THE DRONE INDUSTRY MARKET DISRUPTIONS

Edward Anderson / Catalina Ochoa
Technology Ecosystem

DRONE TECHNOLOGIES
- Global Market growth at 22% / yr
- Electric = simple, clean & low cost
- Vertical Take Off = No runways needed
- Unmanned = safe, expendable, 24/7

DRONE SERVICES
- Global Market growth at 60% / yr
- Surveys and mapping critical in rural Africa
- Cloud Processing + AI Image classifiers = custom insight fast, good, cheap.
- Drone delivery = Resilient Supply Chains

DIGITAL FABRICATION
- 3D printing already makes Drones locally
- DronePort + FabLab = Local Drone repair and manufacture
- Spare Parts on demand service enabled
- Mwanza Drone Delivery Market for spare parts

DRONE AIRSPACE MANAGEMENT
- Performance Based Regulations (PBR) a disruptive Business Process
- Not deployed in Africa
- Unmanned Traffic Management (UTM) a key system enabler for high frequency flights
Although they were initially viewed as military devices, drones have established a significant presence in the commercial sector over the past five years.
Drone Industry Growth

- The drones market CAGR of 15.37% during 2020 – 2025 to reach USD 47.76 billion

Source: www.grandviewresearch.com
Battery prices, which were above $1,100 per kilowatt-hour in 2010, have fallen 87% in real terms to $156/kWh in 2019.

Lithium-ion battery price survey results: volume-weighted average

*Includes Tesla gigafactory

Source: BloombergNEF
Disruption Predictions (ARK Invest 2020)

- Lower battery costs and autonomous technology should power aerial drones into a $455 billion market within 10 years (ARK Invest, 2020)

Source: ARK Invest, Why drones are set to take off: https://www.youtube.com/watch?v=pxWLnfke4cA
Disruption Predictions Retail

- eCommerce today is 14% of retail, and expected to become 60% by 2030 – Drones to deliver half
- Drones to reduce delivery cost by 90%

Ecommerce Share of Retail With Drones

Disruption Predictions Parcel Delivery

- Horsefly drones energy cost $0.03/mile
- Workhorse electric vans + drones short listed for USPS 2020 $6.3billion contract
Disruption Predictions (ARK Invest 2020)

- Food delivery today is 1% of food spend, but 40% by 2030 – Drones to deliver half.

- ARK estimates an Amazon drone could deliver a package in less than 30mins profitably today for $0.25, cutting the cost of domestic shipping by over 90%.

Disruption Predictions Urban Air Mobility

- Launching in 3 cities in 2023 for £4.24 per mile, only 64p more per mile than an average London taxi
- The global market for flying cars is projected to reach £1.2 trillion by 2040
- Out of 101 active urban aviation projects, 38% are already in the flight-testing stage whilst 5% are already in the process of commercial certification.
PART 2 - EMERGING MARKETS & FRONTIER APPLICATIONS
PROBLEM Rural Africa lacks Maps & Mobility

- Only 34% of Africans live within 2 km of an all-weather road compared to over 90% in East Asia. Hard-to-reach communities face higher costs for goods and long wait times for deliveries with lower productivity of rural facilities and fewer opportunities for rural citizens.
- Critical Supply Chains are failing - 12,500 stockouts in the Mwanza region in 2016 compromising health services. Rural dispensaries are challenged by maintaining inventory in-between quarterly deliveries. 28% of all blood tests spoiled in transit from the Ukarewe islands of Lake Victoria to Mwanza in 2018 meaning no disease screening for high-risk citizens.
- Road Safety became Africa’s 3rd biggest killer in 2018 after HIV and Malaria. 16% of road fatalities worldwide with only 2% of the world’s vehicles.
- Only 3% of Africa’s Land is Digitally Mapped at local scale compared to over 90% in Europe

SOLUTION Autonomous Aerial Vehicles

- Harness Autonomous Transport, Digital Fabrication, and AI Mapping technologies with potential to impact health, agriculture, and cargo supply chains in the Lake Victoria basin – and East Africa region
- Drone Technology is evolving fast and offers a leapfrogging opportunity in Africa to develop new markets and boost rural economic opportunity
The opportunity is to rethink infrastructure needs for a new kind of supply chain, bringing greater reach and resilience.

Lower capital requirements: Drone ports are expected to cost about as much as a petrol station.

The immediate opportunity: speed up deliveries and connect the excluded.

The medium to long term potential: enable a greener transportation sector with universal reach.

1 cent per kg / km with Zero emissions
Mapping Context

Challenge Statement

- Africa is experiencing the fastest unplanned urbanization in history
- Urban growth is extremely land intensive leading to sprawl
- Surveys, Maps, and Beneficiary data are old, wrong, missing or inaccessible
- Traditional survey methods are slow, complex, and expensive;
- Local spatial analysis has weak capacity and limited supply
- You cannot manage what you do not measure

DRONES ADVANTAGE

- “A game changer for digitizing Africa” African Union
- Low cost, low complexity
- Local Skills and bottom up process
- Rapid response – on-demand
- In Future – Urban Air Mobility will transform cities

THE WORLD BANK CONTEXT

- Client Demand is sky-high – African Union (2018) urged member states to harness drone technology for development;
- Regional Strategy calls for Digital Moonshot – Data, Skills, Services, Jobs
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LIDAR

1. High Accuracy Digital Terrain Model
2. Urban Flood Modelling
3. $50,000 “low” cost
4. Combination of LiDAR and Photogrammetry

https://www.youtube.com/watch?v=opnWpZfs63M
Energy Assets – Côte d’Ivoire

1. Monitoring
2. Automated with AI
3. Internal Capacity
4. Adapted Regulation
Flood Management - Senegal

1. Change Detection
2. Flood Impact Maps
3. Urban Surface Models
4. Bottom-up approach
Emergency Delivery

1. Rwanda, Ghana, India, USA
2. 25,000 flights in Rwanda
3. 30% Emergency
4. Just-in-time supply chain
HARD TO REACH FACILITIES IN THE UKEREWE ISLANDS
Insight #1
Ukarewe Health Commodities Cost-benefit Analysis

When examining medical goods categories individually, we found that costs are higher to deliver most categories by Unmanned Aerial Vehicles (UAVs)
Insight #2
Will layering use cases provide efficiency and cost savings?

Yes, by allocating fixed costs across a greater number of flights and maximizing utilization in terms of capacity and time.

How?

• By maximizing the cargo capacity and time utilization in all directions

• For routine deliveries, it can also be increased by using “milk runs” instead of hub-and-spoke route
Insight #3
What is the capital cost of a UAV that would make the service provider indifferent from a cost perspective?

The Ukerewe case study suggests an indicative drone capital cost that would bring this mode at price parity with current road - and boat -based transport.

Considers weighted estimated costs and transport requirements for lab samples, life saving items (incl. rabies), and blood/ blood samples.

Results are valid for distribution to/ within Ukerewe only.
Cost per km varies by geography and distribution of health facilities.
Insight #4
What is the health impact if blood is sent by UAV compared to traditional transport?

Analyzed the need for emergency blood transfusion, based on current data

Demand
Supply
Compare the time it takes between
Traditional transport
Drone

>2 hours = Late Delivery

@90% following a delayed blood transfusion

@5% for patients receiving timely blood transfusion
Based on the information collected in healthcare facilities in the Ukerewe Islands, deployment of drones can reduce the number of deaths by almost 80% compared to traditional transport.
PART 3 – ENABLING ENVIRONMENT
CHALLENGES & OPPORTUNITIES
Accepted the recommendations of a report by the High Level African Panel on Emerging Technologies to prioritise Drones on the Horizon as one of three key emerging technologies for African Development.

Countries are following diverse approaches ranging from:

- **Outright Ban**
- **Visual Line of Sight (VLOS) requirement**
- **Experimental use of Beyond Visual Line of Sight (BVLOS)**
- No regulation at all

14 African Countries (26% of those on the continent) had published dedicated UAV regulations by July 2017.

+ 7 Countries appended early ICAO guidance from traditional aviation to amend and enable low-altitude drone operations. Little progress has been made since.


Forthcoming Study – Drone business limited pace of regulatory change

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African Drone & Data Academy

1. 100 Students Trained by Virginia Tech in Malawi

2. 2 yr Master’s Degree in Drone Innovation

3. Authority to Fly License

4. Applications tested in Malawi Drone Corridor
# African Drone & Data Academy

AI for Cholera Response in Lilongwe by GLOBHE

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African Drone & Data Academy

Malaria Mosquito Control by
Liverpool School of Tropical Medicine
African Drone & Data Academy

Critical Goods Transport by Swoop Aero and Wingcopter
WBG Analytical Work
In Partnership with ICAO, UNICEF, WEF, ISG

1. Policy Notes and Play-Book
2. DRM Case Studies
3. UTM Primer
4. Model Regulation
African Drone Forum

The Showcase

A three-day Symposium and Regulator's Summit to discuss the future of the African drone ecosystem.

The Lake Kivu Challenge flying competitions to address critical supply chain needs in the Lake region and drive innovations.

An Expo to showcase curated drone innovations relevant to African use cases.

The African Drone Business Challenge to identify new business models enabled through drone technology and data.

Demonstration of UTM services to facilitate discussions between civil Aviation Authorities and Industry.
ADF Summary Video:
https://www.youtube.com/watch?v=SBGylSQ5f0k

LKC Video Day 4 Highlights:
https://www.youtube.com/watch?v=YoICHhUKKY
PART 4
COVID -19 APPLICATIONS
COVID-19 Applications in China

1. Public Announcements
2. Disinfection Spraying
3. Lab Sample Delivery
4. Home patient delivery
5. Facilities Monitoring
COVID-19 Deliveries in USA

1. Zipline + Novant Health
   (Hospitals North Carolina)

2. Wing + CVS + Fedex
   (Food and Books, Schools, Virginia)

3. Matternet + CVS
   (Medicine to Lockdown homes, Florida)

4. Workhorse
   (testing)

5. Flytrex
   (Trials, Food in North Dakota)
THANK YOU
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