

## COMMERCIALIZATION STRATEGY IN MANAGING ONLINE PRESENCE IN THE UNMANNED AERIAL VEHICLE INDUSTRY

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### ABSTRACT

*Unmanned aerial vehicles (UAVs), commonly referred to as Drones, originally gained international prominence for warfare and surveillance. Today, Drones are commercially made and distributed to the general public. Academic researchers have studied the technical aspects of Drones. However, with the public interest and demands for Drones, there is a need to study commercialization of Drones, specifically management issues and strategies. The purpose of this article is to shed some light on the commercialization of Drones by reviewing websites of companies that market Drones. We identified four countries where businesses have been established to capitalize on the public demand for Drones. We selected twenty-five companies in each of the four countries. Each of the selected companies sponsored websites aimed at capitalizing on the potential Drone market. We conducted a content analysis of each of the 100 company's websites. The results of our content analysis identified two significant variables that differentiate advanced, or nascent commercial endeavours from those companies making a "sort-of attempt" to get on the Drone bandwagon. Our analysis identified two significant variables that distinguished the websites on mature Drone companies. The two variables: attention to legal compliance; and insurance coverage. Our analysis of website data supports our conclusion that a Drone company website should effectively communicate their management position regarding two crucial issues: legal compliance and insurance coverage.*

**Keywords:** *Unmanned aerial vehicles, UAV, drones, UAS*

### 1. INTRODUCTION

The commercial application of Drones and Drone technology is in its infancy stage. Drone technology may become a substantial major technology advancement rivalling that of the automobile. Drones possibly will have an impact on farming by assisting farmers with maintaining crops and expanding output. Drones may well assist firefighters by targeting pin point release of anti-flammable chemicals at key times to stop expansion of wildfires.

According to Australian Certified UAV Operators (2016), there are several terms for remote vehicles: 'Unmanned Aerial Vehicle' (UAV); 'Unmanned Aircraft System' (UAS); 'Remotely Piloted Aircraft System' (RPAS); and 'Drone, with a reference to 'an aircraft that is flown from a remote location without a pilot located in the aircraft itself.' The terms are often interchangeable, with 'drone' historically referring to UAS air weapon. However, popular culture now uses the term as a generic descriptor for all classes of unmanned or remotely piloted aircraft (Australian Certified UAV Operators, 2016). This paper will refer to these systems as 'Drones' (UAVs) in keeping with popular business and media descriptors.

Achille (et. al., 2015) list various types of UAV vehicles including: unpowered (balloon, kite and glider), fixed wings, copter and multi-copter platforms. Each has different advantages and handicaps referring to different tasks and applications. Hobbyists have flown radio-controlled aircraft and helicopters for many years. Drones of commercial value are the result of recent advances in microprocessors, GPS, sensors, batteries, motors, lightweight structural materials, and advanced manufacturing techniques. (Hazel and Aoude, 2015). Achille (et. al., 2015) give a wide price ranges from 1000 to 50,000 Euros for commercial drones, depending on the on-board instrumentation, flight autonomy, payload, and automation capabilities. However, prices are dropping even lower, with a search of Amazon.com for 'drones with cameras' resulting in non-commercial modules for under 50 Euros (Amazon.com, 2016).

With the advent of affordable drones on the marketplace, businesses need to be aware of how the technology can improve their service offering and contribute to the financial growth.

## **2. LITERATURE REVIEW**

In 2014, the global commercial drone market size was estimated to be 552 million USD and is expected to grow at a compound annual growth rate (CAGR) of 16.9% to 2022 (Grand View Research, 2015). The USA Drone market is expected to grow from 300 million currently to over 1 billion in 2022, it is expected that agriculture will emerge as the dominant application. Grand View Research findings imply that North America will dominate the global industry in commercial sector applications. They also expect Europe to likely grow significantly due to relaxations in regulations as well as, increasing use in law enforcement and agriculture.

A Business Insider (2015) report indicated that the global commercial drone market will focus around applications in agriculture, energy, utilities, mining, construction, real estate, news media, and film production. The report estimates that growth in the commercial market of 19% annually while the growth in military will level off at a 5% growth rate. Our review literature will focus on three dimensions of the Drone industry; Commercial Setting; Legal Aspects; and Insurance.

### **2.1 Commercial Setting**

The use of Drone's has progressed into many different commercial avenues in a variety of different industries. Around the world, most commercial drone applications are in early stages, although some are farther or even could be considered 'mature,' such as precision agriculture in Japan or border patrol (Hazel and Aoude, 2015). According to Helmut Kaiser Consultancy (2015), the commercial market is now dominated by small companies and startups, but soon multinationals will enter this highly profitable market. The firm states that some of the major applications will be military, inspections, assessments and surveying, monitoring, search and surveillance, research activities such as aerial imaging, geological surveys, mapping and exploration, wildlife monitoring and spectroscopic measurements

One of the first commercial applications that firms actively pursued was aerial photography. Professional-quality cameras were added to Drone's, thus resulting in much more affordable pricing for firms compared to the high cost of planes or helicopters (Hazel and Aoude, 2015). The authors suggest that aerial photography can now be considered a mature Drone application.

The National Association of Realtors in the U.S. is encouraging the use of drone technology to enhance the process of buying and selling real estate with videos and images, as the technology can provide buyers and sellers with more information and visual insights. (Lowenstein, 2015) Lowenstein, (2015) showed the Drone capabilities allow agents and property managers to obtain views not otherwise available to prospective buyers, and the technology also allows additional property inspection. Schulte (2015) suggests that aerial photos and videos allow agents to showcase certain property attributes that are difficult to showcase with traditional images, such as expanse of a home's mountain views and distance from a neighbor's home.

Although current U.S. regulations require legal exemptions for commercial drone use, the real estate industry was one of the first to recognize the power of the technology. Drone use for American real estate firms was given the first exemption by the FAA in January 2015 (FAA, 2015a). The number of exemptions for real estate firms using drones has increased to 770 as of January 2016 (FAA, 2016).

Survey work is another area that can be conducted safely and economically with drones. Achille (et. al., 2015) described how in 2012, a major earthquake struck Italy, resulting in damage to many buildings. One of these was a Cultural Heritage site of Santa Barbara Church in Mantua. Traditional use of crane to assess the damage would result in higher costs and time expenditures. Instead, drones with lasers were used to analyze the building and eventually create 3D models. This solution allows the problem of surveying tall buildings in congested areas to be solved effectively.

Pietras (2015) states that farmers can use Drone's to survey large areas of crops in a short period of time, with the purpose to monitor for pest infestations or disease. They can also to supply fertilizer

and water to crops. Pietras also gives an example of Lockheed Martin's Marlin AUV, which provides a safer and faster method of surveying of structures in the oil and gas industry.

Tuttle (2015) suggests the insurance industry holds some of the most compelling possibilities for using drones, and insurers were about the first entities that applied to the U.S. FAA for exemption to deploy drones for commercial purposes. The Drones purpose would be for use after catastrophic events. More specifically they can go where adjuster's claims and risk engineers could not because of structural damages that may not be safe for humans to enter. Tuttle (2015) estimates a 50% increase in efficiency in the insurance industry as the ability to combine notes with photos and video collected by drones reduces the needs for follow-up visits.

The sports industry has already been making effective use of drones for sporting events. Drones were used to film ski and snowboarding events in the Sochi Olympics. Camera operators find them more flexible than cable-suspended camera systems (Feltman, 2014). Commercial Settings

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## **2.2 Legal Aspect**

Commercial use of drones raises many legal and ethical concerns particularly with regards to privacy with the US Fourth Amendment and EU Data Protection Framework and presents a challenge for civil liberties (Voss, 2013). The legal right to fly Drone systems differs among countries and regional authorities, with regulations changing to catch up with the technology. In the U.S., the Federal Aviation Authority (FAA) divides drone usage as either for recreational use or for commercial use. The FAA (2015b) advises that recreational users must register UAVs if it weighs more than 0.55 pounds, and cannot be used for business purposes. For commercial users, rules are more stringent. If

operators want to use the UAV for commercial purposes, the FAA (2015b) requires them to petition for Exemption with a civil Certificate of Waiver or Authorization (COA) for civil aircraft to perform commercial operations in low-risk, controlled environments. As of January 2016, there were over 2150 exemptions (FAA, 2016). In the first year accepting exemption requests, the FAA approved almost 500 out of about 1,500 petitions. Over 85 % of the firms were small businesses, with 350 in real estate, 301 in general aerial surveying and 164 in the agriculture sector. Few exemptions are given in insurance (25), emergency management (38) or inspections (78) (AUVSI, 2015). AUVSI explains that part of the reason for the exemption are that low-risk operations, such as aerial survey of rural farmland are regarded as 'safe' and granted access to airspace with minimal regulatory barriers. However, insurance firms or inspections are more likely to occur in crowded urban 'unsafe' areas, thus having fewer exemptions granted.

In the U.K., permission to operate a Drone for 'aerial work' is required by the Civil Aviation Authority (CAA, 2015). The CAA also requires a potential Drone operator to demonstrate pilot competence before any operating permission is issued. Commercial operators must adhere to specific regulations dependent upon the mass of the aircraft. For aircraft weighing less than 20 kg or being flown within direct unaided line of sight or away from congested areas, no additional permission is needed from the CAA. Those with special circumstances would need to file for flight permission with the CAA and ensure sufficient safety measures have been put into place to ensure the UAV will not endanger anybody.

According to Wilde Beuger Solmecke Rechtsanwälte (2014), following an amendment to the German Aviation Act, civilian drones are now recognised as aircraft. Non-commercial drones less than 5 kilogrammes are subject to no specific aviation legal requirements. Commercial operators using drones up to 5 kg must apply for a flight permit from the relevant federal state authority, and Drone's over 25kg are not permitted to fly. Nielson (2015) states that although current German law does require licensing, this may change. In November 2015, the German Federal Ministry of Transportation announced it planned to introduce a license for commercial drone pilots. In addition, all drones from 500 grams or greater shall have to be registered in order to locate the pilot in case of misuse or accident.

France was one of the first countries to implement legislation specific to commercial use of drones (Charles and Purcell, 2014). The authors state in 2012, the French Ministry of Transport's Civil Aviation Authority (DGAC) enacted two decrees: decrees: the Aircraft Decree relating to the design of drones and the Airspace Decree relating to the use of drones in French airspace. The manner in which a civil drone may be operated is dependent on the type of drone and its intended use based on one of into categories. Depending upon the operational scenario and type of commercial use, the DGAC may require pilot certification, training and an aircraft pilot license. Operational scenarios (S1, S2, S3, and S4) indicate distance, height and type of aircraft, and require different licensing (Federation Professionnelle Du Drone Civil, 2016).

### **2.3 Insurance**

Stone (2014) explains that in addition to regulatory and legal challenges, there are many complex liability and coverage issues related to insuring commercial Drone's. The author cautions that insurance carriers are currently in the process of developing policies to cover the technology, yet because it is a new field, there is little guidance or clarity. There are three insurance areas to consider when using commercial Drone's: workers compensation, property coverage and liability coverage. Liability coverage would include protection for personal injury, such as if the drone falls on someone, but would also cover invasion of privacy. Property damage would apply to the Drone unit, while workers compensation refers to employees engaged in work related injuries (Stone, 2014).

The mandate for Drone commercial insurance depends upon each country's legal requirement. In the U.S., the FAA requires drones to be registered, but had not addressed the issue of insurance coverage. For personal use of drones, most homeowners insurance would cover personal property, although there may be an exclusion for model aircraft (Leefeldt, 2015). As of the date of this research, mandatory Drone commercial insurance is not mandatory, although it should be an integral part of a firm's business operations to protect assets, and commercial drone operators should assume that customers and partners will require them to certify they are insured (Global Aerospace, 2016).

Canadian law requires that commercial Drone operators flying under Canadian Civil Aviation Regulation (CARs) exemption must have liability insurance of no less than \$100,000 (Transport Canada, 2014). All European Drone operations fall under the EU Regulation 765/2004, requiring operators to purchase third-party liability insurance, and defines limits based on the mass of the Drone). However, the regulations are not clear cut and some calls have been made to create a better understanding between commercial and model aircraft (UK Parliament, 2015). Lloyds (2015) indicates that proposals are underway in Europe to harmonize liability for operators and introduce a more sophisticated insurance requirement that reflects the size and weight of the Drone, because current regulations impose the same minimum requirements for all commercial Drone's and manned aircraft.

In addition to EU drone operators being covered under EU Regulation 765/2004, other country-specific regulations may be applied with regards to insurance. In Germany, the German Aviation Act and Order requires flights permits to be obtained by commercial operators, and one of the requirement to obtain a permit is to obtain proof of liability insurance (Wilde Beuger Solmecke Rechtsanwalt, 2014). The article explains that many third-party liability insurance policies exclude damage caused by drones, so it may be necessary for German operators to obtain special insurance, or even proof of pilot training for drones to be use. UAVS (2016) states that although EU insurance is mandatory, they have concerns that Drone operators may not be carrying appropriate third-party liability insurance. Some small firms may be relying on their general Public Liability Insurance without studying their exclusion clauses carefully. They recommend commercial operators secure specific Drone insurance for aerial work.

### **3. METHODOLOGY**

Our study conducted a content analysis of business websites that market drone services in four countries. Our goal was to identify Drone business via their websites in each of the four countries: USA, UK, France and Germany. According to Business Wire (2015), the countries selected are contributing to the highest demand for UAVs. All firms selected specialized in marketing the commercial use of Drones.

We focused on Drone businesses with commercial functions as opposed to non-commercial ventures such as emergency services. The following business functions were chosen. These serves are photography, TV/film, real estate, insurance/inspections, aerial surveying, and sports.

An additional set of criteria addressed Drone liability insurance. Each web site was reviewed for any text that indicated whether the firm had specific drone indemnity.

Finally, each site was reviewed for their adherence to governmental legal requirements, and if the firm had legally qualified or trained operators based on local requirements. As each country does have different laws, the criteria were modified for each specific country. In the UK, data was collected on whether the firm indicated they had CAA approval, or if they had the UK CAA logo somewhere on their Web site. Also, data was collected on whether the firm's Drone pilots had Basic National UAS Certificate (BNUC™) pilot qualification. According to EuroUSC International (2016), the BNUC-S™ is the preferred pilot qualification standard required by many European National Aviation Authorities before permission for aerial commercial work is granted to an operator.

For French sites, two legal/qualification criteria were collected. The first was whether the firm mentioned it had DGAC agency certification, or displayed the DGAC logo. The second was whether the use of drones for the firm was approved by the Directorate General of Civil Aviation for operations at either S1, S2 or S3 operational scenarios. For Germany, there is no current German law that requires licensing (Nielson, 2015), so this could not be a marketing tactic on German Web sites. Instead, there is a German Association for Unmanned Aviation, a working group for UAVs in Germany (UAV Dach, 2016). For the USA, data was collected on whether the firm indicated they had FAA exemption approval to fly UAVs, or if they had the FAA logo within their Web pages.

### **4. RESULTS**

Figure 1, is an aggregation of the statistics for each of the four countries. Column two shows that for the governmental legal requirement, there is a significant different in countries for firms to show if they adhere to government laws. In the UK, 88% of firms show this marker on their Web site, while the

numbers are much lower in France (64%) and the USA (52%). The majority of UK UAV firms (68%) advertise the fact that they carry drone liability insurance, while about a quarter of firms in the three other countries do so.

Figure 1 also displays an aggregate of the types of services that UAV offer. Nearly all firms offer aerial photography services while the numbers offering TV/film and surveying are similar (low of 44% to high of 6%) in each country. The number of firms offering services for the sporting industry is low, with an average of only 21% of firms engaging in this activity. There was a sizable difference in the number of firms offering real estate and insurance. Only 24 % of German firms were engaged in real estate aerial photography, while a very high number (74 %) were engaged in the US, and numbers for France and UK were similar. Insurance and inspection service offerings were highest in France (72%) while much lower in the other countries.

For the UK, the majority of firms (88 %) had either text or a logo indicating they are approved CAA UAV operators. Lack of the CAA logo does not necessarily mean these firms do not have CAA license to operate, it merely indicates that the firm is using the CAA approval as part of its online marketing to assure potential customers they are an approved CAA operator. Fifty-six % of UK firms indicate they have BNUC approval. 68% of firms do mention they have required liability insurance to perform drone work.

A majority of UK UAV firms (92 %) indicated they could do basic types of aerial photography. Sixty-eight % could cover TV/film services, and 52 % real-estate functions. Forty-four % did insurance/inspection and survey applications while relatively few indicated they used drones for sporting events.

The findings for UAV French firms are that 62 % of firms display evidence that they comply with DCAG government requirements, with only 20% showing they are approved for flying. Twenty percent of firms mention that they have drone liability insurance. The majority of French firms state they can perform UAV services for general photography (84 %), TV/film (64 %), insurance (72 %) and survey (68 %). A minority of firms engage in services for real estate (48 %) or sports (24 %).

Since Germany has not country-wide legal requirement for drone licensing, the results in Column two showed if the firm was a member of the UAV Dach industry group, of only which one firm was. Only 24% of firms indicated they had liability insurance. Most firms did emphasize their business in aerial photograph (88%) and TV/film (52%). Less than half of the firms mentioned they could do Drone service in real estate, insurance, surveying or sports.

The Drone Web site statistics for American firms show that 52% show that they have the FAA exemption requirement, while 28% show liability insurance. All firms do aerial photography, the majority mention real estate (72 percent) and surveying (52 %). A minority of firms mention TV/film, insurance and sporting as part of their services.

Country	legal	Ins	Photo	TV / film	Real estate	Ins & Insp	Survey	Sport
UK	0.88	0.68	0.92	0.68	0.52	0.44	0.44	0.24
France	0.64	0.2	0.84	0.64	0.48	0.72	0.68	0.24
Germany	NA	0.24	0.88	0.52	0.24	0.36	0.36	0.12
USA	0.52	0.28	1	0.44	0.72	0.48	0.52	0.24
Total	0.68	0.35	0.91	0.57	0.49	0.5	0.5	0.21

**FIGURE 1: TOTAL DRONE STATISTICS**

## 5. IMPLICATIONS AND DISCUSSION

It should be noted that the firms in this study listed a number of specific commercial Drone services on their Web sites. It may be possible that some firms did provide other services, but did not market them on their site. In the case of UK firms, it is a legal obligation for the firms to obtain CAA approval to legally fly. Yet only 88% of firms have the CAA notification on their site, this leads to two possibilities. First, the firms may not actually have CAA government approval, in which case they are

operating illegally in providing drone aerial services. The second possibility is that these companies do have the authorization. However, they do not fully utilizing their authorization in effectively marketing Drones to potential customers.

Also, it should be noted that the firms in the UK make better use of providing notice of their adherence and credibility to meeting government regulations and insurance than organizations in other countries. The knowledge that the Drone firms adhere to legal regulations as well as carry required insurance is of considerable advantage it establishes company credibility and often creates a bond of Website trust. Hidayanto (et. al., 2014) states that customer trust has a positive and significant impact to customer intention to purchase services. A study by He (2011) found that credibility markers, such as institution-based trust antecedents can have a significant impact on positive customers trust in e-commerce. Such factors include as third-party assurance (eg. Government laws) and certifications. It appears that many drone firms, especially in European countries, do not fully take advantage of their adherence to government and insurance credibility markers on their Web sites.

A discussion of customer's views of the firm and eventual willingness to do business with a specific Drone firm has implications for the types of products advertised on the Web sites in this research project. Hidayanto (et. al., 2014) performed a study of customer trust in e-commerce firms and found that customer perception on company scale could impact trust, a big company is likely to provide more diverse and various products, thus gaining more trust. The results of this study showed that an average of 91% of Drone firms denoted they had aerial photography, while approximately half did TV/film, real estate, survey and insurance. What might be interesting to conclude is that American real estate firms are much more focused on providing real estate services while German firms lag in this area. This is an area that may be further explored in future studies as to possible reasons for the lag in German firms pursuing this area of Drone service. Another area of implication is why American, UK and German firms are making much less use of Drone services in the area of insurance and surveying compared to their French counterparts. Finally, sports is an area where Drone services could possibly have great application, yet a distinct minority of firms cater to this type of business.

## **6. CONCLUSION**

Our study of business websites that market and distribute Drones sheds light on the current state of the drone industry. We found from conducting research on 100 websites in four countries there is a difference in the types of Drone services and legal aspects that firms emphasize depending upon the country. It is clear that not all firms are emphasizing their adherence to government requirement on licensing or insurance. Thus, many Drone companies are self-limiting their marketing potential and not establishing user trust with their Drone firm. Our study found that most Drone companies are engaged in drone photography and film services. However, we found one of the most significant variable that dictated or affected the use of website content was the origin of the company's country. Country impact tended to govern company choices among the wide array in different services available to Drone firms. Our study suggests that firms in the relatively new field of managing and promoting Drone services may do more to enhance their online Web sites by taking full advantage of their insurances services and their adherence to regulations. Commercializing the distribution of Drones is an industry with great potential. The industry is in its infancy. Many companies will fail because their management strategy is weak and they do not pay attention to what is important to their customers. This study identifies two significant variables that Drone companies need to effectively communicate to their customers if they are to be successful. The future of the Drone industry appears to be very bright. However, it will be very competitive. Our research clearly shows that Firms who are successful in competing in commercializing Drone need to attend to website communication, paying particular attention to informing potential customers that "their" firm is effectively dealing with two important issues: (1) meeting legal requirements; and (2) having quality insurance. The ultimate objective for these firms should be to create websites that foster trust in all of their constituencies.

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