International Journal of Business, Human and Social Sciences
ISSN: 2517-9411
Vol:12, No:5, 2018

# Regulation, Co-Regulation and Self-Regulation of Civil Unmanned Aircrafts in Europe

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***Abstract*—**Safety and security concerns play a key role during the design of civil UAs (aircraft controlled by a pilot who is not on-board it) by the producers and the offer of different services by the operators. At present, European countries have fragmented regulations about the manufacture and use of civil drones, therefore the European institutions are trying to approach all these regulations into a common one. In this sense, not only law but also ethics can give guidelines to the industry in order to obtain better reports from their clients. With our results, we would like to give advice to the European industry, as well as give new insights to the academia and policymakers.

***Keywords*—**Ethics, regulation, safety, security.

## I. Introduction

THE European Aviation Safety Agency (EASA), as an Agency of the European Union, promotes the highest common standards of safety and develops common safety rules at the European level. This agency and their national equivalents monitor the activity of producers and operators of civil drones, but depending on the size of the drone, this activity could involve regulation measures or not, then other alternatives such as co-regulation and self-regulation can be used.

Taking into account the different regulation systems of the European members, we can find two groups of countries: countries regulation-centered, where legal regulation covers the majority of cases, and countries jurisprudence-centered, where co-regulation is enhanced. In general, few countries have taken self-regulation as a solution for some problems although in other industry sectors it has positive experiences. However, in the last years, new hybrid models propose joint decision-making among companies (self-regulation) or between companies and stakeholders such as the public administration (co-regulation). These models enhance reflection and comparison of the "best practices" to follow some excellent organizations to more ethical decision-making when legal regulation cannot cover every single case. Some economic and third-sector organizations, such as videogames, have developed their own rules or soft law in combination with public administration.

The regulation of small drones (less than 150 kg) depends on their national regulations. These regulations are mainly focused on safety parameters during the design of civil UAS which are applied to the producers and different services offered by the operators. Moreover, drones produce other concerns about their use on people's personal data (privacy) [1]. This is mainly an ethical issue that policymakers should work with stakeholders [2], especially in the case of micro-drones or indoor drones that do not require a flight license or a training to be used. But European regulations on data protection serves to reinforce this aspect of drones' use.

By 2016, more than 80% of the 65 countries with national regulations legislated about drones for two reasons: the increasing technology and high-profile safety incidents [3]. Even small mistakes could result in crashes that threaten the health, well-being, and property of the public [4].

By now, it seems that the necessity of visual line of sight (VLOS) and the lateral distance of the pilot (normally, 500 m) are the main shared parameters. Moreover, minimum lateral distances to the people are in the range of 30 m to 150 m. However, even if there are some similarities across countries, in the case of the civil drones there are frequent differences and for some authors co-regulation or industry self- regulation sometimes are very limited [5] although they have been positive in other sectors [6]. In the case of the civil drones, the point is to achieve the necessary interaction among stakeholders to produce a consensus of a public policy approach in an area where there is considerable uncertainty [7].

As a starting point, all drones' regulations have one common goal: "minimizing the risks to other airspace users and to both people and property on the ground" [3]. Therefore, national regulations frequently cover:

- Technical requirements (regarding the product).
- Operational limitations (regarding the operator: distance to airports/strips, limitations to fly over people or congested areas, prohibited areas, maximal flying height, VLOS, beyond visual line-of-sight, and so on).
- Administrative procedures (certificates, registration, insurance).
- Human resource requirements (qualification of pilots).
- Implementation of ethical constraints (data protection and privacy).

So, as we can observe, the majority of concerns are related to safety. However, from our point of view, also safety can be included in ethical limitations. Moreover, different current regulations, at least in the European Union, can cover privacy

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issues.

Regarding data protection, the current European Directive guarantees rights of access, rectification, erasure and blocking. And new Directives and Regulations on Data Protection (to run at the end of May 2018) include the same standards [8], [9]. But, to apply for them, it is essential to inform the subjects. Besides, the necessary storage measures should be applied when processing, according to the European Union Directive.

The European Union has developed some documents in order to clarify the regulation of civil drones. Current national harmonization actions undertaken by EASA define riskless open and riskier specific categories [3]. To reach a common legal framework, the European Union has developed several stakeholders' consultations although any legislation has been approved yet.

Industrial manufacturers and professional users are expected to play a key role and contribute to the decision about whether UAVs are going to be a tool for everyone or just for professionals [3]. Codes of conduct are the most used self-regulation tool to set rules and standards such as the promises by companies to regulate themselves in the general interest of society [10]. Some associations of manufacturers and operators of drones have developed codes of conduct [11] that could also provide guidance to regulators of in-place legal standards and practices [7].

As drones' technology changes fast, news organizations' adoption of drone technologies must be paired with clear articulations of their ethical use and full transparency with the public [12]. For example, information security seems to have less attention by regulations. However, some measures could be designed by default [13] to protect information and information systems from unauthorized access, use, disclosure, disruption, modification, perusal, inspection, recording or destruction [14]. Some concerns of security include hacking, hijacking, cyber-attack, or other types of vulnerabilities. Thus, the encryption of communications among all the devices could permit secure computer-RPAS communication and avoid unauthorized access by third-parties [15].

The training of drones' operators is a key factor for the industry [6]. Requirement of license and insurance can impose standards and ensure safety.

## II. Objective

The aim of our analysis is to categorize the concerns, measures, and types of hard-soft regulations that we find in the European Union. Therefore, we have studied regulation, co-regulation and self-regulation initiatives, highlighting the last two.

## III. Methodology

Our study is based on a content analysis from three sources of information: academic papers, policies and regulation proposals from the European Union, and the regulation of some European countries. From a comparative analysis of the results, we evaluate the different concerns, regulations and solutions of the National Laws and the European proposal.

After this evaluation, and applying benchmarking, we can classify the best practices that could fit better with each type of regulation: legal regulation, co-regulation and self-regulation.

## IV. Results

We have compared two European countries: Spain (regulation-centered) and UK (jurisprudence-centered). Anyway, the situation in the different European countries is very similar. Normally, co-regulation is used to provide practical training to the drones' pilots, while self-regulation in general is not developed in a specific code of conduct.

We focus our analysis in ethical tools such as co-regulation and self-regulation.

In Spain, Law 18/2014 Section 6$^{th}$ of the National Agency of Aerial Safety (AESA) works with different organizations to provide practical training to the pilots. In this sense, authorization for training is given to:

- Drones' manufacturer
- An organization authorized by a drones' manufacturer
- Licensed operator with own pilots
- An authorized training organization (ATO)

After the training and its assessment (as described by AESA), these organizations have to send to the Agency a dossier with all the required official documents. In this certificate, the drone's type and model that the person is able to pilot should be. This certificate is not necessary in all the cases although it could add value in case of professional works. Moreover, licensed pilot normally contracts an insurance, and this is another trust guarantee.

On the side of self-regulation, even if the Spanish Association of RPAS (AERPAS) is the bigger companies' association as it includes manufacturers and operators, it has no code of conduct. There is a smaller association, AEDRON, Spanish Association of Drones and Similar, just for operators, that has developed one [16]. According to it, some interesting points that do not cover the regulation are:

- Help other pilots in case of necessity
- To identify environmental impacts of the activity in order to minimize them
- To use biodegradable materials and recycle them correctly
- Sign correctly the operation's zone

In the UK, according to the Air Navigation Order 2016 (Article 94), the Civil Aviation Authority (CAA) does not give training but gives this competence to the National Qualified Entities (NQEs) to assess the competence of people operating small unmanned aircraft [17]. That is the Standard Permission to conduct commercial operations with a small unmanned aircraft (drone) weighing 7 kg or less.

Regarding self-regulation, the Association of RPAs ARPAS-UK, has its own code of conduct [18]. The code, very brief and general, is built on three specific themes: safety, professionalism, and respect. Some of their statements could be useful [18]:

- Report incidents to the police, National Authority or

relevant industry body.
- To guarantee RPAS will be piloted by individuals who are properly trained and competent to operate.
- To confirm RPAS will be piloted after an exhaustive assessment of risks. Reliability, performance and airworthiness are established standards.

To sum up, we can observe that self-regulation is focused on operators and the main concerns for an ethical use of their work are:
- To work in a helpful environment, prioritizing safety all the time
- To minimize environmental impacts
- To give all the necessary information and request permission to the people affected by the activity
- To report incidents
- To pilot when there is the competence and training to do it in a safety way, respecting the operating manual
- To analyze the risks associated with the activity, taking in mind the class of drone in use and the own limits

We think that these measures are in line with the draft of the new European Union regulation but could be useful, meanwhile that regulation is approved and implemented.

## V. Conclusion

From our point of view, manufacturers and operators are different actors, even if the traditional way to distinguish the standards is in active and passive measures all together for both groups. Manufacturers are key actors as they develop safety and security measures, but operators just can use them, so they are less involved in the design of the product. Manufacturers should work together with operators and other stakeholders in order to improve those measures because knowing actors' concerns can add a lot of value to the product.

Manufactures could be more centered in a safety by default and security by default designing of drones, to avoid risky cases in their use. Operators should have the appropriate training to avoid any risk, even if we talk about small drones. Maybe if the industry is able to develop very precise drones the pilots could be unexperienced people, but in this moment, we think that these cases should be reduced to indoor environments where the risks can be better assessed.

Even if ethics and codes of conduct can help manufacturers and operators of drones, a co-regulation where public agencies could give some kind of certificate will be an additional element to reinforce other kind of works where flight licenses are not compulsory.

As we have observed by now, in the European countries, co-regulation is only centered in the operators and practical training. The participation of other stakeholders to ensure safety and security is not included. However, other agencies could be involved with the industry, for example to ensure information security, product safety or data protection applying different best-practice standards. Moreover, from the side of regulation, it could help the introduction of a compulsory specific insurance to create a registry of devices to link each drone to its owner to help to assign responsibilities for illegal activities. In the same line, citizens see drones analogous to car regulations, therefore they should have "mandatory licensing, registration of devices, and mandatory third-party insurance" [19].

The European Commission [20] recommends that producers can help giving some advice in their packaging and using codes of conduct in order to self-regulate the industry. Other tools, as Impact assessment or the participation of a Data Protection Officer, could improve clients' reliability. Industry could react in a proactive way in the case where regulation is not enough.

## Acknowledgment

The European Project AiRT has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 732433. Reference: H2020-ICT-2016-2017.

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