THE ORGANIZATION OF COMPANIES INVOLVED IN DRONE ACTIVITIES

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This paper presents a study on the business model of companies involved in the development of Small Unmanned Aircraft Systems, i.e. drones, and relevant services. The main companies involved and relevant activities are presented. The compliance with Open Service Innovation company model developed by Chesbrough is discussed. Moreover, the typical organization of Drone Service Providers is presented. Finally, the case of SenseFly™ is discussed in order to show a practical application of the presented model.

1. Introduction

This paper aims at discussing the terms that influence the asset of companies that provide services related to the use of drones. Moreover, it exploits the similarity between companies involved in the development of drone services and the one described by the Open Service Innovation Model introduced by Chesbrough (Chesbrough, 2001 – Chesbrough, 2011).

Drones are flying platforms with both rotary-wing and fixed-wing configuration that are equipped with systems that supports manual or semi-autonomous remote control by operators (FAA, 2015). A whole set of new services could be provided thanks to the availability of these systems, such as traffic surveillance, monitoring of crops, packet delivery, law enforcement, fire monitoring, and support of digital communications (AUVSI, 2013). These application attracted important international high-tech companies, such as Google, Amazon, Facebook and Apple (NASA, 2015). Indeed, the technology of drones is well integrated with the Internet framework. Drones can provide services to Internet users while Internet can provide a communication support to drones (Gharibi; Boutaba; Waslander, 2016). They are also called Small Unmanned Aircraft Systems SUAS.

It is worth noting that the use of SUAS for civil applications causes also some important issues to be assessed. First of all, security issues shall be considered. Indeed, the drone operator shall ensure that the operation of drones is performed without adding risk to other civil applications (FAA, 2015). In particular, SUAS shall be realized so that the risk of collisions with other fixed or moving objects is reduced to the minimum. In addition, a safe flight termination shall be ensured for both nominal and emergency conditions. These are technical issues that need a specific technical knowledge to be assessed. A different type of problem is related to the protection of privacy (Glennon, 2015). Indeed, SUAS can record several forms of multimedia information from an elevated point of view. However, they have to respect privacy regulation while performing observations in order to avoid performing illegal activities.

This problem need to be treated by privacy legal specialists. Finally, the issue related to regulations must be assessed.

It is worth noting that the current SUAS market is at its earliest stage of development. Indeed, several regulatory issues shall be provided in order to assess a safe operative framework for these systems that will be effectively integrated with other human activities. Moreover, a dedicated traffic management system shall be developed in order to provide assistance for safe vehicle separation and routing, such as the one that is available for vehicular traffic and for manned aircraft (NASA, 2015).

As described in the previous paragraphs, the organization of a company that handles SUAS is a complex job. Several figures are needed, such as:

1) Specialists of SUAS platforms;

2) SUAS Remote Pilots;

3) Airspace specialists;

4) Legal experts that are capable to handle privacy issues;

5) Managers that are specialist of running companies that exploit advanced technologies.

This paper will describe the typical organization of a drone based company. First of all, SUAS market for civil use will be presented (AUVSI, 2013). Subsequently, drone issues will be discussed, i.e. technical matters, safety and regulatory questions, and privacy concerns. The framework of drone operation is compared to the Open Service Innovation model developed by Chesborough (Chesborough, 2011). The relevant peculiarities are discussed in details. A proper organization model will be developed for the most important applications presented. It will be derived by exploiting both existing experiences and regulatory guidelines. Finally, the case of SenseFly™ company is presented to report a distinctive experience in this field.

2. Literature Review

2.1. SUAS Providers and Services

First of all, the main categories of small drone shall be assessed in order to highlight the services that they can provide. Drones are a main source of service in the military field. In this case, they are classified in terms of their strategic performance. However, this paper is not focused on military use of drones. The focus is rather on civil applications of drones that are forms of activities that follows a fast developing process, in the last few years. A final statement on the definition of small drones has not been reached at international level. The general idea is that a drone can be classified as "small" if it provides limited damages to people and things in case it collapses on ground as a consequence of a failure. Some experts associate this condition to a limit in the maximum takeoff weight of the drone. However, the level of damage produced by a crash with ground depends on the total momentum of the drone, i.e. it depends on both its mass and its speed. Since the speed of most drones is very limited and the typical configuration of crashes is when drones reach the free-fall speed, i.e. a constant speed that depends on drone aerodynamic drag, the categorization in terms of weight is preferred. Small drones are considered the ones that have a maximum takeoff weight of less than 25 kg (FAA, 2015). The type of enterprises involved in SUAS applications include SUAS Providers and SUAS Service Providers. SUAS Providers are restricted to a few companies worldwide, mainly distributed in the US and in China, i.e. the countries with the most advanced SUAS deployment. More details about SUAS Providers will be presented in section 3. SUAS Service Providers are more largely diffused and the type of activity they carry out can be very variable. In the following lines, an overview of SUAS services is reported.

Several types of services have been considered for SUAS. Some of them are still at experimental level, some others are more mature depending on the level of risk they rise and, consequently, on the level of technology that must be adopted to let the drones fly safely.

A service that has been provided since several years by using SUAS is precision agriculture (Tokekar; Vander Hook; Mulla; Isler, 2016). These service has been developed in Japan where SUAS helicopters are used to estimate the harvesting stage of crops by visual inspection or by using other type of sensors. Moreover, SUAS are used to spray pesticides over crops. In the past, this function was performed by manned aircraft and it resulted in a dull activity, since it requested to fly up and down over fields in order to guarantee a proper irrigation. In addition, it was a dangerous job for pilots since the aircraft had to fly at low speed and low altitude.

A typical application for SUAS is law enforcement. Indeed, the availability of platform that helps to get an overview from above during a law enforcement activity is very helpful in order to help law enforcement operators to attain better situational awareness. For this reason, several local and national organization involved in law-enforcement activities are planning to use drone derived from military applications in order to perform patrolling and surveillance (AeronVironment, 2016).

Another task important for public activities is wildlife and wildfire surveillance. Drones are used to perform early detection of fires and to support fire extinguishment operations in order to reduce the risk of direct contact of human operators with fire (Merino; Ollero, 2010). Moreover, drones are used to detect illegal activities against wildlife so that people that perform this type of activities can be recognized and prosecuted (Gonzalez; Montes; Puig; Johnson; Mengersen; Gaston, 2016).

Aerial photography and, more in general, aerial remote sensing is a useful job that can be realized by exploiting SUAS. A huge list of end-user can be provided including mapping operators, realty agents, leisure employees, power-line and pipeline owners to monitor line interruptions and fluid leakage, and professional photographers (SenseFly, 2016).

The capability to attain elevated position at low cost makes SUAS suitable for performing as communication relay. They can be equipped with a proper transceiver or micro-cell payload in order to provide a radio link between two points that are out of line of sight connection. A similar application has been proposed by Google™ and Facebook™ in order to provide Internet connection for areas that have no line availability (Soundararajan; Agrawal, 2016) (Bonomi; Milito; Natarajan; Zhu, 2014).

Finally, SUAS are planned to be used by Internet shops for small packet delivery at local level. Indeed, some issues related to safety, autonomy, and allowed payload mass should be addressed but an experimental service has already been provided by Amazon™ (Pandit; Poojari, 2014).

2.2. Issues Related to the Use of SUAS

Several issues have been arisen in order to permit the use of SUAS in civil applications, such as:

1) Technical issues;
2) Regulatory issues;
3) Privacy issues;
4) Management issues.

First of all, technical issues, have been addressed. They can be summarized in the following list:

1) A Sense and Avoid strategy must be defined for each SUAS and for each application. Indeed, a non-negligible number of collisions is avoided each year thanks to the visual support of a human pilot. Regulatory agencies require that proper systems must be installed onboard SUAS to replace this function (Forlenza; Fasano; Accardo; Moccia, 2012);

2) A Flight Termination strategy must be defined for each SUAS, i.e. technical solution and a specific procedure must be defined so that the SUAS can perform safe landing in nominal and emergency conditions (Eaton; Chong; Maciejewski, 2016);

3) A Communication Data Link for Command and Control must be provided so that the remote pilot can perform a safe and efficient control of SUAS. This data link can be different from the one used to transmit and receive information related to mission payload. In general, a 2.4 GHz ISM digital data link is provided for Line-of-sight operations, i.e. the operations that take place when the remote pilot has direct visual contact with SUAS, while WiMAX and 4G LTE digital link are proposed for beyond line of sight operations, i.e. operations that take place when the remote pilot has no longer visual contact with SUAS (Rahman, 2014);

4) A proper traffic framework interface must be provided. Indeed, a SUAS traffic system must be built up in order to properly address the SUAS flight plan and to prevent the risk of unsafe separation or traffic congestion among SUAS and between SUAS and standard flying platforms that operate at low-altitude such as helicopters. A specific protocol over WiMAX framework has been proposed to exchange information between traffic framework interface and SUAS. Moreover, proper SUAS traffic monitoring stations will be deployed (Kopardekar, 2014).

Air traffic regulations must be updated in order to permit a regular operation of SUAS. SUAS will be allowed to fly in the segment of national airspace known as “G” airspace. Regulations to manage SUAS traffic have been issued only in the last few years by regulatory agencies (Hoffmann; Prete, 2008). Some details still need to be better addressed, such as Sense and Avoid. This is a main issue that discourage potential SUAS service providers to start their business. For this reason, NASA has undertaken a specific study called NASA UAS Traffic Management UTM in order to fill the regulatory gaps (Kopardekar, 2014).

Privacy is an important term that must be accounted by SUAS service providers. Indeed, like all instruments that collect multimedia information in public places SUAS must proof to respect people privacy and must provide a specific data processing guidelines in order to ensure that no misuse will be performed of data collected during SUAS missions. These guidelines must be related to data acquisition procedures, data storage procedures, data delivery to customers, and data cancellation from memories. Indeed, no service that could harm people privacy can be legally authorized for SUAS operators and they cannot accept missions from customers that ask to perform violation of someone privacy. Recently, a major public discussion has been performed on US news providers in order to assess what type of SUAS operation could be authorized without risk of violation of someone privacy. Indeed, some people consider that even law-enforcement operations should be forbidden if they determine the risk of people privacy violation. In particular, a specific wave of opinion has been very critical, it is called Not-In-My-Backyard NIMB (Cavoukian, 2009).

Finally, management issues must be considered. Indeed, customers of drone providers do not request just the availability of the flying platform and the relevant remote pilot. They need that a specific service is offered, such as full support to one of the task reported in subsection 2.1. As a consequence, drone service managers must own a detailed knowledge about the requested application. Given the large variability of applications, drone service providers are usually specialized in one or few applications depending on the typical request of local customers (Rule, 2015). For instance, precision agriculture specialists are not usually requested to perform packet delivery services.

3. SUAS Market

As stated in section 2, the SUAS Platform Provider market is formed by a restricted number of companies worldwide, whereas the SUAS Service Providers Market is formed by a much larger number of enterprises that are specialized on customized services. As a consequence, while SUAS Platform Providers can be described in terms of involved companies and products, the SUAS Service Providers can be illustrated just in terms of market budget and worldwide distribution. It is worth noting that two types of drones are usually available from vendors:

1) Rotary wing drones, i.e. quadcopters or hexacopters, that are simpler to be handled but have endurance and maximum allowed payload weight limitations;

2) Fixed wing drones that have better performance in terms of endurance and maximum allowed payload weight, but they are much more complicated to be piloted since fixed wing planes need to have a minimum ground speed in order to

An overview of SUAS Platform Provider shows three main players and three interesting followers, such as (Drone Industry Insights, 2016):

- Chinese SUAS producer DJI™ is world largest drone producer. It sells about 50% of professional SUAS and covers about 70% of overall SUAS budget. This difference is determined by the fact that DJI™ leads the professional drone market with its model Phantom™, i.e. the market of drones that have a price higher than $2000,00 (DJI, 2016);

- US producer 3D Robotics™ 3DR™ is second largest producer with a market share in the order of 10% both in terms of number of units and budget. It manufactures the drone named Solo™. Moreover, it develops an autopilot called Pixhawk™, i.e. the *de-facto* standard for self-developers of drones, since it is made with open source code based on a Linux™ operating system. It allows for advanced user to customize the operative functions of their drones (3D Robotics Inc., 2016);

- French producer Parrot™ sells a large number of drones, i.e. it has a share of about 20% in terms of unit sold, but it covers the low-cost segment and it results in less than 10% in terms of budget (Parrot SA, 2016);

- US producer AeroVironment™ that exploited its experience with military drones in order to produce a drone dedicated to law enforcement applications, i.e. the Qube™ model. It has a market share of less than 5% (AeroVironment Inc., 2016);

- Swiss producer SenseFly™ that is specialized in the development of professional systems with advanced capabilities. It manufactures the model Ebee™ that is the most important fixed wing system currently available. It is used for mapping applications as a low-cost replacement of manned aircraft. Sensefly™ has a limited share of market, i.e. less than 5%, but it is a leader among drone producers for professional surveying applications. Moreover, it has been acquired by Parrot™ in the year 2012. SenseFly is a sort of hybrid SUAS company, since it provides both platforms and services (SenseFly Ltd., 2016);

- Chinese producer Yuneec™ that produces a rotary wing drone named Typhoon™ that is a low-cost alternative to DJY™ Phantom™. It was funded recently, but it has already gained a share in the order of 5% of the overall SUAS market (Yuneec, 2016).

Regarding SUAS Service Providers, three main examples can be considered (Drone Industriy Insights, 2016):

- US company MAVRX™ that provides services to support precision agriculture. It declared a total of $11.9M funding in the year 2015 (Mavrx Inc., 2016);

- UK company Sky-Futures™ that provides oil and gas pipeline inspection services. In the past these services were developed using helicopters, but Sky-Futures™ was able to integrate the new technology into its core business. It declared a total of $11.8M funding in the year 2105 (Sky-Futures, 2016);

- US company Cape Productions™ that provides video services to support movie producers and sport tv channels. It is the first company to receive a permission from FAA to fly its drones near the public. It declared a total of $11.6M funding in the year 2015 (Cape Productions Inc., 2016).

Regarding the overall budget related to SUAS worldwide, it is estimated a value of $8.2 billion by the year 2018 (ABI Research Inc., 2016). The study was carried out by integrating sale information by SUAS vendors and service providers, the number of flight licenses requested and SUAS customer surveys. The number is consistent with similar market research (AUVSI, 2016).

4. SUAS Services and Open Services Innovation

The scope of this section is to demonstrate that SUAS Service Companies are structured as Open Service Innovation Companies. While both type of companies, i.e. SUAS Platform Providers and SUAS Service Providers, can be classified in this form, the role of SUAS Service Provided has been highlighted in this paper, since the number of service providers tends to be much larger worldwide, while platform providers tend to be mainly focused on the companies reported in section 3. Consequently, a wider interest is reported on service providers rather than on platform providers.

4.1. Definition of Open Services Innovation

The definition of Open Service Innovation Companies is given by Henry Chesbrough (Chesbrough, 2011). Open Service Innovation Companies are described by Chesbrough as an evolution of traditional Product Based companies. The latter are the ones based on a standard product catalogue that fund their business on licensed and patented products developed by internal R&D employees. This is the standard model of companies since new fast digital communications have been available, such as Internet and last generation digital mobile communications. Conversely, Open Service Innovation Companies are distinguished by a structure that has a complex interface with external sources in order to provide satisfactory and up to date solutions to their customers. In particular, while the focus on traditional companies is related to the “product”, the focus of Open Service Innovation Companies is related to the “service”. For instance, a traditional company can be associated to a manufacturer of cars, while an Open Service Innovation Company is the one that provides advanced car rental services including all aspects that have interest for the customer, such as pick-up and return procedures, insurance, maintenance and repair.

The main differences between Product Based Companies and Open Service Innovation Companies are reported in table 1 (Chesbrough, 2011).

In the following section, the categories reported in Table I will be discussed considering the typical organization of SUAS Service Company in order to demonstrate the correctness of its classification as a Service-Based Company.

	Product-Based Company	Service-Based Company
Customer relationship	Transactional	Relational
Value	From exchange	In use
Customer	Consumer	Co-creator
Quality	Zero defects	Customer satisfaction
Core competences	Built on assets	Built on processes

Table 1 – Comparison of Product-Based Company with Service-Based Company (Chesbrough, 2011)

4.2. Organization of a SUAS Service Company

First of all, *customer relationship* is considered. It is worth noting that the typical customers of SUAS require a specific service to be provided rather than flying a particular SUAS model. Examples have been already discussed in previous section, such as harvesting monitoring, pipeline monitoring, surveying, and aerial remote sensing. The fact that this service can be provided by SUAS is a secondary detail that has minimal interest for customers. The UK company Sky-Futures is a classic example of such condition. In the past, the service of pipeline monitoring was realized by exploiting manned helicopters. SUAS are currently used in replacement of helicopters because they provide a significant cost reduction and they are more fitted to execute dull repetitive tasks. As a consequence, a transactional relationship with costumers is not feasible, since the typical costumer is not familiar with SUAS piloting and flight regulations. The most proper solution is a relational customer relationship that allows for selecting customized solutions to fulfill user requests by exploiting SUAS capabilities.

Regarding the *value*, SUAS service providers are usually paid in terms of flight hours. Consequently, the value is determined by SUAS use rather than in transactional form.

As reported in the first paragraph, a customized solution must be defined for each customer. Flight safety prescriptions and hardware can have significant change from application to application depending on the zone that must be overflown and by the requested flight plan. A constant integration between customer and company is mandatory to fulfill costumer requirement. The effort required to costumer makes it eligible as *co-creator* of SUAS service. Indeed, the service creation process must be regulated by a proper Non-Disclosure Agreement that defines the correct policy to reuse the developed solutions in future applications.

In the case of SUAS Service Providers, the quality assurance is determined not only by defining a proper Compliance Matrix to ensure fulfillment and traceability of requirements. Moreover, specific surveys are developed to assess the level of customer satisfaction by scoring SUAS Service Providers results. Most SUAS Service providers' websites have reserved sections where the costumer can fill the surveys. To this end, quality assurance includes customer satisfaction. For instance, a remote sensing service with zero defects can produce data that have poor significance for the user. The resulting perception of service quality by the costumer is poor, too. Consequently, if a SUAS Service Provider plans to offer a useful service to its customers, quality must account for *customer satisfaction*.

Finally, core competences must be focused on processes rather than on assets. Indeed, the creation of a SUAS based service is a complex process that involves platform selection, flight plan determination, remote pilot selection, and request of authorization from flight safety agencies. The competences of company employees must be *built on process* in order to compel the above reported tasks.

Figure 1 depicts a reference organization chart for a SUAS Service Provider.

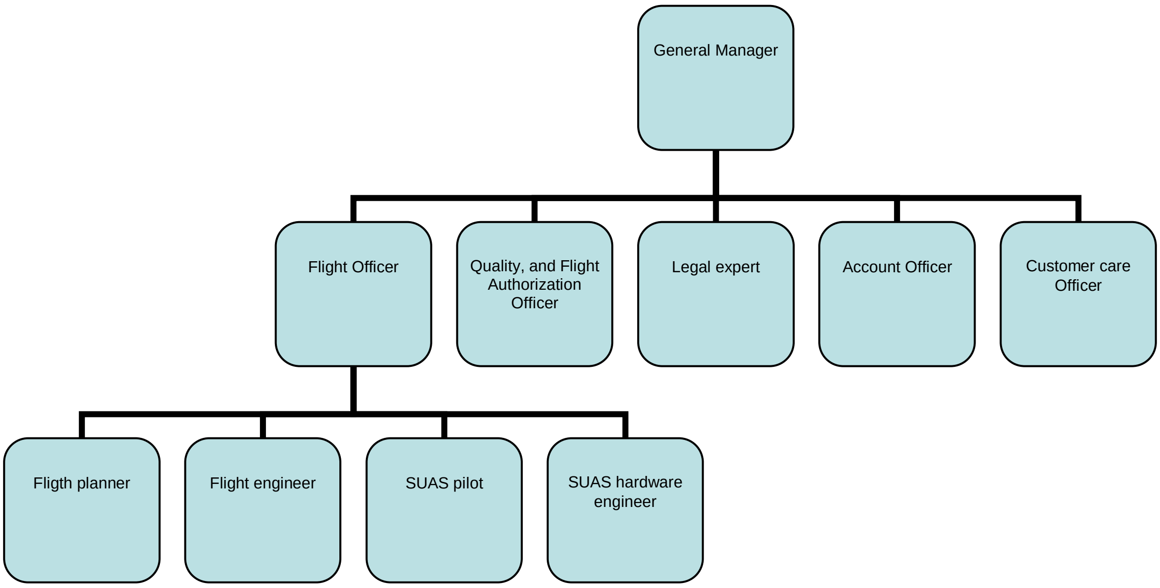

Figure 1 – Organization Chart of a SUAS service provider

The *General Manager* is the high-level responsible of company activities. This position is dedicated to a professional with an experience of several years in the business of aerial services. He coordinates all the company activities.

At second level six officers are needed, such as:

1) A *Flight Officer* who coordinates all flight activities. This figure needs knowledge in air traffic regulations, SUAS piloting, and SUAS platform handling. He is responsible of four people, such as:

    a. A *Flight Planner* who is responsible of providing the flight plan of SUAS for each service requested by customers. He needs knowledge of air traffic regulations;

    b. A *Flight Engineer* who develops all pre-flight and post-flight technical activities, such as installation of ground station and pre-flight tests;

    c. A *SUAS Pilot* who performs piloting activities during flights. In case of use of several platforms, i.e. fixed wing and rotary wing, or performing long endurance flights, more than one pilot is needed;

d. A *SUAS Hardware Engineer* who performs platform procurement, maintenance, and configuration management;

2) A *Quality and Flight Authorization Officer* who monitors and handles quality assurance processes in the company. Moreover, he is responsible of interactions with flight safety authorities in order to attain the requested Certificate of Approval for each operative scenario needed to provide a service to a customer;

3) A *Legal Expert* who will be responsible of all legal aspects related to SUAS operation, such as accident management and privacy issue handling;

4) An *Account Officer* who performs all requested accounting and financial activities inside the company;

5) A *Customer Care Officer* who manages the interactions with customers.

The above reported organization chart can be used in a flexible form since some figures, such as Quality Officer and Legal Expert, can be covered by a single person if the size of the company is small. In case the company is large, some figures can be covered by multiple persons, such as pilots.

4.3. SenseFly™ case

Even if it is mainly a SUAS Platform Provider, Swiss company SenseFly™ case will be discussed in this subsection because it presents several distinctive issues related to Open Service Innovation. Moreover, SenseFly™ is a hybrid SUAS company since it provides several services to its customers, as reported in section 3. In fact, most distributors of SenseFly™ drones are SUAS Service Providers rather than SUAS Platform Vendors. This is due to the high technical added value of platforms developed by SenseFly™ and the relevant high level of cost, if compared with typical cost of SUAS platforms. These circumstances determined the need to provide a strong support to final customers in order to let them derive the maximum performance from the use of SUAS.

SenseFly™ was funded in the year 2009 by Prof. Jean-Cristophe Zufferey and Dr. Antonie Beyeler. They were experts in Robotics and Microengineering. Originally, it was a sort of spin-off from Swiss Federal Institute of Technology in Lausanne (EPFL). Since the start of the company, the team of researcher was integrated by Mrs Andrea Halter, i.e. a specialist in Geodesy, and Mr Cyril Halter, i.e. an expert of industrial qualification of laboratory prototypes with specific focus on aeronautics. This team developed an integrated platform including a lightweight fixed-wing drone with electric propulsion named Ebee™, a customized tool to perform drone remote control, and an advanced software, i.e. Emotion Flight Data Manager™, to realize post-processing mapping applications based on data.

The most important points related to Ebee™ development can be summarized in the following list:

1) The company has a strong background in terms of research on robotics and automation. In particular, Prof. Zufferey co-authored several research papers and books on topic related to bio-inspired systems (Zufferey; Floreano, 2006)

(Beyeler; Zufferey; Floreano, 2009). Thanks to this research he was able to add advanced features to SenseFly™ systems, such as visual Sense and Avoid and advanced fail safe strategies. The results of Prof. Zufferey research are available to the open audience in his publications. Currently, just one patent is recorded to SenseFly™ and it is related to a single drone and Prof. Zeuffrey is not in the list of inventors as reported in the patent database Google Patents;

2) The fixed wing configuration is a main advantage to overcome typical rotary wing limitations, such as reduced range and endurance performance and high sensitivity to wind;

3) Even if the fixed-wing configuration has several safety issues, i.e. a fixed-wing aircraft need to have a consistent speed to keep sustained while a rotary-wing aircraft can perform stationary hovering, they are mostly bypassed by SenseFly™ Ebee™ thanks to the following solutions:

    a. Lightweight configuration, i.e. maximum takeoff weight in the order of 0.7 kg, that ensures low level of damage in case of collision;

    b. Adavnced Bio-Inspired Visual Sense and Avoid System installed onboard;

    c. Advanced Fail-safe system that support the best control effort even in case of failure;

4) The system is easy to use. It can be launched by hand. It flies automatically over a path of waypoints that can be transmitted by means of a tablet. It performs safe belly landing;

5) Sense-fly performs end-to-end support from providing the SUAS platform to the software for advanced image processing. The customer is enabled to produce high accuracy 3D mapping by following a simple procedure from flight to the generation of output;

6) SenseFly™ makes an estensive use of web resources such as multimedia video and social networks. This approach helps to have a direct contact with costumers.

In the year 2012, SenseFly™ was acquired by large scale French SUAS manufacturer Parrot™. The acquisition determined no fusion between the two companies. Conversely, a synergic approach was followed, such as:

- Parrot™ acquired some advanced technological solutions to be implemented into its SUAS;

- SenseFly™ could exploit the large sales network and the assessed management capabilities of Parrot™.

The up to date price of Ebee™ is in the order of 20k€, i.e. about 10 times the average price of a SUAS. Indeed, it is an advanced platform developed for high level professional applications.

Currently, SenseFly™ has more than 100 employees and an annual revenue of about 6.3M€. Ebee™ has collected an overall of more than 50000 flight hours.

After joining Parrot, also a rotary wing drone has been developed named Albris™, i.e. an upgrade of previous model named Exom™. It exploits high level micro technology developed for Ebee™ to be used for inspection purposes and mapping on small areas.

As a result, SenseFly™ can be undoubtedly classified as an Open Service Innovation Companies by considering the following issues:

– It promotes knowledge sharing with industrial partners, research centers, and customers;

– It has a relational relationship with customers by means of several multimedia documents available on the web and a constant attention to social networks;

– The results of R&D activities are usually made available to public by means of research publications;

– It has a main attention on customer satisfaction. For this reason, SenseFly™ has developed a network of more than 200 qualified point of sale worldwide in order to guarantee a constant and efficient support to its customers;

– Sense Fly™ core competences are built on processes. Indeed, they provide self-contained solutions to customers from SUAS platform to processing software, thus allowing for a complete end-to-end service support.

5. Conclusion

This paper presented a study on the companies involved in the development of Small Unmanned Aircraft Systems, i.e. drones, and relevant services. The main companies involved and relevant activities were presented. The compliance with Open Service Innovation company model developed by Chesbrough was discussed. The typical organization of Drone Service Providers was presented. Finally, the case of SenseFly™ was discussed in order to show a practical application of the presented model.

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