FIXAR

WHITE PAPER

ECONOMIC EFFICIENCY OF COMMERCIAL DRONES

While the commercial drone market continues to expand and the demand for unmanned aerial vehicle technologies grows exponentially, the question "**HOW TO CHOOSE THE RIGHT DRONE FOR PROFESSIONAL USE?"** is more relevant than ever.

> *Like any smart transaction, a drone purchase should assess the value a customer gets in exchange for the money they pay. When it comes to measuring value, economic efficiency should be considered as an essential factor.*
>
> *When assessing the economic efficiency of industrial drone ownership, a lot of companies are guided by the price of the device, losing sight of the long-term value they could get from a solution, such as optimized processes, reduced costs, and increased safety.*

In order to evaluate the economic outputs of particular drone exploitation, a number of essential factors have to be considered, including, but not limited to, aircraft type (fixed-wing vs multirotor), performance characteristics, costs associated with drone maintenance and operation, as well as specific requirements of the individual job.

This white paper factually describes how to evaluate the economic efficiency of different types of UAVs based on three examples of different applications. It also helps to understand how an aircraft's construction affects the profitability of flight missions. The data and calculations presented in the text are based on publicly available information from drone manufacturers, interviews with drone operators as well as industry reports such as Levitate Capital, December 2020, ARK Big Ideas annual report 2021, E&Y UAV market potential and development issues 2021.

1. USE CASE: Survey of nonlinear objects

A land survey is a multipurpose technical discipline that is in high demand across various industries and sectors such as construction, mining, urban planning, cadastral management, oil & gas, and more. As the world is based on measurement and mathematics, surveying brings them to life by providing essential data for further mapping, modelling, and analysis.

With advanced unmanned aerial vehicle technologies, businesses can significantly decrease field time and associated costs. But how to compute the real value of drone usage for aerial photography missions?

Aerial photography of 60 km² landscape with 2.5 cm/px accuracy

Criteria	Average copter up to 3kg payload	FIXAR 007
PRODUCTIVITY (SQ KM PER HOUR)	2	4
NUMBER OF FLIGHT HOURS	30	15
TOTAL JOB COST, EUR	**7 213**	**2 724**

FIXAR customers are **3x** more efficient

When it comes to an evaluation of the economic efficiency of an aerial survey, three key factors should be considered:

1) Number of hectares/ acres covered in a unit of time = sq. km (sq. ft)/ hour
2) Number of flight hours needed to complete the mission
3) Total cost of an operational hour that includes operator salary, amortization, cost of technical inspections, component repair and replacement.

> *Due to the hybrid aerodynamic design, FIXAR configuration combines main advantages of a fixed-wing and a multirotor scheme. Rigid wing of the aircraft generates lift due to drone's forward airspeed, thus saving energy for longer flights and heavier payloads. At the same time four rotors mounted on FIXAR's frame enable smooth take-off and landing, plus great manoeuvrability on the turns.*

Since copter drone rotors are constantly in a hover mode this type of construction consumes much more energy to stay aloft. In order to efficiently consume its energy, copters move slower when capturing aerial photos.

Also, since the FIXAR 007 requires twice as few flights to complete the job, it naturally reduces the wear of drone components, time spent on technical checks, as well as the amount of crew's working hours. As a result, **FIXAR's ownership allows companies to reduce the total costs of the job by three times.**

Now to illustrate the key value of the FIXAR 007 model, let's take a look at its flight performance characteristics:

- Flight distance up to 60 km (37.3 mi)
- Cruise speed of 65-72 km/h (40-45 mph)
- Flight time up to 60 min
- Payload up to 2 kg (4.4 lbs)
- Setup time of less than 2 min

2. USE CASE: Linear object inspection

For the past couple of years, drone-based workflows have been positively affecting the economics of linear infrastructure inspections.

The usage of UAV technologies for linear inspections requires less time on-site and less skilled personnel involved. But also assure higher data quality and consistency while eliminating human errors and accessing hard-to-reach areas. For companies in the public planning, infrastructure (road, rail) and utilities sectors (hydrocarbons, gas, electricity, water infrastructure), switching to commercial drone guarantees reductions in technological and personnel costs.

Aerial photography of 120 km long and 100m wide linear object with 2.5 cm/px accuracy

Criteria	Average copter up to 3kg payload	FIXAR 007
PRODUCTIVITY (KM PER HOUR)	7	12.5
NUMBER OF FLIGHT HOURS	18	10
TOTAL JOB COST, EUR	**4 328.00**	**1 816.00**

FIXAR customers are **2x** more efficient

Therefore, when selecting the RIGHT drone in the context of linear infrastructure inspection, endurance is the key. Furthermore, as already discussed in Use Case 1, the flat wing schemes are better adapted to longer distances, which they cover using less energy than rotary drones. There are two main factors that contribute to why FIXAR's airplane-type configuration can leverage the full productivity potential:

1. Speed and endurance. With 20 m/s (45 mph) cruise speed and maximum flight time of up to 60 minutes on a single charge, FIXAR 007 ensures **2x higher efficiency** than the average multi-rotor model (e.g., the cruise speed of the popular surveying drone DJI MAVIC 2 is 8.9 m/s (20 mph), and its maximum flight time 30 minutes). Having a drone with higher endurance not only saves a lot of time and man-hours as opposed to bringing it down every 30 minutes, but also means that it is possible to cover twice the distance compared to DJI MAVIC 2.
2. Less overlap, more efficiency. Besides, FIXAR can carry heavier payloads and as a result, more high-end cameras with 24MP or 42 MP resolution compared to cropped sensors of the average multirotor drones. This, in turn, allows performing missions at higher altitudes and covering more land with smaller GSD overlap settings. **For example: recommended front overlap setting for FIXAR drone is 60% in comparison to MAVIC 2`s 85% overlap requirement, which makes it 1.4 times more efficient during aerial photography mission.**

Last but not least, the hybrid flight capabilities of FIXAR 007 (fixed-wings plus 4 rotors) make it possible to resist a wind speed of 12 m/s to 18 m/s (27 to 40 mph). The aerodynamics of copter-type vehicles leaves them more vulnerable to the wind that often causes the cancelation of the flight mission.

3. USE CASE: Delivery flight missions

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Delivery cost comparsion between UAV types

Criteria	Average copter up to 3kg payload	FIXAR 007
DRONE COST, EUR	33 000	21 000
LIFETIME	3 years	3 years
DELIVERIES	7 200	7 200
ANNUAL OPERATOR COST, EUR	83 000	43 200
ANNUAL MAINTENANCE, EUR	11 500	16 117
ANNUAL INSURANCE, EUR	5 500	5 500
ONE DELIVERY COST, EUR	**43.6**	**29.9**

FIXAR customers cut expenses **by 35%**

Delivery in its traditional state refers to the movement of products from one point to another, e.g., from warehouse to a store, or to their final destination. Notably, last-mile delivery is also the most expensive stage of the transportation process and often comprises over half of the overall delivery costs on the entire process. To stay competitive and profitable, logistic service providers like Amazon, DHL, UPS, and many others need to provide faster and cheaper ways of delivering goods. Furthermore, drone deliveries can tackle healthcare challenges when dealing with time-critical medical supplies or samples for lab tests.

That's why autonomous drones like FIXAR 007 started replacing traditional methods of delivery while maintaining continuous growth in the market. Still, when looking for the best unmanned aerial vehicle solution for your business it is **vital to consider the economic efficiency of drone ownership.** In other words, understanding which UAV models are available on the market will save your organization money and how you can actually compare the expected value of different aerial vehicles.

To compare FIXAR 007 performance with other models on the market, we have reviewed data provided in Levitate Capital, December 2020 issue. The comparison is based on commercial drone category with same payload capacity - under 3 kg (6.6 lbs).

In the course of the comparative analysis, the following evaluation criteria were selected:

a) Cost of a drone

b) Lifetime of a drone

c) Number of deliveries during a lifetime

d) The annual cost of UAV operator force

e) The annual cost of drone maintenance

f) The annual cost of drone insurance

Based on the industry research reports, the average cost of an industrial copter drone for last-mile delivery is 33 000 EUR (40 000 USD*[1]), **which is 57% higher than FIXAR 007 price.** And this is not the only economic advantage of the FIXAR.

Due to complex configuration and complicated operational routine, the vast majority of drones require high-qualified personnel with advanced piloting skills to control the unit. Meanwhile, **FIXAR 007 offers a simple and reliable construction that doesn't require extra equipment such as launchers or capture systems for take-off and landing.** The completely autonomous aircraft follows pre-loaded instructions from proprietary xGroundControl software: take-off, land, perform a flight mission, and capture data. Unlike the average industrial drone, only one operator*[2] is required to perform the flight mission with the FIXAR 007. Therefore, less time is spent in the field, allowing companies to cut the costs associated with the flight operations team and its training.

As a result, the delivery costs using the **FIXAR 007 fixed-wing drone within a lifespan of 3 years is 35% less than using an average drone with a payload capacity of up to 3 kg (6.6 lbs).**

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[1] The amount is displayed based on currency exchange rates as of November, 2021.

[2] The number of required UAS operators can be subject to local regulations However, technically, the FIXAR drone can be controlled by only one trained operator.

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For a quote, a real time demonstration or more information on any FIXAR products please contact us via www.fixar.pro or sales@fixar.pro