial Vehicles (UAV) will fly down and deliver the package.

The drones would be able to communicate with each other via a mesh network to give information such as weather and route

5.1 For Security in Logistics

- Polish freight carrier PKP Cargo has conducted a trial on security drones to help protect goods on rail network.
- Dhabi Ports Company has also utilized UAVs to strengthen security and safeguard ships with high-value or sensitive cargo.
- Research from the National Aeronautical Centre revealed that 42% of logistics carriers plan to use UAVs for the distribution of cargo in the future

5.2 Advantages

- Drone delivery offers tremendous benefits in the form of cheaper, faster shipping.
- You don't need a "costly" human pilot (for most of the process).
- Inexpensive and safe way to examine, record, and inspect critical areas from multiple angles
- Enhance sales to potential investors and clients by demonstration how you will meet their standards from 360 degrees, using drone photography to enhance your approach
- Streamline and save time by inspecting areas from difficult to reach vantage points
- Keep your workforce safe by removing them from harm's way. Let Inspectifly assist you in inspecting these hazardous and dangerous areas, with your personnel safely on the ground

5.3 Disadvantages

- The cost to transport a drone, per pound/volume is much higher than many other solutions due the intensive energy requirements.
- Drones suffer from the same problems as rockets- the more you lift, or the further you want to go, the more energy you need.

- Limited payload Susceptible to wind due to low weight.
 - Public Liability – The aerial reach of drones makes negligent collision with people, buildings, and other aircraft, leading to property damage, personal injury and possible loss of life in extreme cases is a real possibility.
 - Nuisance – Fines or imprisonment may result from actions for public and private nuisance, trespassing with the use of drones.
 - Privacy - Drone operators may inadvertently breach legislation such as the Data Protection Act, the Human Rights Act, the Regulation of Investigatory Powers Act and the Sexual Offences Act.
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6. Conclusion

- Drone delivery offers tremendous benefits in the form of cheaper, faster shipping.
- You don't need a "costly" human pilot (for most of the process).
- It has stayed at the top due to constant innovation in its operations that has led to better efficiency.
- Over the next 16 years, drone will become significant component of military, civil and perhaps even commercial aviation.

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