UNIVERSITY OF LJUBLJANA
FACULTY OF ECONOMICS

MASTER'S THESIS

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DRONES IN BUSINESS PRACTICE IN SLOVENIA

Ljubljana, December 2016 MITJA VIDMAR

AUTHORSHIP STATEMENT

The undersigned Mitja Vidmar, a student at the University of Ljubljana, Faculty of Economics, (hereafter: FELU), author of this written final work of studies with the title Drones in business practice in Slovenia, prepared under supervision of prof. dr. Vlado Dimovski

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INTRODUCTION

The subject of drones is becoming an increasingly discussed and researched topic. Drones were first used for military purposes, but today there is a wide range of their potential usage, extending from leisure activities to business purposes, while also for police work (law enforcement). All these segments have one common point, which regard problems with regulatory and statutory filed, which is quite vague and still in the stage of preparation. Another crucial issue represents the problem relating to privacy issues and respecting the privacy of individuals. These two elements are they key obstacles for a massive (and routine) use of drones, which would bring many advantages, especially in the field of law enforcement and also in business.

In the present master's thesis we focus mainly on the issue of drones in business practices, as drones for civilian, leisure and especially business (commercial) purpuses is increasing. Drones or Unmanned Air Vehicle (hereinafter referred to as UAV) or Remote Piloted Aircraft Systems (hereinafter referred to as RPAS) are becoming popular devices, which boost drone industry all over the world. As these aircrafts are becoming more and more affordable for masses their popularity increased, while drone manufacturers and service providers saw an opportunity to increase their range of business practices. In fact, many experts reveal enormous numbers in connection with the use of drones and money, which are supposed to be generated within the drone industry. To highlight only a few of these estimations, we can mention Association for Unmanned Vehicle Systems International's (hereinafter referred to as AUVSI) predictions, which estimates a contribution of 82 billion $ to the US market in the period between 2015 and 2025 or estimations given by The Volpe Center, which predicts the US commercial drone market to reach 5 billion $ annually by the year 2035, while the global market is expected to be even several times bigger. On this basis, it is evident how important drone industry is, and will be in the future for both, the amount of money that is being generated in this business, as well as for jobs and entire global economy.

However, we need to point out an important limitation within this business, arising from legal regulative and directives concerning the use of drones, which is still quite loose, as regulative are still in preparation or in its early stages of adoption. Therefore, many drone companies are still reserved and cautious in their business practices. Experts, who are working on the legal framework regarding the use of drones are aware of the importance of drones' industry and business and thus strive to prepare a legislation that would satisfy both aspects (i.e. security and privacy, while also profitability). Countries (and continents) have different regulations regarding drones, but in the master's thesis we will mainly focus on the USA, EU and Slovenia, in order to analyze the regulatory framework regarding the use of drones in general, and for business practices. In addition, we will analyze the primarily usage of drones i.e. for military purposes, for law enforcement purpuses, for hobby and within business.

The purpose of such an approach is to investigate, whether there exist good practices in analyzed countries, which could be used as a basis or a model for establishment of legal framework in other countries where drones are a relatively new phenomenon. And, given that drones are being used much longer in the United States, than in the European Union and even more in Slovenia, we will consider the United states as a potential model for a good practice, and test our predictions, both in the theoretical and empirical part of the present research.

In addition, we conducted semi-structured interviews with four chief executive officers, who operate in Slovenian drone industry and with foreign partners and/or do business abroad. The latter will enable a broader applicative value of master's thesis as we expect that interviewed experts to point out and present their practical experiences in drone industry, what problems they face, how would/will new regulations affect or restrict their business practices, etc. In the overall study (i.e. in the theoretical and empirical part) we will derive from the key research question: How legal regulations affect the use of drones for business purposes abroad and how would regulations impact business practices in Slovenia? In addition, we will try to provide a value added element, by comparing chief executive officers answers to theoretical findings and try to point out proposals for improving Slovenian legislative framework.

Hence, in the present master's thesis we will deal with analysing drones' original purpuse i.e. military usage and their further potentials, mainly for recreation (leisure) and business practices. Both niches are becoming increasingly important and generate great amounts of money and understanding drones' legal framework is crucial for further understanding of drones's usage in business practices and the future of the latter. Namely, the regulatory framework is a key element of the existence and further growth of drones' niche since it can significantly restrict business practices and operations in this segment on one hand, or facilitate this industry, which represents a significant potential for job and economy growth, etc.

1 DRONES AND THEIR USAGE

1.1 Defining drones

Small, radio-controlled modeled airplanes are already in use for decades by enthusiasts. The first recorded use of such a device began in 1935, when the British Royal Navy used the model DH82 Queen Bee for exercise target shooting. But, in the last decade, the use of drones has significantly expanded for civil purposes, e.g. commercial and technological use. Drones can be use for many purposes varying from the military operations (for which were originally created) to photography, earth observation, searching for missing persons, repairs, hobby (Foster, 2015, p. 2), while also for humanitarian purposes, ranging from

mapping critical areas, search and rescue, dumping payloads of medicines and food to inaccessible areas, monitoring of power lines, etc. (Čičerov, 2013, p. 226), for law enforcement surveillance, fire suppression activities, tactical advantage and live imaging in hostile situations, property inspections, etc. (Reiss & Gergen, 2015, p. 2). In this respect, drone industry has an immense potential for large and small companies, therefore it is necessary to maintain high-quality manufacturing standards (Foster, 2015, p. 2).

There are many terms used for denoting these devices, ranging from: Drones (as a more populistic and media-used expression), Unmanned Air Vehicle (hereinafter referred to as UAV), Unmanned Air System (hereinafter referred to as UAS), Remote Piloted Aircraft Systems (hereinafter referred to as RPAS), but notwithstanding that these terms are used as a synonyms, there are some differences (hereinafter, Office of the Privacy Commission of Canada, 2013, p. 2; Brooke–Holland, 2015, p. 7):

1. UAVs (Unmanned Air Vehicle): a power driven aircraft, other than a model aircraft, that is designed to fly without a human operator on board;

2. UAS (Unmanned Air Systems): an unmanned aircraft and all of the associated support equipment, control station, data links, telemetry, communications and navigation equipment;

3. RPA (Remotely Piloted Aircraft): an aircraft, without a human operator on it, and flown remotely by a pilot, and it can carry a (non)lethal payload and

4. RPAS (Remote Piloted Aircraft Systems): a remotely piloted aircraft, its associated remote pilot station(s), the required command and control links and any other components as specified in the design.

In this respect, the International Civil Aviation Organization (hereinafter referred to as ICAO) defines drones in the context of RPAS, which will also become the internationally recommended term when ICAO will develop uniform standards for member states (Office of the Privacy Commission of Canada, 2013). But, currently all mentioned terms are being used in literature to define drones, hence we will use drones, UAVs and/or RPAS as synonyms in the present master's thesis.

Drones are defined in professional literature as an aircraft piloted by remote control (floating device or onboard computers), which is preprogrammed to automatically control a certain task or controlled by a radio-navigation system from the ground. Therefore, drone is a tool based on a system, which combines an aircraft and a ground control station in which there are a pilot and a controller. Drones are usually piloted by remote operation through wireless signals (see Čičerov, 2013, p. 226–229; Bracken – Roche, Lyon, Mansour, Molnar, Saulnier & Thompson, 2014, p. 8; Antoniazzi – Ronconi, Jessinski –

Batista & Merola, 2014, p. 137–138; Reiss & Gergen, 2015, p. 1). However, there are two types of drones: those which are piloted from a remote location and drones which are completely automated (Boucher, 2014, p. 5). Drone system consists of the aircraft, associated system components and support equipment (e.g. control station, computer software, data links, telemetry, communication systems, navigational tools, etc.) (Reiss & Gergen, 2015, p. 2). Today, more than 80 countries in the world are using Unmanned Air Vehicle (hereinafter referred to as UAVs), which triggered the interest of the EU and other international organizations to deal with this phenomenon, while they met with a number of legal problems, because of the lack of a legal framework for the use of UAVs (Čičerov, 2013, p. 226–229).

Nowadays, drones (UAVs) can be constructed from various materials, nevertheless major parts have been fit together from components of molded plastic. The National Aeronautics and Space Administration (hereinafter referred to as NASA) uses 3D printing, which enables the production of good prototypes (in the form of plastic models), which could be structured in real devices for exploring the surface of Mars. The United States of America (hereinafter referred to as USA or US) and United Kingdom's navies also use the 3D printers to make customized UAVs which would be positioned on ship deks. Also the commercial sector of drone industry uses 3D printers for creating plastic models in order to reduce costs and enable manufacturers to enter the market without worrying about the supply of components (Canis, 2015, p. 3).

Experts from the aviation space distinguish three basic types of aircraft, which do not have onboard pilots (hereinafter Canis, 2015, p. 1):

- aircrafts steered from a remotely controlled position;
- reprogrammed and possibly controlled aircrafts by onboard navigation system[1] and
- aircrafts designed with limited flexibility, which fly in a repetitive manner.

In what follows, we present a more detailed typology of drones (UAVs) in order to understand further context we are dealing with.

1.2 Typology of drones

Contemporary drones/UAVs have different objectives, purposes and characteristics (Blom, 2010) and are becoming well known and widely used all around the world, although US are still one of the major investors in UAVs' development and manufacturing (Davis, McNerney, Chow, Hamilton, Harting & Byman, 2014). Due to technological advances of drones and their ability of being used for many different purposes, public agencies and higher education institutions are increasingly considering of implementing drones/UAVs in

[1] Which maintains altitude, direction and location.

flight programs (Trending Now: Domestic Drones, 2015, p. 2). Therefore, drones can be classified according to their intended usage, their shape/form, purpose, etc. Therefore, below we present different categorizations of drones.

What regards the use of drones/UAVs (in USA's national airspace system), these are categorized in three main groups, which are all subject to separate restrictions (hereinafter Trending Now: Domestic Drones, 2015, p. 4):

1. civil UAS (UVS, drones): comprise the commercial usage of drones for operations in private/non-governmental sector (without recreation or hobby purposes). In this context Federal Aviation Administration (hereinafter referred to as FAA) introduced regulations in February, 2015, under which only two methods of authorized Civil UAS flight are allowed, based on a Special Airworthiness Certificate[2] (hereinafter referred to as SAC) and/or Section 333 Exemption[3], which also requires an authorization from Certificate of Authorization (hereinafter referred to as COA);

2. public UAS (UVS, drones): comprise drones, which are owned and used by the government agencies and organizations (e.g. state, county, city government agencies or public universities). Most often public UAS are used in cases of law enforcement, firefighting, disaster relief, search and rescue operations. The usage of public UAS in civil airspace is possible only with a COA's issuance[4], whereby applications are first submitted online and then evaluated for purposes of operational safety. A standard procedure comprises the rule that organization must first receive a COA for training and performance evaluation, and afterwards it may receive a jurisdictional COA;

3. model Aircraft (UVS, drones): comprise small, unmanned aircraft (drones), which are used only for recreational and hobby purposes (excluding business purposes). The usage of drones under this category is subject to rules, which are outlined in the FAA Modernization and Reform Act (2012) and FAA Advisory Circular 91-57 without the requirement for special authorizations or waivers. In addition, model aircraft have to weigh less than 55 pounds, operate below 400 feet, remain within the operator's line of sight, avoid operating over people or stadiums, remain clear of other aircraft, and avoid operating within 5 miles of an airport (without a prior control tower approval).

Another categorization can be done on the basis of drones' degree of accessibility to a certain actor and on technological basis and infrastructure characteristics, which are required to produce and operate drones/UAVs. Therefore, we can highlight four categories (hereinafter Sayler, 2015, p. 8):

[2] Use of drones for research and development purposes by private companies.
[3] Commercial use in defined, low-risk, controlled environments.
[4] It may include special conditions like limiting operations to daylight hours, etc.

1. hobbyist drones, which are devices already available for purchase, generally for a few thousand $. Hobbyst drones can be (pre)assembled from component parts;

2. midsize military and commercial drones, which are not available to individuals as they cost more (than hobbyst drones), or due to infrastructure requirements. Nevertheless, they can be sold to foreign militaries and non-state actors;

3. large military-specific drones, which are armed UAVs and therefore require a substantial military infrastructure to operate. These devices are not generally accessible and operable by actors beyond major militaries;

4. stealth combat drones[5], which include highly sophisticated UAVs (e.g. low-observable features) and are not accessible to nonindigenous producers.

Another categorization (classification) is provided by Keane & Carr (2013, p. 559) who underline three classes of UAVs:

1. pilotless target aircraft, which is used for training purposes (e.g. target drones);
2. nonlethal aircraft, which is designed to gather intelligence, surveillance and reconnaissance (ISR) data and
3. unmanned combat air vehicles (hereinafter referred to as UCAVs), which is used for providing lethal ISR services.

On the other hand, drones can be categorized according to their form (hereinafter Office of the Privacy Commission of Canada, 2013, p. 3; Colby, Deneen, Kreiling, Mormino & Root, 2014, p. 3):

1. large fixed-wing aircraft: like the models Global Hawk or Predator, which was the first model that was weaponized, which purpose was to gather intelligence and perform targeted strikes in overseas missions. Predator can fly up to 25,000 feet for 40 hours, for which it was recently adapted for surveillance on the borders (in the USA and the USA – Canada border). On the other hand, the model Global Hawk is most commonly used for surveillance, as it is not weaponized. It can fly for 35 hours and transmit videos to stations during it. Global Hawk is used by NASA as a »Hurricane Hunter«. Large fixed-wing drones are similar to manned aircraft and size and range of flight allows them to be used in persistent and highly sophisticated surveillance missions;

2. small fixed-wing aircraft: like the model Boeing ScanEagle, which can fly for 24 hours or more at 19,500 feet. Small fixed-wing drones are being used for domestic purposes (like local law enforcement in the USA);

[5] There are several countries which develop stealth combat drones, but USA is the only known operator of such systems at this time.

3. micro-UAVs (or also called the Backpack craft or mini-helicopters): like the 300 Parrot AR Drone or the DraganFlyer X6. These models of drones are cheap, portable and small enough to be carried and operated by one person. Due to its affordable price, they are used for leisure activities, but in addition they are also popular for operations which regard law enforcement;

4. biomimetic UAVs: like the Nano Hummingbird. These models are designed so that can imitate animals or plants (for example birds, snakes, insects);

5. blimps or balloons: which are used for observing as can stay in one place (in the sky) for long periods of time.

1.3 Original purpuse of drones: Military usage

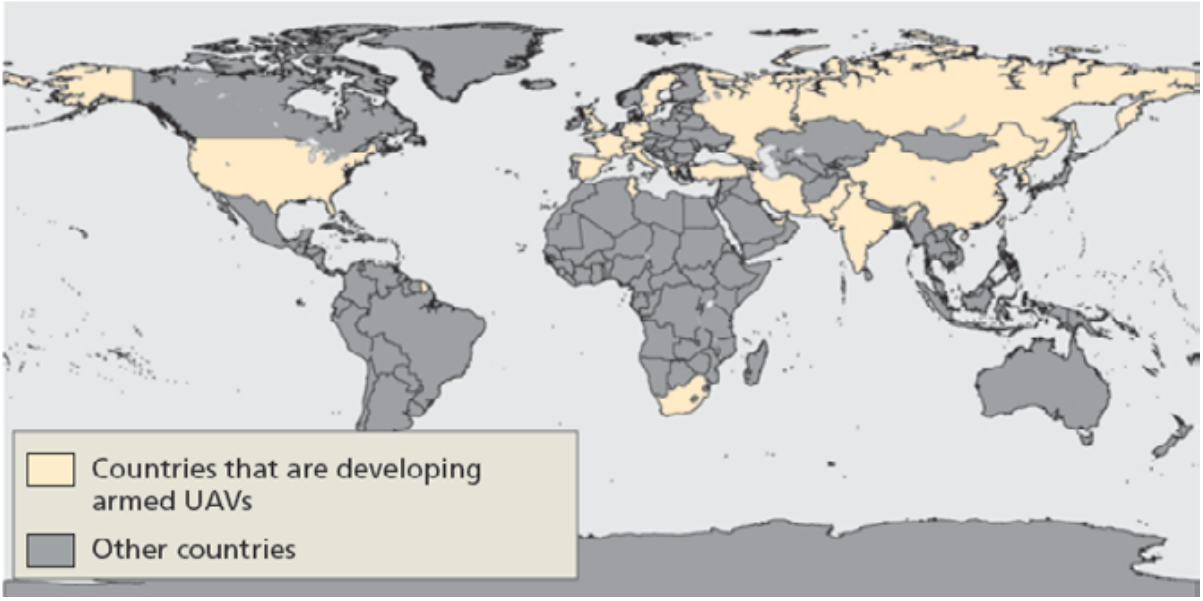
Today, unmanned aerial vehicles (UAVs) are used for many purposes, but it were originally developed for military usage, so they are treated as a subset of Unmanned Vehicle Systems (UVS) in military terminology and usage (Bracken – Roche et al., 2014, pp. 8). Unmanned air systems were first developed as aerial torpedoes (Keane & Carr, 2013, p. 558). The incipient of drones usage for military purposes are to be found already in the World War I. During this period, the US Navy arrived out a secret program (in central Long Island, New York), within which it hired Elmer Ambrose Sperry, who was supposed to develop a fleet of air torpedoes unmanned Curtis biplanes for being launched by catapult and hit the enemy's base. In 1926 the intentions of the secret program were revealed by New York Times, which stated that: »the planes were automatically guided with a high degree of precision and after a predetermined distance were supposed to suddenly turn and fly vertically downward, carrying enough TNT to blow a small town inside out«. The program was later abolished as the war ended in 1918 (Sifton, 2012).

The mass production of remote-controlled aircraft has in fact started during the World War II in the USA with the so-called Radioplane OQ – 2, designed as a target drone. Another two main inventions, which have contributed to drones' development and expansion in this field were the V – 1 bomb and the Norden bombsight, developed for precision of the aerial bombing. This invention is very important as it set the course towards greater accuracy in the use of aerial force, as a crucial aspect of modern drone strikes (Gettinger, Michael, Pasternack, Koebler, Musgrave & Rankin, 2014, p. 4). During the World War II, UAVs had been used as a permanent device, differentiated from ballistic missiles. They had been designed in the way that could return to original point (of departure) and equipped with surveillance capabilities, i.e. tactical understandings of battle spaces. For this reason UAVs represented the »weapon system or sensor that feeds information through an extensive and complex system of networks which gets the right information to the right person at the right time« (Zaloga, 2008, p. 4).

The development of unmanned aircrafts continued through the Korean War as military services experimented with missions, sensors and munitions for strikes and military observations to battlefield commanders. Also after 1950s, the Navy and Air Force used their knowledge and power to build cruise missile[6] and unmanned aerial vehicles[7] (UAVs) via separate means (Keane & Carr, 2013, p. 558). Another innovation, which was brought in this field, was the i.e. unmanned helicopter QH – 50, from USA (Blom 2010).

Today, military drones are still being used, acquired and/or produced by a large number of militaries (87 countries in total, by 2013). In Figure 1 we present countries, which are currently involved in developing armed drones.

Figure 1: Production of Armed Drones in 2014 (World)



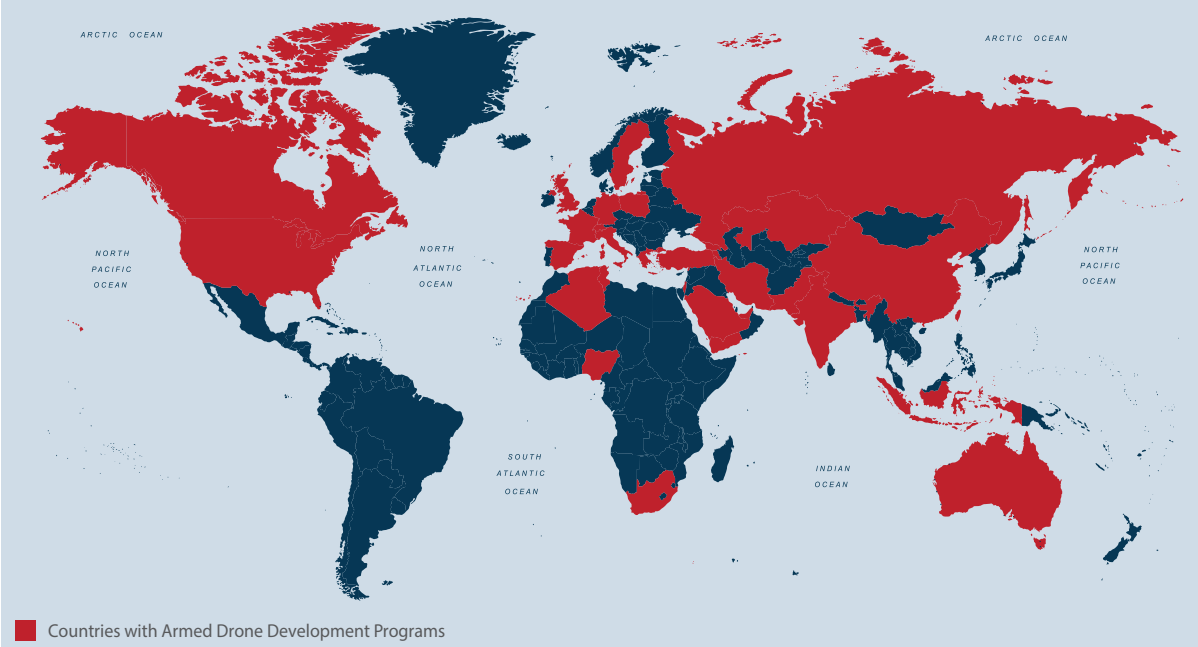
Source: L. E. Davis, M. J. McNerney, J. S. Chow, T. Hamilton, S. Harting & D. Byman, *Armed and Dangerous?, 2014, p. 8.*

Military drones are of various forms and are used for various purposes, e.g. surveillance, intelligence, combat missions, etc. (Gettinger et al., 2014, p. 8). 23[8] countries are developing UAVs for military purposes, while Israel and USA are the largest exporters of the latter (Davis et al., 2014).

In Figure 2 we present the map of countries, which have an active Armed Drone Development Program (see Figure 2).

[6] A one-way lethal munitions for striking specific targets
[7] A reusable aircraft with the ability to perform a variety of missions.
[8] China, France, Germany, Greece, India, Iran, Israel, Italy, Lebanon, North Korea, Pakistan, Russia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Tunisia, Turkey, United Arab Emirates, United States and United Kingdom.

Figure 2: Armed Drone Development Program in 2015 (World)



Source: K. Sayler (after M. C. Horowitz & M. Fuhrmann), A world of proliferated drones: A technology primer, 2015, p. 22.

Such mass production of armed drones (for military purposes) attracts attention of experts and dilemmas whether UAVs are transforming the conduction of war? The debate is focusing on discussing the possibilities whether military (and financially) strong countries could take advantage of UAVs to deliver precise strikes on specific leaders and take advantage (and control) over smaller and weaker countries (Hazelton, 2013). Contemporary UAVs are used for their surveillance capabilities and are shaped by the combination of radio control, wireless communications and internal navigation technologies (Bracken – Roche et al., 2014, p. 9). In this respect, Antoniazzi – Ronconi, Jessinski – Batista & Merola (2014, p. 137) claim that a considerable percentage of military operations, which use drones are performed in foreign airspace without a prior formal authorization of central governments, which can be defined and treated as a disrespect of states' sovereignty and therefore condemned as a violation by the Charter of the United Nations.

The expansion of military drones was a result of technological advances, which allowed these crafts to be detailed piloted over large distances and also due to possibilities to identify high-value military targets[9] (Singer, 2010). Moreover, armed drones can provide useful and valuable information, they can kill, disable or support soldiers or others on the ground, track, destroy, hinder, people or targets, etc. (Davis et al., 2014). Another reason why drones are used for military purposes in such an extent is their low-cost satellite

[9] While at the same time keeping civilian casualties and other collateral damage at a relatively low level.

communication. In fact, such a communication require only a satellite phone, in order to spot UAV's location and determine its functioning. Yet another reason includes UAVs' size, i.e. UAVs small size is a great advantage in military missions, for which are also relatively cheaper. Besides, due to high-tech design drones/UAVs are very accurate and thus able to precisely spot and aim the target (e.g. a single human being) and hit it in detail (Boot, 2006).

Drones/UAVs for military usage have its advantages (strengths) and disadvantages (weaknesses) compared to manned aircrafts. As an advantage we could certainly highlight the option of using them for dangerous tasks (missions), as drones offer the option of a constant presence in a specific area through still and video imagery, provide an intelligence, surveillance and reconnaissance capability for ground troops, they can provide additional air strike capability (e.g. Reaper), they provide less collateral damage, can remain overhead for 14 hours (to gather information for a strike), missile can be diverted from its original target in an intentional miss, are less expensive, etc. (Brooke – Holland, 2015, p. 8; Hazelton, 2013, p. 30).

On the other hand, drones have also some disadvantages, like relatively low maneuverability and low speed, little or none defensive measures, they can be vulnerable to attack from a sophisticated air defense network, vulnerable to cyber and communications link attack, they can loose data links, they require a permissive environment, which is likely to limit their utility in own theaters, etc. (Brooke – Holland, 2015, p. 8; Hazelton, 2013, p. 30).

Finally, it is important to highlight the policy about drones and laws of their usage in wars, since their usage is in increase (for military and other purposes). For this reason it is essential that countries (should) have a specifically defined formal and legal policies in this respect. It is interesting to note that US, which is the most important user of drones, does not have an explicit formal policy about the use of the latter, which is becoming a serious burden for the government (New America Foundation 2013). For now, drone operations are coordinated by the CIA and the US Air Force[10] (Becker & Shane 2012). The international humanitarian law allows the United States to use lethal force against individuals also outside of war zones, but only in the case these are actively involved in hostilities, which represent an imminent threat to USA. From this perspective, we have to mention the US war against Afghanistan and targeted killing operations in Pakistan, which is considered by the USA as an extension of the war in Afghanistan and therefore a legal action[11] (Gettinger et al., 2014, p. 10–11).

[10] The US Army also flies many of military drones.
[11] In this respect, Yemen represents an additional legal problem.

1.4 Drones for law enforcement

Drones (UAVs) are also used by the police in various operations, but so far the majority of these are still in trial form, as the varied use of drones in police work and operations go hand in hand with potential problems and issues raised by technology and other potential obstacles, which need to be solved so these devices can be allowed for regular flights and missions, so that UAVs would become widespread. Crucial issues, regarding the use of drones for police work (domestic law enforcement) refer to potential dangers of intrusive surveillance and potential militarisation of domestic law enforcement (Jones, 2014, p. 21). But, despite the fact that drones for purposes of law enforcement are still in the beginning phase, they show great potentials for various police missions and operations. UAVs can be used for search and rescue missions, document crime scenes, they can be useful for bomb squads to access places, etc. (The Use Of Drones In Law Enforcement and Private Investigations, 2016).

Another key problem bout the use of drones (UAVs) for law enforcement purpuses relates to issues of protection of personal data and privacy policies. Indeed, the use of drones for investigative purposes and law enforcement could (potentially) violate crucial human rights regarding privacy. As pointed out by the International Association of Chiefs of Police Aviation Committee (hereinafter referred to as IACP): »We also live in a culture that is extremely sensitive to the idea of preventing unnecessary government intrusion into any facet of our lives« (IACAP, 2012, p. 1). It seems that personal rights, which are protected by the Constitutions of each countries, represent a priority before safeness, which drones (UAVs) are supposed to bring and provide. Therefore, IACP also states that privacy concerns must be dealt with effectively in order that drones (for police purpuses/law enforcement) will be well accepted by the general public (IACAP, 2012, p. 1). In the context of using drones for law enforcement in USA this aspect is directly linked with the Fourth Amendment of the US Constitution (1788, p. 1199), stating:

> »The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated, and no warrants shall issue, but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.«

In Slovenia, this aspect is associated with Constitutional paragraph II. Human rights and fundamental freedom, more specifically with Articles 34, 35 and 36 which state (Constitution of the Republic of Slovenia, 1991, p. 10):

> »Article 34: Right to Personal Dignity and Safety, stating that: Everyone has the right to personal dignity and safety. Article 35: Protection of the Rights to Privacy and Personality Rights, stating: The inviolability of the physical and mental integrity of every person and his privacy and personality rights shall be guaranteed. And Article 36: Inviolability of Dwellings, stating: Dwellings are inviolable. No one may, without a court order, enter the dwelling or other premises of another

> person, nor may he search the same, against the will of the resident. Any person whose dwelling or other premises are searched has the right to be present or to have a representative present. Such a search may only be conducted in the presence of two witnesses. Subject to conditions provided by law, an official may enter the dwelling or other premises of another person without a court order, and may in exceptional circumstances conduct a search in the absence of witnesses, where this is absolutely necessary for the direct apprehension of a person who has committed a criminal offence or to protect people or property.«

Proceeding from the above mentioned IV Amendment from the US Constitution and articles from Slovenian one, it could be argued that freedom, integrity, privacy rights, etc. represent an important dimension of human life and thus come before any other dimension – even security (talking for the purposes of prevention). But, having said that, drones are yet used for police purposes in some cases. Below, we point out just a few examples of these examples in order to facilitate the understanding of drones' capabilities and potentials, which are predicted in the future.

Drones are used for traffic observation in the case of accidents as these shorten the investigation time. For example, in the case of a collision roads can remain closed for long hours due to a traditional »detailed electronic mapping process« of an accident, which can paralyze the traffic. In such a case, using drones (UAVs) for capturing an aerial image can reduce road closure. In addition, drones can be used in the case of incidents involving hazardous materials to limit the exposure of people (Westall, 2015). Moreover, these devices are a useful investigation tool in forensic purposes in crime scenes, while also in cases of missing persons (see Westall, 2015; Australian police, 2015).

Therefore, drones represent an innovative tool for police, which are able to assist in accident reconstructions, provide Special Weapons Attack Team (hereinafter referred to as SWAT) with live intelligence on potential threats, and supply invaluable support in search and rescue operations over rugged terrain. Besides, unlike costly-to-purchase and expensive-to-operate aircraft and helicopters, these suitcase-sized devices controlled from a computer screen, can be purchased for the price of a luxury car and are cheap to fly, while also easy to use (Mulgrew, 2013).

Alaska's police use drones for mapping and wildlife surveys, for operations and crash investigations, for monitoring, according to testimony to the task force and Troopers envision using it mainly for highway crash's investigations Demer (2013). Drones are also used in cases of searching for fire spark with thermo cam, mostly by firefighters (Tunison, 2015).

Besides cameras (to capture image and video recording), UAVs can be equipped with specific tools for cracking Wi – Fi networks and interception of communication. Such devices were used by London's Metropolitan Police, with which they gathered data on mobile phones (Jones, 2014, p. 2).

1.5 Drones for hobby

First drones for non-military purpuses were used by hobbyst and are still in a constant increase as technology is developing. For this reason, experts predict further growth of this market, while also claiming the latter will be overtaken by drones for business purpuses (Schlinkheider, Ramarao, Tully, Banga & Deokar, 2014, p. 6).

Drones for hobby (recreation/leisure) activities and usage are those devices, which are readily available for purchase. These drones do not require a formal infrastructure or training for the operator. Today's hobbyist can use drones for aerial surveillance, due to their commercial off-the-shelf technology (Sayler, 2015, p. 5). Technological advances, camera equipment, variety of options, low costs, etc. have increased the popularity and desirability of drones for hobby and recreation purposes (Lynes, 2016, p. 1–3), but in addition these advances have blurred distinctions between the hobbyist and professional drones. UAVs for leisure (hobby) sometimes even exceed capabilities of commercially approved UAVs (Goldberg, Corcoran & Picard, 2013, p. 6). Today's hobbyist drones can be used in a variety of ways and purposes, as they are equipped with high-end capabilities. And as these drones are becoming cheaper, their popularity expanded between 2011 and 2013, when SZ DJI Technology Co. recorded an almost 3.000 % increase in annual revenues (Sayler, 2015, p. 11).

For European Union Committee (2015, p. 10) civilian use of RPAS comprises commercial (businesses) usage of UAVs for a profit, as well as for leisure activities by private individuals. But, it distinguishes between hobbyists, being members of a flying club with a good knowledge of aviation and leisure users who buy UAVs to use it »for fun in his back yard«.

Despite the fact that Model aircraft (drones for leisure activities) are not subject to specific legislation framework or the FAA's approval, one has to follow safety guidelines, which were established for this purpose. In this respect, FAA relieved the following rules regarding the use of drones/UAVs for hobby (see Federal Aviation Administration, s.a; Goldberg et al., 2013, p. 6):

It is ALLOWED to:

- use/fly drones at the local model aircraft club;
- take lessons to learn how to safely fly a drone;
- contact the airport or control tower when flying within 5 miles from the airport;
- use a drone for personal enjoyment.

On the other hand, it is PROHIBITED to:

- use/fly drones near manned aircraft;
- fly beyond line of sight of the operator;
- use/fly drones which weigh more than 55 Ibs[12];
- fly contrary to ones aero-modelling community based safety guidelines;
- use/fly drones for commercial (paid) activities/purposes.

Small hobbyist drones are already sold as toys and therefore, there is no necessary license to operate these devices, which poses a problem for regulations in this area (Office of the privacy commissioner in Canada, 2013 p. 5). Model aircraft are exempt from the FAA's regulations due to the Special rule for model aircraft, which is included in the FAA Modernization and Reform Act of 2012 (hereinafter referred to as FMRA). FMRA states that if certain criteria are met by the users, the FAA may not apply any rule or regulation regarding the hobbyist drones (model aircraft). Nevertheless, the FAA is still permitted to apply enforcement actions in the case if hobbyists use UAVs in an unsafe manner (Villasenor, 2015, p. 3).

On the other hand, on the European Union's (hereinafter referred to as EU) level distinctions between commercial, model and leisure drones are not clear, as drones from both groups can be equipped the same. The regulatory framework regarding the hobbyist drones creates an artificial contrast also between the commercial and non commercial use of RPAS. In fact, there is no longer mandatory that all non-commercial RPAS users have a pre-existing knowledge of aviation. Besides, technological development has enabled that similar aircraft can be/fly for commercial, hobbyist and leisure purposes under differing regulations (European Union Comitee, 2015, p. 11).

Another key point regarding hobbyist drones is the privacy issue, as technological equipment includes also video camera and sensory devices, which facilitate the operator's violation of privacy. As an example, there are many videos on the internet made by individual who used hobbyist drones to record a wide range of »events«, ranging from sport, sobriety checkpoints checkpoints, beaches, public parties and concerts, etc., therefore it is only a matter of time, when hobbyist will start using drones for stalking, shooting individuals within their homes, etc. (see Cash, 2016, p. 704; European Union Comitee, 2015, p. 10).

1.6 Drones for commercial use

Drones/UAVs were first used in commercial purposes in the beginning of '80s in Japan. In this period unmanned helicopters supplemented the piloted ones and were used in

[12] Without a certification released by the aero-modelling community – based organization

agricultural sector to spray pesticides on rice fields. At first unmanned remote aircrafts were much more expensive than they are today. In addition, drones/UAVs were larger and heavier (Mazur & Wiśniewski, 2016, p. 4). But with technology advances, the latter become not only smaller and lighter, but also advanced in terms of their capacities. Because of the latter, drones become popular devices in business sector.

Commercial drones can be thus used for various purposes ranging from infrastructure inspections, to communications and broadcast services, wireless communication relay, satellite augmentation systems, natural resources monitoring, media/entertainment, digital mapping, air quality control, etc. (Office of the privacy commissioner in Canada, 2013; Mazur & Wiśniewski, 2016). Among companies that have considered using drones to improve and expand their business are also Amazon, Google, Facebook, etc. (Lynes, 2016, p. 1). Drones are used for their broader applications, e.g. the ability to capture unprecedented levels of data and are therefore used in sectors, which require mobility and high quality data (Mazur & Wiśniewski, 2016, p. 1). We will focus more in details on drones for commercial use in Chapter 3 Drones in business practices.

In the following chapter we focus on the legal framework of drones in USA, EU and Slovenia. The primary focus is on the segment of hobbyist drones and commercial ones, in order to highlight the basic legislative framework and point out the complexity of the issue regarding drones' regulations, affecting especially individuals, who operate in drones business.

1.7 Privacy issues

Along with all debates regarding drones, there is the issue of risks regarding safety, third party liability and privacy (data protection). A key problem is the mere fact that these are small devices, which fly in the sky and can be dificult to be seen by people. On the other hand, drones see everything underneath, which represents a specific problem if these are equipped with cameras, which may intentionally or unintentionally exceed the limits of people's privacy. Also if they are aware of drones' presence, individuals can never be sure about data processing equipment, the purposes of data collection and for whom these data is being collected for. The later can result in a feeling of being under control or a true surveillance of individuals in their daily lives. Subsequently, we can talk about a decrease of civil liberties and rights (Privacy and data protection issues relating to the utilisation of drones, 2015, p. 7). Due to such potential violations the Information Commissioner's Office advocates for appropriate drones' practices which would respect policy of data protection and rights of individuals, while also enable commercial operator of drones to comply with the Data Protection Act from 1998 and the General Data Protection Regulation, which will enter into force on May 25, 2018 (Bond, 2016). Nevertheless, it has to be pointed out that concerns about human rights violations of data protection and privacy issues represent a problem even in a correct use of drones, because of their

equipment, since the latter can collect data in a wide range of its flying and thus vision (National Authority for Data Protection and Freedom of Information of Hungary, n.d., p. 3). Drones' software enables to further analyse collected pictures and video material in details, due to high zoom, thermal sensors, night vision, radar, see-through imaging, Wi – fi sensors, microphones and audio-recording systems, biometric sensors, etc. therefore images and videos can serve for facial recognition, behaviour profiling, movement detection, number plate recognition, etc. (Marzocchi, 2015, p. 21).

Examples of practical violation of privacy and human rights include (hereianfter National Authority for Data Protection and Freedom of Information of Hungary, n.d., p. 4):

- violation of people's psychological and physical dignity;
- incomprehensibility of technology for private individuals;
- risk of non-compliant data processing;
- increased vulnerability in the anonymity of the human body and human dignity;
- increased vulnerability of private property and home;
- negative impacts on the right to freedom and safety, freedom of association and assembly, religion, expression and non-discrimination.

The key problem with privacy issues and data protection in civil usage of drones is linked with the lack of a common coherent legal system. There are various directives and regulatios, which protect, to some extend, individuals' rights, but much more has to be done in order to fully regulate this area. In what follows, we will highlight just the crucial ones in order to present a general situation in the field of regulatory framework. Starting from Data Protection Directive (1995) and Directive on Privacy and Electronic Communication (2002) could be a starting point for further design of a common and comprehensive legal framework in the case of drones' usage for purpuses of electronic communication services offered by public providers. Article 29 of Data Protection Working Party (hereinafter referred to as WP29)[13] comprises a few exceptions, which may fall out of the scope of the Opinion according to the Directive: »1. Data processing by a natural person in case of a purely personal or household activity (Article 3.2 of the Directive), and 2. In case of personal data processing solely for journalistic purposes (Article 9 of the Directive)« (Masutti, 2015).

Moreover, individual's privacy issues and data protection in the EU are regulated by the European Convention of Human Rights (signed in 1950, p. 10), as stated in Article 8 – Right to respect for private and family life:

> »1. Everyone has the right to respect for his private and family life, his home and his correspondence. 2. There shall be no interference by a public authority with the exercise of this right

[13] Which relates to UAS in Civil Aviation and is binding for national (CAAs) and European legislators.

> except such as is in accordance with the law and is necessary in a democratic society in the interests of national security, public safety or the economic wellbeing of the country, for the prevention of disorder or crime, for the protection of health or morals, or for the protection of the rights and freedoms of others.«

Another important document, which regulates this field is the Charter of Fundamental Rights of the European Union (2000, p. C 364/10) as stated in Article 7 – Respect for private and family life:

> »Everyone has the right to respect for his or her private and family life, home and communications. And Article 8 – Protection of personal data: 1. Everyone has the right to the protection of personal data concerning him or her. 2. Such data must be processed fairly for specified purposes and on the basis of the consent of the person concerned or some other legitimate basis laid down by law. Everyone has the right of access to data which has been collected concerning him or her, and the right to have it rectified. 3. Compliance with these rules shall be subject to control by an independent authority.«

Washington's Center for Democracy and Technology (hereinafter referred to as CDT), which advocates for respect of civil liberties (data privacy), has urged FAA to highlight all the necessary rules regarding privacy, data protection and transparency for government and non-government use of drones. CDT's arguments go in direction of establishing a clear process for a successful law enforcement n the case of drones' usage. In addition, CDT strives for implementing policies where all applications for a drone licence, include also a statement, which would clearly reflect about whom drones will collect information (eg. individuals), circumstances under which its use will be authorized and by whom, specify what information drones will be looking for and gathering, timeframe of data collection, possible impact on individuals' privacy, a description of all steps in the process of mitigating the impact on individuals' privacy, etc., while also highlight circumstances under which gathered data will be retained, used and disclosed (Cavoukian, 2012, p. 12–13).

Furthermore, the American Civil Liberties Union (hereinafter referred to as ACLU) raised concerns about disclosure of information of drones (UAVs) compared to manned aircraft, claiming that UAVs represent a more serious threat to privacy issues due to their »/.../ potential for pervasive use in ordinary law enforcement operations and capacity for revealing far more than the naked eye /.../« (Stanley & Crump, 2011, p. 14). Therefore, ACLU recommends some key measures, which would help preserving privacy, which include restrictions of using drones for specific and articulable grounds (eg. collect data for evidence in the case of crime, in the case of a geographically confined, time-limited emergency situation, where lives are in danger, for reasonable non-law enforcement purposes by non-law enforcement agencies, if privacy will not be substantially affected), restrictions regarding image retention, restrictions regarding clear rules about policies and procedures for the use of aerial surveillance technologies, which should be publicly disclosed, rules regarding democratic basis (eg. deployment and policy decisions about

UAVs should be democratically decided and should base on open information) and rules regarding clear and transparent investments in UAVs, based on a costs-benefits analysis (for more on ACLU's recommendations see Stanley & Crump, 2011).

In addition, it is specifically proposed that the usage of drones by private individuals in public spaces should be regulated by the Act CXII of 2011 on the Right of Informational Self-Determination and on Freedom of Information (National Authority for Data Protection and Freedom of Information of Hungary, n.d., p. 5).

From what presented above, it could be claimed that there is much more work needed in order to fully engage and organize the issues of privacy and data protection of individuals. These issues will increase along with a rising usage of drones, which will require a coherent, systematic and integrated approach for appropriate and optimal regulation of the issue. In the following chapter (2 Drones and legislative frame), we will analyze in more details laws and directives related to the use of different types of drones for specific purposes.

2 DRONES AND LEGISLATIVE FRAME

2.1 Convention on International Civil Aviation (Chicago Convention)

The use of drones (UAVs) is expanding worldwide, which evokes a lot of questions and dilemmas about UAVs' strategic importance in international affairs and thus raises security issues. One of crucial problems is related also with unclear legal framework, especially regarding drones for military usage (Woods, 2013).

The fundamental basis of regulatory framework for UAV on the global level is covered by the Convention on International Civil Aviation (referred to also as the Chicago Convention). The document was signed on December 7, 1944 by 52 states and came into force on April 4, 1947. Further on, International Civil Aviation Organization (hereinafter referred to as ICAO) was established, which became a specialized agency of the United Nations linked to Economic and Social Council, which in October 1947, which crucial purpuse was to create and preserve good relationship and common understanding among nations (Convention on International Civil Aviation – Doc 730, 2016):

> »/../ therefore, the undersigned governments having agreed on certain principles and arrangements in order that international civil aviation may be developed in a safe and orderly manner and that international air transport services may be established on the basis of equality of opportunity and operated soundly and economically.«

Relating with drones' (UAVs') context, the Article 8 the Convention on International Civil Aviation alias Chicago Convention (1944, p. 5) prohibits the use of UAVs in the airspace

of another state, unless with a special permission (authorization)[14]. But, in the case of such an authorization, it has to ensure that UAVs' will not jeopardize civil aircraft in areas with passing civilian traffic. Nevertheless, it should be noted that the Chicago Convention applies only to civil aircraft, and not to so-called state aircraft (police, army and customs), as these need a special permit in accordance with the Article 3c of the same Convention. In order to get an UAV it must comply with certain conditions, such as: delivery of registration data, the nationality of the aircraft, radio equipment, certificate of airworthiness, travel books, restrictions on cargo and photographic cameras, etc. and also satisfy the rules stated in Annex II in respect of flight rules (see Čičerov, 2013, p. 228; Juul, 2015, p. 2).

Recently, ICAO published a Manual on Remotely Piloted Aircraft Systems (2015) designed for purposes of guidance in all matters related with legislative/regulatory process and framework. The latter represents a starting point of ICAO and the EU's development of proper regulations of this field. Highlighting only a few key points of the Manual, we can mention the general consensus on the fact that unmanned aircraft must be allowed to operate without segregation from other air space users; issues regarding safeness in commercial use of drones have to be solved; the gravity of security risk has to be lessen; issues regarding potential invasions of privacy and infringement of trespassing in case of non-authorised low level over-flight of private property represent a serious concern, which has to be properly managed and resolved (Bernauw, 2015, p. 223–224).

Legislative and regulatory scope of drones is currently focused more or less on issues regarding flight safeness, while privacy matters are set aside, resulting as a gap in regulation (Office of the privacy commissioner in Canada, 2013, p. 1). But, efforts made by ICAO can not be ignored in terms of modest but yet important adjustments regarding the regulatory framework. In 2012, ICAO added Annexes 2 (Rules of the air), 7 (Nationality and registration marks) and 13 (Accident investigation) to the Chicago Convention in order to fit RPASs in the regulatory framework for international civil aviation usage[15]. Further supplements were added to the Convention, like Annex 7 in order to recognize also smaller sizes and shapes of drones for the purpose of marking. Annex 13 was added for purpuses of accidents' investigations as are treated serious incidents of manned aircraft (Bernauw, 2015, p. 236).

2.2 Legislation in the United States of America

Due to the increased usage of drones, a need to regulate the use and development of the

[14] Article 8 was complemented by the Appendix 4, which regulates the Convention's application and further elaborates the application for a host country's authorization. Specifically, Appendix 4 provides for a reciprocal recognition of member countries of licenses and certificates, while also it highlights the member countries' ultimate sovereignty in this context.
[15] As the result Article 3.1.9 now acknowledges RPAs and RPAS.

latter emerged. Experts, advocates and civil liberties groups have begun to advocate for rules and laws, which would reduce or counteract the negative effects and potential abuses in using drones. These groups of experts consider the possibility that law enforcement agencies could use drones to bypass the crucial elements from the already mentioned 4th Amendment, which cover privacy rights. Therefore, they see a need for balancing privacy rights and protection of civil liberties in the case of using drones for surveillance and gathering information. For this reason, state legislatures already began to review warrant requirements, but so far there is still no uniform approach to the matter (Trending Now: Domestic Drones, 2015, p. 3). The Congress gave the FAA a mandate to safely integrate civil unmanned aircraft systems (UAS) into national airspace by 30thSeptember 2015. Despite the fact that FAA has endeavored to establish a legislative framework and to achieve this task, here is still no final rule in place until nowadays. Therefore, drone operators have to comply with a patchwork of proposed rules, interim final rules, interpretations and policy statements (Lynes, 2016, p. 1).

Therefore, states have limited authority within legislation and acts regarding the use of drones as federal government and FAA control flights and safety in the National Airspace System (hereinafter referred to as NAS). States can only regulate the use of drones by the state itself or local law enforcement organizations and adopt legislation, which addresses general privacy concerns, i.e. data collected by drones (Bennett, 2014). In 2012 the »FAA Modernization and Reform Act of 2012«, was signed by Obama, in order to ensure funding (of 63 billion $) for four years. As part of this funding FAA has the obligation to formulate basic safety rules which will accelerate integration, while also broad the civilian usage of drones in the USA's airspace by the year 2015. According to the Reform Act, the FAA estimates an approval of nearly 30,000[16] drones to fly in the next 20 years (Office of the privacy commissioner in Canada, 2013, p. 8).

The FAA and some states' laws limit the use of drones in private and/or public sector. The FAA focuses more on the safety of operations, which involve drones and prevent state laws that relate to the national airspace, while many states adopted statutes to regulate the use of drones on privacy issues, some local governments are even trying to control aspects of drone use within their borders (Reiss & Gergen, 2015, p. 3). In 2016, at least 41 states considered a legislation, which would regulate the use of drones and prevent potential abuse of the latter. Out of these, only 14 states[17] have passed 26 pieces of legislation (National Conference of State Legislatures, 2016). Nevertheless, FAA rules and legislative acts excess states' legislature, some states (overall 26) have a legislation frame which addresses drones and its usage[18]. Notwithstanding, half the states do not have laws yet, in

[16] For now there are 300 authorization certificates, which allow drones to fly in the USA'S sky.
[17] Alaska, Arizona, Idaho, Indiana, Kansas, Louisiana, Oklahoma, Oregon, Rhode Island, Tennessee, Utah, Vermont, Virginia and Wisconsin.
[18] What concerns the regulation of drones by the local government within their borders, for now there are relatively few local governments that have taken this step.

2015, 45 states have considered 150 drone related bills (Reiss & Gergen, 2015, p. 5).

The regulatory portfolio of the FAA Modernization and Reform Act (2012) required that FAA fully integrate unmanned aircraft into the NAS by September 30, 2015, and set adequate standards for operations which involve drones. Thus, FAA elaborated 6 test range sites to be used in both cases, i.e. with manned and unmanned flights. These test sites are necessary for each FAA policy, in order to comply with state, local, and federal laws, which cover the field of privacy and civil liberties. Moreover, all operators at the site have the obligation to present a written plan specifying the storage and use of all collected data from these tests (Trending Now: Domestic Drones, 2015, p. 5). Therefore in 2015, the FAA released a proposal of rules entitled Operation and Certification of Small Unmanned Aircraft Systems for small drone regulations. The rules stipulate that drone operators must be 17 years or more and have a license before flight operations. This proposal also states that small drones (under 55 pounds) can be flown under 500 feet above ground level and only during daylight, at airspeed which does not exceed 100 mph. In addition, drones have to be flight in the way that operator maintains a visual line of sight of the device. The part which regards safety and privacy prohibits to operator drones over bystanders (for more on the topic see Federal Register, 2015).

Determination and adoption of rules and regulations is becoming a burning issue, therefore most government entities are considering to adopt laws in the context of drone technology. The latter is a necessarily measure, since FAA is tasked with controlling and assuring the safety of the national airspace, while potential violation of privacy and civil rights are still an undetermined concern (Reiss & Gergen, 2015, p. 6).

The usage of drones for recreational purposes in the USA is permitted without a Federal Aviation Administration (FAA) approval, based on a specific directive in 2012 legislation. Nevertheless, FAA barred nearly all commercial use of drones, which had adverse effects for drones manufacturers, users, and officials who were to support drones industry (Hazel & Aoude, 2015).

2.3 Legislation in the European Union

Despite the fact that European Union (within the Europe 2020 Strategy) has already perceived economic and developmental potentials, while also industrial competitiveness in the emerging drones' industry (Office of the privacy commissioner in Canada, 2013), it is still »shrouded« in a vague and unclear legal framework regarding the use of UAVs, which has triggered the formation of various organizations (i.e. EUROCAE, EASA, etc.), which aim is to develop appropriate solutions (Čičerov, 2013, p. 230). The European Aviation Safety Agency (2015) suggests that regulations, regarding the usage of drones should base on a logic of proportionate risk of a specific operation itself. According to that, it proposed

to establish three (3) categories of operations coinciding with a specific regulatory regime (hereinafter European Aviation Safety Agency, 2015, p. 3; Juul, 2015, p. 5):

1. open operation category, where there is no need for a special authorization by an Aviation Authority for the flight, but it is necessary to respect defined limitations for the operation[19];

2. specific operation category, where there is a need for a special authorization by an Aviation Authority with specific limitations depending on operation;

3. certified operation category, which will require certification for high-risk operations (depending on the kind of operation). Alternatively, certification might be requested on a voluntary basis by organizations, which provide services related to UAVs/drones.

Such a proposal is based on two key objectives (hereinafter European Aviation Safety Agency, 2015, p. 3):

1. a safe and proportionate integration of UAVs/drones into the already existing aviation system and
2. an innovative and competitive European drone industry, which would enable and foster new job positions, in particular in the segment of SMEs.

EU Member States are aware of potentials in this niche, consequently they strive for policy practices, which would aim at facilitating the growth of this industry. What is interesting indeed is the fact that USA runs a leading market for the use of UAVs for military operations, while Europe has the lead for the use of drones for civilian purposes (whether EU states produce drones or carry out operations). The latter has 2,500 operators, while the rest of the world only in 2342 (Foster, 2015, p. 2). The EU and FAA have already established agreements in order to initiate, coordinate and support the process of provisions' development, which would fully recognize drones (UAVs) as a legitimate airspace user (Office of the privacy commissioner in Canada, 2013, p. 8). A comprehensive regulation of requirements for airworthiness of UAVs would require a complex legal framework, whereby it would be necessary to determine the type of UAV, the use of which would be regulated by EU legislation, and those which would be regulated by the national legislation. Thus, UAVs under 150 kg (for police, customs and military use) would remain under the jurisdiction of national laws. The crucial issue regards the fact that legislation will not significantly differ from the one that applies to civil aircraft, which is regulated by the Chicago Convention. In practice, this means that UAV would respect rules, which are applicable to civil aircraft, where all phases of flight

[19] For example distance from aerodromes, from people, etc.

should not violate civil aviation rules established by the ICAO and the EU (Čičerov, 2013, p. 230).

Regulations for UAVs have already been adopted or are in the process of being prepared in Austria, Denmark, France, Germany, Italy, Ireland, Spain and the United Kingdom. Certified flight schools already exist in Denmark, the UK and the Netherlands, while in the Netherlands and the UK there are more than 500 pilots with UAV's license (Foster, 2015). The European Commission established the European Steering Group for UAVs in 2012, which presented its recommendations in a document called Roadmap for the Integration of Civil Remotely piloted Aircraft Systems in 2013. This document identifies the key milestones relating the approach and timetable for the integration of UAVs into airspace. In 2014, the same Commission published a Communication on the future operations of UAVs for civil use (Foster, 2015, p. 2).

In 2002, the European Agency for Aviation Safety Agency (hereinafter referred to as EASA) was established, which launched crucial conditions for more uniform regulations of aircraft. However, the Regulation 1592702 does not expressly mentions UAVs, which in the same time does not mean that rules do not refer to UAVs. On the contrary, UAVs are subordinated to EU's rules in this field as the definition of an aircraft is sufficiently broad to include also UAVs, which weigh more than 150 kg. What regards the Regulation 216/08, the European Economic and Social Committee considers that EASA should have the power to regulate the UAV industry, airworthiness and design, while also the certification of ground operators and the launching system. Moreover, there is an increasing demand that UAVs should be subjected to civil aviation (Čičerov, 2013, p. 229).

Operations associated with drones are legal only on the basis of nationally established legislation or in the case of granted exemption, based on the rule of the International Civil Aviation Organization. Thus, in the Commission's communication (hereinafter referred to as COM), issued in April 2014 states that each organization will have to contribute to development of the UAV's market of commercial purposes, while in the same time strive to protect the public interest, that it is necessary to introduce new standards for regulation of civilian UAVs, which would regulate issues of safety, security, privacy, data protection and liability. The Commission's aim is to enable European industrial companies to evolve and carry out technologies, which will enable them to become leading companies on a global scale. Stakeholders' representatives of the Commission agreed that there should be a proportionate regulatory framework, if the EU wants UAVs industry to grow. In March 2015, the rapporteur of the Commission spoke on UAVs conference in Riga, on the basis of which a Declaration from Riga was adopted. The latter highlighted the urgency of five principles on which the EU should focus in the future, while the European airline community has pledged that by 2016, it would facilitate EU companies to implement UAVs' services throughout Europe. The crucial principles, which have to be respected are (hereinafter Foster, 2015, p. 5):

1. UAVs should be considered as a new type of aircraft by proportionate rules based on the risk of each usage on a specific case;

2. EU rules for safe UAVs operations has to be established in order that industry can make investments;

3. it is necessary to develop proper technology and standards for full integration of UAVs into European airspace;

4. growth of UAVs services depends on public acceptance and

5. UAVs operator is responsible for its use.

2.4 Legislation in Slovenia

The use of drones raises ambivalent feelings, which are the result of its many positive qualities and efficiency and drones' negative aspects. In this context, Slovenian Information Commissioner highlights the key dilemmas regarding the use of drones and argues that it should be regulated in a way, which would lead to the exploitation of drones' opportunities, while ensuring its safe usage and protection of fundamental human rights, i.e. respect of privacy, the collection and processing of personal data, definition of appropriate exemptions for journalistic use and personal use of drones, define areas where the use of drones would be prohibited, etc. (Informacijski pooblaščenec, 2015, p. 11 – 12).

Before the adoption of regulations regarding the area of drones (in summer 2016), experts kept pointing out that an adequate formal legal legislation regarding UAVs (drones) was essential, which should strive to appropriately and optimally define the relationship between usability and security of drones. Normative-legal regulations' guidelines should base on a content analysis of legislation and good practice from other EU countries and the US, while also interviews with experts from the filed. According to the analysis carried out by Svete, Vuga, Ferlin, Hlavaček, Mišigoj, Polajnar & Zajc (2015), it was found that the most appropriate organization to take control over the use (and legislation filed) of UAVs would be the Public Agency for Civil Aviation of the Republic of Slovenia (Javna agencija za civilno letalstvo Republike Slovenije).

Public Agency for Civil Aviation of the Republic of Slovenia is developing into a high-quality organization, which will represent the center of civil aviation in Slovenia and broad. Its crucial aim is to achieve high quality results in all its areas, but it is primarily focused on the safety of civil aviation. Its another key objective is providing conditions for continuous development of civil aviation in Slovenia, support the local aviation industry and development of sport aviation, while respecting all aviation safety requirements (Javna agencija za civilno letalstvo RS, 2016).

As part of the preparation of a legislative framework regarding UAVs, the Faculty of Law in Ljubljana organised an International Scientific Conference (2013): Spy in the Sky: Regulatory Issues of drones and unmanned Aerial Systems, where participants from various fields, which were covered by the conference, argued about arguments pro and contra UAVs. Experts discussed the issue from different perspectives, i.e. international humanitarian law, criminology, infringement of personal data, humanitarian law, criminal law, international and national air law (Čičerov, 2013, p. 226).

A study conducted by Svete et al. (2015) stressed that normative-legal gap about the use of UAVs could be filled by a separate legal act, which would allow a different treatment of national security authorities in relation to commercial and leisure users. One of the crucial conclusions regards also the classification of UAVs, as for practical and international comparative reasons it would be suitable to design a classification, which would base on »after take-off« weight of the vessel. Among other things, a distinction between helicopters and wings would be suitable, as these two groups have very different technical characteristics and a significantly different usage.

Finally, in May 2016 the Ministry for infrastructure of Slovenia prepared a draft of Regulations of unmanned aircraft systems, which highlighted the general technical and operational conditions for a safe operation and usage of unmanned aircrafts, unmanned aircraft systems and aviation models. It also proposed conditions, which apply for persons who fly/use drones/UAVs, implementation of aviation activities and its monitoring and penal provisions. The provisions of proposed Regulation are envisaged to be applied to systems of unmanned aircraft with an operating mass of 150 kg and not more, which are used in Slovenia (Ministry for Infrastructure of Slovenia, 2016).

From May to June 2016, a significant step was taken by Slovenian Government, which adopted the Decree on unmanned aircraft systems (Uredba o sistemih brezpilotnih zrakoplovov, 2016) on 28th July 2016 and entered into force on 13th August 2016. The decree was finalized by the Slovenian Civil Aviation Agency (CAA) and is applied for drones/UAVs usage for recreational (hobby) and commercial (business) purpuses (3D Survey, 2016). The Decree specifies and highlights general technical and operational requirements for a safe use of UAVs/drones, while also it contains conditions which must be observed when using drones. In addition, it includes the execution of aviation activities, supervision of the implementation of the decree itself and penal provisions (Government of the Republic of Slovenia, 2016).

Within the framework of the new regulation it is allowed to operate/fly drones/UAVs with operational not heavier than 500 grams and are not used for aviation purposes, which are not covered by provisions of the Decree, so operators do not have any obligations to comply with rules of the air, identification of aircraft etc. In addition, the Decree on

unmanned aircraft systems meets the EU guidelines and is thus comparable with solutions and regulations, which were implemented in the EU countries (Uredba o sistemih brezpilotnih zrakoplovov, 2016).

Nevertheless, the Decree has already been adopted and just entered into force, it still represents a platform for further development on legislation and regulative framework on this field. The Decree is designed in order to support innovations safely, to help advance environmental monitoring and risk assessment, improve surveying and land management, and develop scientific research. But it also classifies drones in accordance to their operational weight, areas of application, safety regulations and licensing guidelines. Regulations are designed to minimize risks to other aircraft, people and properties. It also states that operators must maintain a visual contact with UAV's. There are no limitations or inhibitions for drones' industry, and it is designed so different business areas (like telecommunications, construction, agriculture, search and rescue, etc.) could benefit from it (see 3D Survey, 2016; Uredba o sistemih brezpilotnih zrakoplovov, 2016).

3 DRONES IN BUSINESS PRACTICES

3.1 Drones for business purpuses and their potentials in the future

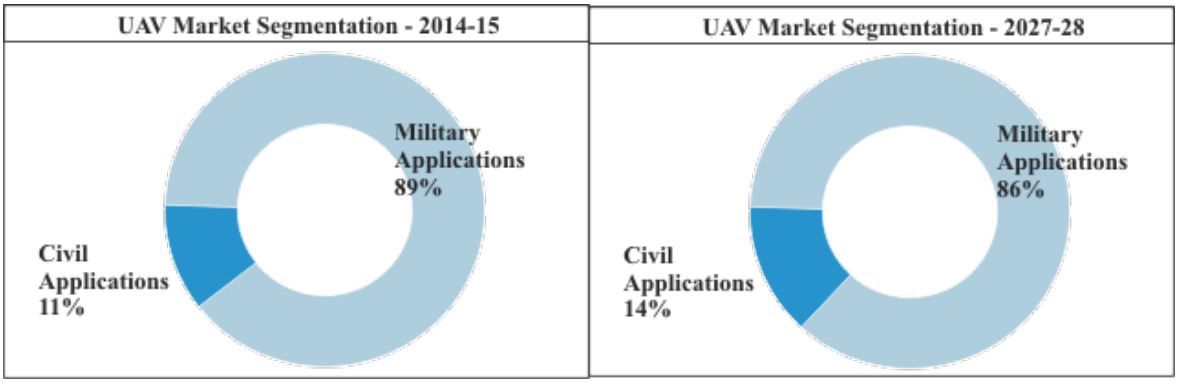
UAVs' industry was initially boosted by the military use and developments, while nowadays UAV technology is reaching to private sector needs, which is interested in smaller UAVs, intended for commercial applications. Nevertheless, the uncertain and fuzzy situation regarding laws in this matter, it hinders the spread of usage of drones in commercial and business practices. Among the greatest and the most important concerns is the question of security, flight safety and privacy (Wijninga, De Jong & Oosterveld, 2015). Hobbyists flown radio-controlled aircraft many years before drones actually become that popular and affordable for mass consumption. Notwithstanding, drones of commercial value and business purposes were developed as a result of recent technological development and advances within the field of microprocessors, GPS, sensors, batteries, motors, lightweight, etc., which will influence and guide drones' development and industry also in the future (Hazel & Aoude, 2015, p. 5).

Supporters of the use of drones for commercial purposes (in business practices) see their advantages in particular what regards improving efficiencies and competitiveness (which can include for example safety inspections of pipelines and rigs); increasing accuracy (they offer a more accurate and optimized inventory for example in warehouses); accelerating the decision making process (in the case of natural disasters, since drones allow a quick overview of damage and /or injury suffered); accelerating the planning process (as drone reduce the time of mapping data); optimization of product promotion (as aerial photography is cheaper while also images and video snaps are of a better quality, while also videos and photos allow a greater sense of space); reducing maintenance

costs (Morrison, 2016, p. 5). According to the latter, drones could efficiently contribute to improving existing businesses practices (Cooper, 2015), while also create new business opportunities (Aeronavics, n.d.). In addition, it is expected that the use of drones for business purpuses will reduce safety exposure (in areas which were exposed to contamination or where potentials for security threats exist) and address global concerns (for example to study how water vapor and the ozone interact and how could stratosphere's changes affect the global climate) (Negm, Mullan, Sang-ik Kim & Holsman, 2014, p. 7).

On this basis it is expected an increase in drones' (UAVs) usage for civil (business) purposes, while a reduce in the use of drones for military purposes. In Figure 3, we provide a comparison regarding the use of drones in a compared perspective between 2014/2015 and 2027/2028 (Nagpal, n.d.).

Figure 3: UAV Market Potentials (2014/2015 vs. 2027/2028)



Source: K. Nagpal, Unmanned Aerial Vehicles (UAV) Market, n.d.

Nevertheless, risk managers from the survey by Munich Re (2015) highlight various technical, legal, regulatory and risk management issues, which have to be addressed and resolved over time (Cooper, 2015). Legal matters and issues regarding the use of drones are of vital importance for the future of this industry. Unregulated use of drones increases the risk for crimes and interventions in fundamental human rights, while impeding the development of new services and jobs and increases security risks (Informacijski pooblaščenec, 2015, p. 4). Nevertheless, airspace governing bodies will have to consider all crucial aspects of regulatory and technological perspectives when dealing with legal aspects of drones (UAVs). It is of vital importance that they consider the aspect of safety and privacy of citizens on one hand, without suppressing innovation and growth on the other (Mazur & Wiśniewski, 2016).

One of drones' key features is the possibility of their customisation and configuration of the same base system. The latter is crucial as it enables a wide variety of business niches and opportunities, within which drones can deliver various marketable services in their payloads. Another interesting fact regards specific drones' configurations, which can also

be used for a wide variety of purpuses. To this extend, it is plausible to think that further development of civil drone sector would generate onsiderable investments in both research and development, which would result in miniaturisation of UAVs and lower costs, which would be beneficial for civil and military sector (Boucher, 2014, p. 9).

In total there are approximately 500 drone manufacturers on the global market, within which one third are located in Europe. Currently, drones (especially military ones) are manufactured mostly in the USA and Israel (The Danish Transport Authority, 2015, p. 13). In the USA there are approximately 89 companies, among which the biggest ones are for example Boeing, Lockheed Martin, Northrop Grumman and Sikorsky Aircraft, while the smaller ones are for example AeroVironmen, 3D Robotics, Titan Aerospace, Aurora Flight Sciences, etc. Also BRIC countries are expected to gain importance in this nice, although in China SZ DJI Technology Co.[20] is already an important and the biggest manufacturer of UAVs. The latter has developed an internal stabilization system whereby the devices have become easier to fly and navigate. The second-largest company is the French Parrot SA, which leads in the lower-end consumer marketplace (Canis, 2015, p. 7–8; Peasgood & Valentin, 2015, p. 3). But, as companies operate in various sectors, they also have diverse needs, and thus need different types of drones, with specific capacities: e.g. flight speed, high-quality and real-time data, cost-effectiveness, etc. (Mazur & Wiśniewski, 2016, p. 4).

In Figure 4 we present drone market environment map in order to highlight the variety of companies in drone industry. The map consists of 711 companies (according to their individual cluster and sub-cluster), from 49 different countries, ranging from North America (54 %), Europe (30 %), Asia (9 %), Oceania (3 %), Middle East and Africa (3 %) and South America (1 %). These are gathered in specific market categories consisting of (hereinafter Schroth, 2016):

- platforms (29 %),
- components and systems (16 %),
- services (20 %),
- universities and research programs (10 %),
- software (7 %),
- news/media/blogs (6 %),
- coalition/organizations/initiatives (5 %),
- conferences and events (3 %),
- operator marketplaces (2 %),
- drone insurances (2 %) and
- user groups/networks (1 %).

[20] The company started with drones for leisure activities, but has eventually moved in producing other models.

Figure 4: Drone Market Environment Map (in 2015)

Source: DroneII.com, Product Description The Drone Market Environment Map 2016, 2016.

Some of the listed companies are already well developed and functioning on drone industry/market, while others are in a developing stage or early startup, with revolutionary approaches, ideas and technologies. The interesting fact is that the majority of these companies are small and medium-sized enterprises (hereinafter referred to as SMEs) operating in average for about 6,5 years, with aproximately 8 employees (Schroth, 2016).

Within the commercial/industrial market, we could generally speak about four (4) sub-segments of drones' industry and its user groups, which we present in Table 1.

Table 1: Drones' Market Sub-segments and Target Groups

	MARKET SUB-SEGMENT	TARGET GROUP
1	**MEDIA**	Production companies (Movies/advertisements/TV) (Semi) pro camera operators Camera rental companies Marketing agencies Real estate agencies (Aerial) photography companies
2	**PUBLIC SERVICES**	Police/law enforcement agencies (Rural) fire brigades Search and rescue organizations Councils Coast guard Federal Universities/research organizations
3	**INDUSTRY**	Mining companies Civil engineering Oil and gas Energy/utilities Property developers/architects Insurance companies
4	**AGRICULTURE**	Dairy Farmers Beef and sheep Crop farmers Vineyards Forestry Fisheries Agricultural contractors

Source: Aeronavics, Leading drone innovation, n.d., p. 16.

For this reason we present Figure 3, which reflects the expected growth in the use of drones or various commercial (business) purposes.

Figure 5: Growth of Commercial Drones by Segment (2014–2019)

Source: B. Canis (after CyPhy Works Inc.), Unmanned Aircraft Systems (UAS): Commercial Outlook for a New Industry, 2015, p. 6.

The changing trend of drones' usage reflects that in 2014, the latter were used more or less for leisure activities, which changed in the following year, when there has been an increase in the use of drones for the purposes of protecting and inspecting. In the upcoming years it is expected that it will increase drones' usage for commercial purposes which includes evaluating and managing and or delivery and transport (in the field of trade, in food industry, medicine, etc.).

In Table 2 we show present estimations of addressable markets, which have high potentials for drone powered solutions (Mazur & Wiśniewski, 2016, p. 4).

Table 2: Value of Drone Powered Solutions in 2015 (in bn $)

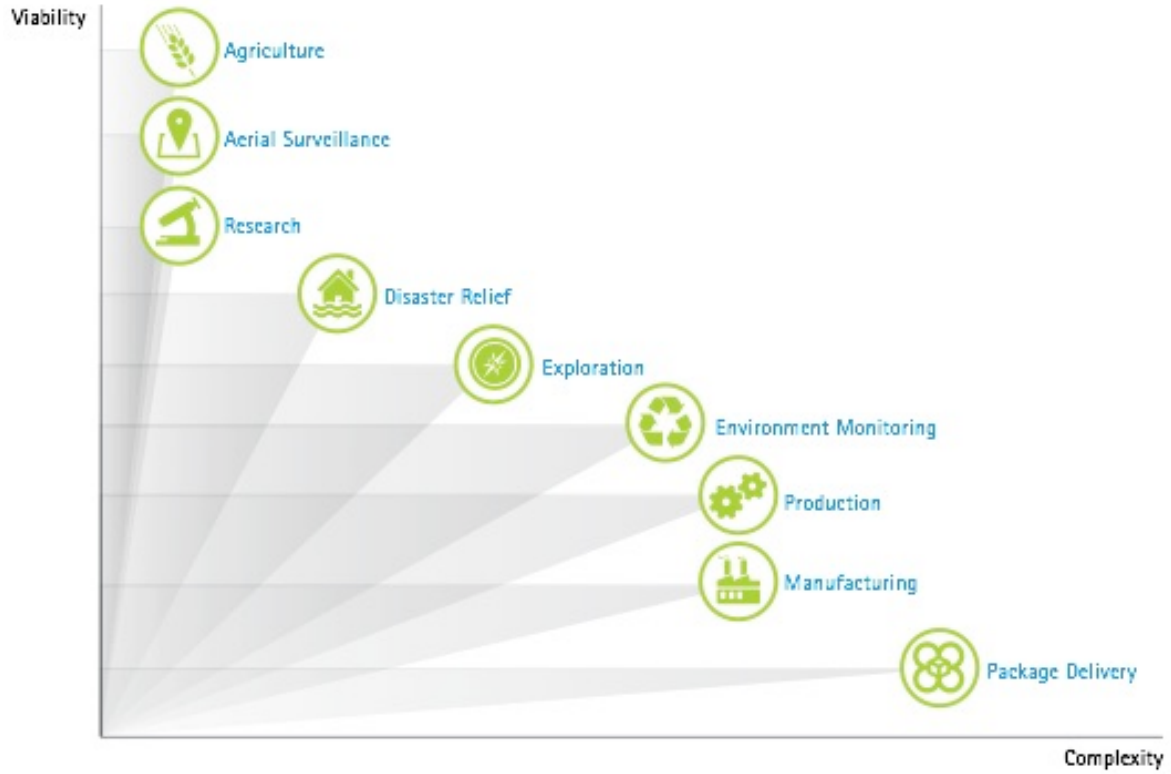
SECTOR	**2015 (in bn $)**
Infrastructure	45.2
Transport	13.0
Insurance	6.8
Media & Entertainment	8.8
Telecommunication	6.3
Agriculture	32.4
Security	10.5
Mining	4.3
TOTAL	**127.3**

Source: M. Mazur & A. Wiśniewski, Clarity from above: PwC global report on the commercial applications of drone technology, 2016, p. 4.

Values in Table 2 are calculated on the basis of labor cost and services, which have high potentials for replacement with drone powered solutions. Data corresponds with current values of businesses and labor in each industry, which is estimated at over 127 billion $. The highest prospects for drone applications is estimated for infrastructure sector (45.2) followed by agriculture (32.4). On the other hand the lowest prospects for drone applications is in mining sector (4.3).

But, the adoption of drones (UAVs) will strongly depend on two main factors, which will determine drones' efficiency and reliability, these are: market viability and solution complexity. In line with this, it is assumed that drones will mostly be used in the segment of agriculture, aerial surveillance and research, followed by the niche of disaster relief, exploration, environment monitoring, production and manufacturing, while experts are most skeptical about the use of drones for delivery purposes as this segment seems to be the most complex one (see Figure 5).

Figure 6: Adoption Of Drones in Industries (Projections)



Source: W. Negm, P. Mullan, K. M. Sang-ik & R. Holsman, It's Time for Flying Robots. Key recommendations for making unmanned aerial vehicles operational, 2014, p. 6.

Drones are increasingly on the rise in business practices; in fact corporate risk managers who participated in a survey by Munich Re stated that in less than five years, drones could become a common practice for almost 40 % of businesses. By 2020 approximately 30,000 of commercial and civil drones could be flying the skies of the USA, according to the

Federal Aviation Administration (FAA), which would create 100,000 jobs and contribute 82 billion $ to American market, according to the Association for Unmanned Vehicle Systems International (hereinafter referred to as AUVSI) in the period between 2015 and 2025 (Cooper, 2015). RAND Corporation forecasts an increase in drone spending on procurement, research and development up to 11.4 billion $ in year 2022 (Davis et al., 2014). Drones provide inexpensive options for research, site inspections, search and rescue operations, crime scene investigations and aerial investigations.

Drones are a suitable tool for businesses, which require mobility and high quality of data, e.g. dispersed assets, large scale capital projects, infrastructure maintenance and agriculture, insurance, mining, transport industry, etc. In this respect, addressable market value of drone powered solutions at it is estimated over 127 billion $ (Mazur and Wiśniewski, 2016). Another prediction within this segment was given by experts from the Teal Group, which estimate that the global drone market is worth 6–12 billion $, out of which commercial drones account about 10 %. Moreover, The Volpe Center estimates the USA commercial drone market to reach 5 billion $ annually by the year 2035, while the global market of UAVs is estimated to be several times bigger (Hazel & Aoude, 2015, p. 4). But the future of drone usage in commercial sector (i.e. for business practices) is strongly linked and dependable on regulative and legal framework in this field. To this end, in the following paragraph we examine legislative regulations within business practices which use drones and its impact on business revenue.

3.2 Legislative regulations of drones within business practices

The future of drones' use for commercial/business purposes (i.e. drone powered solutions) are currently quite dependent on regulatory aspects. Although, many companies would like to use drones in their business practices as they see the benefits of the latter, are still quite reserved and skeptical to opt for drone powered solutions. Hence, a need for transparent rules and regulations is essential in this field. National and international aviation authorities have already started to design crucial regulations and acts to guarantee a secure and business-friendly usage of drones (Mazur & Wiśniewski, 2016, p. 21).

For now, the issue is regulated in a more general way by already mentioned Article 8 of the Chicago Convention, which requires a specific national authorization from airspace authorities in the case of a pilotless aircraft operation. Nevertheless, terms for this authorization can be set by the country, which will be overflown. Therefore, there is a lack of a harmonized regulatory framework or legislation, as the latter differs among countries ranging from a more permissive to a totally restrictive, which bans drones' operations. In addition, it is crucial to mention also Annex 7, which refers to definitions of applicable categories of »aircraft« in the same Convention, depending on: weight, power, type of wings, etc. Also relevant are the Article 2.18 (of Annex 11), which refers to timely

coordination of activities, which could be hazardous to civil aircraft[21] (Bernauw, 2015, p. 231–232).

After the arrangements of legal and regulative framework, companies may be required to stipulate adequate insurance for drones' operations in order to ensure they are able to meet all the necessary liabilities in the case of an accident. Type of insurance will depend on: the type of aircraft, its weight, location coverage, potential usage, pilot's qualifications, the airspace (altitude, controlled or restricted) and experience of the organization, which carried out the specific operation (Negm, Mullan, Sang-ik Kim & Holsman, 2014, p. 8).

But so far, most countries are in the phase of preparing a suitable and effective legislation and directives, which ill not be harmonised, as each country regulates the field separately. Therefore, in what follows we present in more details legal regulations in the EU, USA and in a global perspective. In this context, we will not deal with Slovenian regulations, since the first Directive (adopted in May 2016) is still in the process of completion and in the existing version does not include concrete regulations about business practices.

As a curiosity, in Figure 7 we present how this segment is differently regulated in Canada, the USA, the UK, Japan and Australia, in order to outline the basic regulative framework of some countries and federal states.

[21] This category is further regulated by the E.U. Insurance requirements for air carriers and aircraft operators (2004).

Figure 7: Regulation of drones (in 2014)

Source: W. Negm et al., It's Time for Flying Robots. Key recommendations for making unmanned aerial vehicles operational, 2014, p. 9.

In what follows we focus in more details solely on the legislative and regulative field in the USA, the EU and Slovenia.

3.2.1 Legislation in the European Union

In 2015 the European Aviation Safety Agency published a brochure Concept of Operations for drones, which stated (European Aviation Safety Agency, 2015, p. 1):

> »Drones should be integrated into the existing aviation system in a safe and proportionate manner and this integration should foster an innovative and competitive European drone industry, creating jobs and growth, in particular for SMEs. The proposed regulatory framework should set a level of safety and of environmental protection acceptable to the society and offer enough flexibility for the new industry to evolve, innovate and mature. Therefore the exercise is not simply transposing the system put in place for manned aviation but creating one that is proportionate, progressive, risk based and the rules must express objectives that will be complemented by industry standards.«

From this statement it is evident that European Union (and the European market) is aware of potentials about the use of drones in business purposes and practices, especially for small and medium enterprises). The planning for a regulative frame in this segment will be »market driven«. Nevertheless, regulations should be set with cooperation and in accordance with the European Commission and Member States and proposed to Joint Authorities for Rulemaking on Unmanned Systems (hereinafter referred to as JARUS) and ICAO, while it should benefit the global drones' market (European Aviation Safety Agency, 2015, p. 10).

In April 2016, the European Parliament adopted Data Protection Regulation, which will enter in force on 25 May 2018 and revoke the already existing Directive 95/46/EC. Data Protection Regulation binds commercial users of drones to comply with principles and rules regarding purpose limitations, data minimization and proportionality, while also transparency principle[22]. In addition, due to the new regulation »privacy by design«[23] and »privacy by default«[24] will become mandatory (Papademetriou, 2016, p. 130–132).

3.2.2 Legislation in the United States of America

In the USA, drones for commercial use are currently inhibited, unless the FAA authorizes the contrary, by issuing an exemption, of which the most commonly known is the »Section

[22] The latter requires individuals to be informed of any processing carried out during drone's operation.
[23] Within *privacy by* design, the controller will be required to implement appropriate technical and organizational measures in order to ensure that data processing complies with the proposal.
[24] Within *privacy by default*, only personal data which were necessary for each specific purpose of the processing will be processed and not be collected or retained beyond the minimum period necessary.

333 Exemption«[25] of the FAA Modernization and Reform Act of 2012, while also a civil Certificate of Waiver or Authorization (Trending Now: Domestic Drones, 2015). This authorization shall apply on a case – by – case basis (Lynes, 2016, p. 1).

In 2014, the FAA permitted commercial enterprises the use of drones by allowing exemptions from its ban on commercial drones' flights. In fact, the FAA granted 500 exemptions from received and reviewed 1,500 petitions[26] by the Association for Unmanned Vehicle Systems International (AUVSI), which provides the first factual insights on the potential interest in commercial use of drones. These exceptions were made for over 20 big industries dealing with real estate, aerial surveying, aerial photography, agriculture, aerial inspection, etc. These exceptions were granted for companies in 48 states in the USA, but the top three states where manufacturers received exemptions were California, Texas and Florida (Canis, 2015, p. 8–9).

The next set of exceptions was granted in 2015 when the FAA announced a new policy within which it granted a blanket certificate[27] of waiver for flights at 200 feet (or below) to any drone operator holding a Section 333 exemption. On the basis of these exceptions (hereinafter Lynes, 2016, p. 1–2):

1. an aircraft has to weigh less than 55 pounds (lbs);
2. operate during daylight hours and in accordance with applicable visual flight rules conditions;
3. a visual contact with the device has to be maintained by the operator;
4. be conducted at all times within the visual line of sight of the operator and
5. a determined distance has to be maintained from airports or heliports.

In February 2015 the FAA released a framework proposed regulations[28] regarding drones for business (commercial) purposes in the national airspace, which comprise; operational limitations, operator certification and responsibilities, while also aircraft requirements. The FAA has already received comments, but the final version of regulations (rule) is not be expected until the end of 2016. Amendments also concern proposals that drones should operate at a maximum altitude of 500 feet and not more than 100 miles per hour, prohibition of flying a drone over other persons (which are not directly involved in the use of a drone), an operator yield right of way to other aircraft, manned or unmanned and refrain from using a drone in a careless manner (Lynes, 2016,pp. 2).

[25] From March, 2015, there have been 42 cases of such exemptions for different operations, e.g. aerial inspections for insurance, development of economic platforms for aerial survey, law enforcement, bridge inspections, etc.
[26] More than 80 % of the applicants for exceptions were small companies.
[27] If operators wish to fly drones outside these parameters have to apply for a separate certificate of waiver or authorization specific to the airspace required for such operations.
[28] For aircraft which weigh less than 55lbs and are not used for recreational purposes.

Finally, in June 2016, the FAA finalized the first Operational rules for commercial use of small UAVs/drones, which has enabled a pathway towards a full integration of UAVs into the nation's airspace. These rules were set and adopted in order to effectively stimulate innovations, to create job positions and stimulate the economic growth, advance critical scientific research, save lives, etc. The new rule proffers safety regulations regarding drones weighing less than 55 pounds for non-hobbyist operations. New regulations determine that pilots have to maintain UAVs within a visual line of sight, fly only by daylight[29], determine height and speed restrictions and prohibits flights over unprotected people. Drone's operator has to be at least 16 years old and have a remote pilot certificate with a small UAS rating[30] (Directions Magazine, 2016) or be supervised by a person with such a certificate. In addition, pilots have to respect regulations regarding height and speed limit and must not fly drones over unprotected people if these are not the participants of the same operation (Summary of Small Unmanned Aircraft Rule – Part 107, 2016).

3.2.3 Legislation on the global level

On the international (global) level, safety standards and recommended practices for air navigation[31] are regulated and ensured by the ICAO[32], which has 191 members (International Civil Aviation Organization, 2016), out of which 63 already have in place certain regulations regarding the use of drones, 9 states have pending regulations, while 5 have temporarily banned the use of drones (Mazur & Wiśniewski, 2016, p. 26). Nevertheless, there is no common regulatory policy for commercial use of drones, therefore each country manages and regulates this field by its specific rules and. In Table 2 we present the regulatory framework in 15 countries (Mazur & Wiśniewski, 2016, p. 21).

It is interesting to notice that Poland was the first country, which implemented all necessary sets of regulations regarding the usage of drones. Poland allows the use of drones for commercial purposes, which is a result of cooperation between the civilian aviation authorities, the UAV community and insurance companies (Mazur & Wiśniewski, 2016, p. 26).

[29] Or during twilight if the drone has anti-collision lights.
[30] Or it has to be directly supervised by someone with such a certificate.
[31] Nationally and internationally
[32] A specialized agency of the United Nations

Table 3: Regulatory Framework by Countries in 2016 (Global)

Territory	Possibility of commercial flights	License required to fly	Possibility to perform BVLOS flights	License required for BVLOS flights	Insurance required for commercial flights	Training required for pilots in order to obtain licenses
Poland	✓	✓	✓	✓	✓	✓
UK	✓	✓	✓	✓	✓	✓
China	✓	✓	✓	✗	✓	✓
Canada	✓	✓	✓	✗	✓	✗
Germany	✓	✓	✗	✗	✓	✓
France	✓	✓	✓	✗	✗	✓
South Africa	✓	✓	✓	✗	✗	✓
Indonesia	✓	✓	✗	✗	✓	✓
Australia	✓	✓	✗	✗	✓	✓
Brasil	✓	✓	✓	✗	✗	✗
Mexico	✓	✓	✗	✗	✗	✓
USA	✓	✓	✗	✗	✗	✗
Japan	✓	✗	✗	✗	✗	✗
Russia	✗	✗	✗	✗	✗	✓
Argentina	✗	✗	✗	✗	✗	✗

Source: M. Mazur & A. Wiśniewski, Clarity from above: PwC global report on the commercial applications of drone technology, 2016, p. 21.

3.3 The impact of legislative regulations for business revenue

In the US, it is estimated that drones' industry will increase if/after FAA will develop rules and proper legislative framework regarding commercial drones and their usage. The crucial issue regards the nighttime flights and flights beyond the operator's line of sight, which should be abolished. In addition, FAA argues that each (human) controller should operate only one device at a time, which may impact technical considerations, costs, and deployments if automatic system could control multiple drones (Canis, 2015, p. 5–6).

The FAA has allowed some changes that could expand the understanding of commercial usage of drones. In fact, within the Pathfinder Program it will be experimented the flying of drones beyond the line of sight. The FAA has permitted the BNSF Railway Co. to use drones for inspection purposes (for track and monitor) of trains. Moreover, it has allowed the PrecisionHawk to learn how can farmers effectively and efficiently use drones. Furthermore, (separately) in 2012 the reauthorization legislation requested that FAA establishes permanent areas in the Arctic where small drones could be used for research and commerce. Therefore, FAA allowed exceptions and granted permits to ConocoPhillips and BP[33] in order to test drones for marine mammal and ice surveys, which are necessary to meet environmental and safety rules prior to sea floor drilling (Canis, 2015, p. 9–10).

[33] Oil companies

As it seems, for the time being all types of unmanned aviation in the non – segregated airspace will not be allowed and supported and only remotely piloted aircraft will be included in the international civil aviation system. Article 2.3.1. and 2.4. (of Annex 2) of the Convention on International Civil Aviation require a responsible pilot, who is the entitled authority for a specific aircraft operation. Consequently, supranational institutions have already launched the regulatory process in order to finally settle the whole legislative framework in order to accommodate the unmanned aviation activity. In this respect they would relate to Joint Authorities for Rulemaking on Unmanned Systems, which will serve as a global think-tank for technical, safety and operational recommendations for Remotely Piloted Aircraft Systems operations (Bernauw, 2015, p. 235–236).

The FAA's delays in adopting a proper legislative framework, which were supposed to facilitate drones' business and its ban on commercial drones represented great losses for drone industry. For this reason, we present a few open letters of US manufacturers and companies that use drones within their services, as well as of AUVSI, which is the support organization. The aim of these letters was to urge the FAA for the earliest adoption of appropriate legislation that will allow a normal business performance in this niche and generate profits, thereby also jobs, which would have a positive impact on the overall economy.

Spokesperson for Association for Unmanned Vehicle Systems International (AUVSI) stated (Hallissey, 2015):

> »AUVSI released an economic impact study in March 2013, which found that every year that airspace integration is delayed, the United States loses more than $10 billion in potential economic impact. This translates to a loss of $27.6 million per day that UAS are not integrated in US airspace. Once integration occurs, the UAS industry will create more than 70,000 new jobs and more than $13.6 billion in economic impact in the first three years after UAS are allowed to fly in the U.S. airspace.«

Spokesperson for CEA stated (Hallissey, 2015):

> »The sooner we have permanent rules in place in the U.S. regarding commercial drone use that support safety and protect innovation, the better off we'll be in the U.S. market. The FAA's exemption process is important in the meantime, but it is time-consuming and resource-intensive forboth the public and private sectors.«

Paul Misener (Amazon's Vice President) stated (Hallissey, 2015):

> »In the absence of timely approval by the FAA to conduct outdoor testing, we have begun utilizing outdoor testing facilities outside the United States. It is our continued desire to also pursue fast-paced innovation in the United States, which would include the creation of high-quality jobs and significant investment in the local community.«

These open letters show how important a proper legislation for the development and flourishing of this business area is. For this purpose, businessmen appealed to the FAA and called for fast solutions and implementation of appropriate legislation, so as they could develop and perform their business. Pressures and calls have proved to be successful, since in June 21, 2016, the FAA finalized the operational rules for routine commercial usage of small drones, which represents the first step towards a full integration of UAS into the nation's airspace (we already mentioned these rules the previous chapter). With such a regulative framework, it is estimated that drone industry could generate more than 82 billion $ within the US economy, while also create more than 100,000 new jobs in the forthcoming 10 years (Federal Aviation Administration, 2016).

But, on the global level, designation and adoption of a regulatory framework and rules is more complex. In fact, operations (involving the use of drones) have to be commercially viable, but still meet the key elements of regulatory framework (like security, data protection, requirements regarding the size and weight of drones, licenses, etc.). The ICAO is working on guidance for drones' operations, and expects to adopt these standards by the year 2020. ICAO'S crucial goal is to design proper standards, which would meet all the necessary regulations about infrastructure for air-traffic management and sense-and-avoid technology (Mazur & Wiśniewski, 2016, p. 28).

4 EMPIRICAL STUDY

4.1 Methodological frame of the research

The crucial goal of the present master thesis is an applicative value of our findings, therefore we will conduct a quantitative survey with a semi-structured interview with experts from drones' industry. The latter will give the master's thesis a significant added value, particularly because the subject of drones' legislation for commercial use is very complex. And even if Slovenia adopted the Decree on unmanned aircraft systems (Uredba o sistemih brezpilotnih zrakoplovov, 2016) in July 2016, which is to be applied for hobbyist and commercial drones, the issue is still quite fuzzy. Slovenian crucial challenge was to design a proper legislative framework, which would satisfy all security/safety and privacy aspects, and at the same time encourage the industry of drones. With interviews we will verify whether this was achieved.

The present survey is important as drones' industry is increasingly growing and represents an important niche in economic filed. Indeed, many organizations explore possibilities of growth in this industry, and numbers which they indicate are enormous (see chapter 3 Drones in business practices). Through interviews we wanted to spot crucial facts on this rising niche, the key problems faced by people working in drones' industry, etc.

We decided to use the qualitative research methods, i.e. semi-structured interviews, as it allows a researcher to analyze how individuals in certain circumstances understand and interpret everyday events and how they react to them (Kordeš & Smrdu, 2015, p. 15). When starting a qualitative research we have to be familiar with key concepts and theories of the problem (Mesec, 1998, p. 9), which was analyzed in the theoretical part. In the latter, we analyzed the available professional and scientific theory in order to understand the concept of drones (UAVs), their operations, modes of usage, as well as regulatory and legal framework. Therefore, we can upgrade theoretical data with empirical one and compare findings from both parts.

We decided to perform semi-structured interviews because it is a suitable method to provide a broader and more complex view of analyzed field (problem) while also it provides credible and comparable qualitative data. We designed the questionnaire based on our research question: How legal regulations affect the use of drones for business purposes abroad and how would regulations impact business practices in Slovenia?

4.2 Data collection and sampling

Our sample consist of chief executive officer (hereinafter referred to as CEOs) from various enterprises, which deal with production and sale, as well as offer services in connection with drones in Slovenia and worldwide. The interviewee presented the practical facts about drones and business practices related to drones' industry and about issues regarding regulations and legislation.

In the final part of our survey we compared CEO's answers to theoretical findings and existing legislation, in order to examine possible discrepancy and design proposals for improving the legislative frame, which will also be the crucial contribution of the master's thesis in the study of drones.

Our sample consists of the following companies and respondents:

- C – Astral d.o.o., Mr. Marko Peljhan;
- Modri Planet d.o.o., Mr. Marko Mesarič;
- Airnamics, Mr. Marko Thaler and
- OneDrone, Mr. Robert Verlič.

We will briefly present these companies and than present CEO's or Deputy CEOs' answers.

4.2.1 C – Astral d.o.o.

C – Astral is an aerospace enterprise and solution provider and represents one of the most important companies from the niche of small UAVs. The company operates in a global market and offers a research and developmental programs, while also advanced integration/customization capacities. It covers the field of practical experience in aerospace, unmanned systems, electronics and sensor development, aerial based surveying and processing, remote sensing, telecommunications, renewable energy systems and extreme environment autonomous habitats and communications. The founders of the company (which was formally funded in 2007) started to operate in the field of aerospace in 1999 and performed the first Unmanned Aircraft System test flight in Slovenia in 2005 with the Spectral System platform. C – Astral's resellers are set in Central and Latin America, New Zealand and Australia, Poland, Brazil, Canada, Malaysia, Italy, South – East Asia and South Africa (C – Astral, 2014).

The company started based on the idea of production of unmanned aircraft for geodetic needs. The system was developed based on knowledge and experiences of building models of aircraft, when small unmanned aircraft's market was still in development. C – Astral's team started in a small workshop with two employees, which eventually outgrew the limits of start-up company. Today, the company provides solutions for many applications in the global marketplace. C – Astral first developed a basic system GEO and proceeded to a complex system C4EYE for aerial observation in real time for security and civilian purposes. But, they also develop custom-made systems for specific customers for various purposes (detection of gas leaks from pipelines, control lines, etc.). The majority of development is financed by own resources (Peljhan, 2016).

4.2.2 Modri Planet d.o.o.

The company developed an integrated system for geodetic companies for capture, process and convert spatial data from air into accurate 3D models. This system consists of unmanned aircraft (drone) designed for capturing images of land from air and equipped with photogrammetric 3Dsurvey program, which converts 2D photos into accurate photo maps, clouds and 3D digital terrain model by using computer vision algorithms. Thus, the program 3Dsurvey enables geodesists a fully automatic data processing and a quick, easy and effective investigation as well as capturing of information about an area. The latter enables geodesists' to collect data for construction plans, geodetic measures, studying flood and other potentially hazardous areas from air, etc. (Vabšek, 2015).

Data capture from air was first offered as an additional service in Slovenia while at the same time the company financed the development of the program for data processing. The company is active also in Croatia, Bosnia, Austria and Germany, while it plans to expand across the rest of Europe (Pavlin, 2014).

4.2.3 Airnamics d.o.o.

Airnamics is striving to develop a new paradigm within which companies dealing with UAVs can focus only on the usage of custom made UAVs products. Therefore, the company should only focus on engineering, development, certification and production aspects of UAVs. Therefore, the company's crucial aim is the elimination of complexity, reduce of costs, an increase of safety, high quality devices and certified mass market UAS products. In addition, the company strives for a custom designed helicopter or fixed wing Vertical Takeoff Or Landing (hereinafter referred to as VTOL) system at lower price. UAS development process is based on three crucial building blocks, consisting of: advanced simulation environment, high performance control and power electronics suite and an in-house engineering of all system aspects. All members of the company's team are connected with the aviation industry (engineering professional, sport or model airplane pilot, etc.). Due to a variety of staff's professional background (i.e. mechanical or electronics engineering, computer science and embedded systems, composites manufacturing and industrial design), the company can develop everything in-house (from carbon fiber airframe to on-board computers and systems, fly-by-wire autopilot and control algorithms). Within the whole business process, the company respects safety requirements. The company operates in the field of film production, live broadcasting, GIS data capture and engineering inspection, while its core partners are Albatross Fly, MathWorks and Trimble (Airnamics, 2015).

Airnamics is developing custom made UAS systems and custom engineer all main UAS components in-house (mechanics and airframe, electronics, control algorithms, etc.

4.2.4 OneDrone d.o.o.

The company started its business activity of selling drones in 2012, with only a few brands of UAVs and have further expanded the sales covering all major brands from FPV/UAV world. The company is a partner of Team BlackSheep (hereinafter referred to as TBS) and one of the biggest distributors of TBS products in Europe. The company sells UAVs/drones (airplanes and (multi) copters), as well as other equipment and accessories for the latter (OneDrone, 2016). The basic idea of Onedrone.com is to offer all the drone/UAV related equipment available in one place.

4.3 Data analysis

Since our research sample consists of interviews with CEOs we have taken in consideration that they are very busy and often face the lack of time. Therefore we conducted our interviews via e-mail (e-interviews), which we estimate as reliable and credible, since we previously contacted respondents by phone, who personally arranged in answering our questions. Below we provide answers to our questions.

The majority of companies from our sample perform business in Slovenia and abroad, only Airnamics has no customers from Slovenia (just foreign business).

Only OneDrone deals with drones for hobby purposes, but it is already moving towards professional solutions. Modri Planet deals with a specific field, i.e. geodetic solutions for geodetic companies for capturing images from air. Airnamics deals with drones for commercial or government usage. C – Astral has the most diverse range of clients, as approximately 60 % of business represent major contracts with state institutions in Slovenia and abroad, as well as international institutions, like The United Nations. The other 40 % of turnover represent aero-photogrammetry and various types of remote sensing for research and/or commercial purposes.

The beginnings of drone business have been different for all companies. Airnamics and OneDrone developed its business from hobby activities, wherein OneDrone »gathered all of the best brands from this field and offer them in one place«, as at the time it was not possible (or difficult) to buy components for building a drone. While C – Astral and Modri Planet's beginnings were different. Mr. Mesarič from Modri Planet says they recognized the needs for a better and more accurate (detailed) and easier measurements in the segment of geodesy, and from than the company deals with development of systems for geodetic services. Meanwhile, C – Astral started in 1999, when this niche was still rather unknown even in the world. Mr. Peljhan »started to think about creating an autonomous flying robot vessel, for remote sensing associated with migration of humpback whales in the Southern Indian Ocean«, within the artistic – scientific project Makrolab. But, even before that, he designed a conceptual project TRUST-SYSTEM 15, which was closely connected to technological background of unmanned systems, which were known at the time. In the end of 2007 (when C – Astral was founded), the company associated with all actors in industry and science from this field in Slovenia within the Targeted Research Project (hereinafter referred to as TRP) project, which boosted the further development of drone business. Mr. Peljhan claims: »Already then, we were aware that within such a technological autonomy conceal crucial issues, with so-called civilizational range«.

Given that all companies operate also (or especially) abroad, we asked if they perceive differences in business practices and whether if they face problems in terms of legal regulations. Three respondents (from companies Airnamics, C – Astral and OneDrone) claim that EU legislation from this field is not harmonized, which represents a problem. Each EU country regulates this field according to their national rules and legislation. Mr. Peljhan, from C – Astral even said that they: »stock CAA with data and asked for establishment of regulations already in 2007... when we had the opportunity to be the first. /.../ so now we will be almost the last ones in Europe, who will have, also thanks to dedications of individuals who are not serving in the CAA, exemplary regulated«.

Mr. Thaler, from Airnamisc claimed that their company is not able to perform their core business, due to a non-defined legislation. While Mr. Verlič, from OneDrone said: »Drone operators have to put a lot of efforts to comply with the rules with every single country. Some pan-European rules and licenses would simplify this industry a lot and give it a new boost«. Only Mr. Mesarič, from Modri Planet thinks that this field is well regulated and says: »I.../ which I consider to be good and certainly very similar to regulations in neighboring countries«, nevertheless he argues that countries with a fast development are significantly more susceptible to change, and adapt much sooner the legislation to technology (e.g. China). But, at the same time he said that their sells in Slovenia almost stopped at the time of prohibition of drones. Nevertheless, now they can continue with their plans and projects.

Since we conducted our interviews at the time when Slovenian legislation has not been adopted (it was in the phase of preparation), we asked our respondents whether they though it would possible that any legislative proposal could negatively impact or harm their business (both in Slovenia and abroad). The responses were mainly focused on criticizing Slovenian experts, who were involved in preparing this Directive, but because the articulation of answers was so diverse and interesting, we provide questions of all respondents. Mr. Thaler, from Airnamics said: »Companies that are pushing the state of the are in UAS technology should have defined rules of how they can do it safely, efficiently, and quickly so they can create new technology and execute on business opportunities as currently the non-defined legislation or overly complicated bureaucracy procedures are killing startup initiatives in the UAS industry«. Mr. Peljhan, said: »There were many bad proposals, but it looks like that for now the profession and intellect have predominated. Unfortunately, Slovenia is a country with a reactive policy and regulatory culture, which reacts post-festum. This is one of our major defects. This may be the result of official's class ignorance, but it is difficult to generalize /.../«. Mr. Verlič, from OneDrone said: »The most negative impact on the business had the decision of Slovenian CAA which completely restricted all drone activities in Slovenia until the legislation is prepared. This decision almost completely stopped Slovenian market for several months. But we think that everything will start to go in the right direction with new Slovenian legislation which should be implemented in August«. Only Mr. Mesarič, from Modri Planet was quite optimistic and said: »Basically, it can only get better».

Due to the non-existent (or fuzzy) legislation regarding drones at the time of the interviews, we asked our respondents whether they thought the experts had properly addressed the issue and how do they assess experts' knowledge, who were engaged in preparing the Slovenian legislation. Two respondents were more tough to the whole matter. Mr. Thaler claimed that Slovenia has competent experts, but the problem is/was the government/ CAA's attitude to the latter. Mr. Peljhan pointed out that the majority of hard work was done by one person (he does not reveal his name though), who was not part of the CAA and who consulted stakeholders in a democratic and professional manner. He

continues with a more critical approach towards Slovenia and adds that in other countries things would develop differently. Mr. Verlič argued that individuals from various Slovenian companies gathered in 2015 to form the »Institute for development of unmanned systems« , which acted as voice of industry and government's agencies partner in the time when Slovenian legislation was still in preparation. Only Mr. Mesarič was again more positive and benevolent towards Slovenian experts and said: »I would like to praise their cooperation with private companies, which have valuable experience with the use of unmanned aircraft. I would hope that the legislation was adopted several years ago and, in this way, enable competitive conditions for business in comparison with other countries« .

In addition, we were interested in respondents' comments regarding drones' legislation and regulations in the US and EU and other countries of the world in comparison with Slovenia. We were interested particularly in respondents' opinion about which practices they think should be applied in Slovenian legislation. The answers were again diverse. Mr. Peljhan likes Finish legislation the best, and adds that also New Zealand has a good legislation. As far as legislation in the EU he was critical and said: »There is a confusion on the EU level, cacophony, irrespective of the fact that research sector as well as industry communicated with European institutions from 2002 onwards«. Similarly claims Mr. Verlič: »In EU there is evident lack of common policies on the level of EU, which would really form EU as single drone market without unnecessary bureaucracy«. Mr. Mesarič, claimed that Slovenian legislation is similar to Austrian and Croatian and added that they have suggested some improvements for which he believes to be comparable to European legislation. While Mr. Thaler considers that EASA guidelines or JARUS suggestions should be applied. As regards the US legislation, respondents assess and comment as a totally »different story« compared to Slovenia and the EU, while also they do not mention or highlight any good practices that could be used as a reference model for design the Slovenian or EU legislation.

As we interviewed individuals who are active for many years in the industry of drones, we wanted to hear any suggestions regarding the Slovenian legislation. But their answers were not as comprehensive as we expected. In fact, Mr. Peljhan and Mr. Thaler replied that they have already send (various times) their proposals to CAA and competent authorities, while Mr. Verlič said that all the ideas and proposals were already discussed within the »Institute for development of unmanned systems«, while also adding that they were partly included in designing the upcoming Slovenian legislation.

Finally, Mr. Peljhan highlighted an important issue regarding drones' terminology, while claiming that the term »unmanned aircraft« (*slo. brezpilotni letalnik*) should be enacted, rather than »Drone« (*slo. dron*). Namely, in the aviation field drone is a so-called »flying target«, which took hold because of the media ad their propaganda.

4.4 Synthesis of results

As expected, most companies from our sample of interviews is dong business also abroad, which is understandable due to the small Slovenian market and the fact that drone industry is still quite a new phenomenon in Slovenia, mainly in terms of business practices. Nevertheless, it has to be acknowledged that these companies perform their business activities also in Slovenia.

In this respect, we found that most respondents (with one exception, i.e. Modri Planet) were/are quite critical towards the Slovenian and EU regulations and legislation regarding drones. Their critics were mainly focused towards the CAA and Slovenian government which did not took into account the advices from experts in this field. The experts believe that the current EU legislation is not yet aligned and harmonized, as each EU country regulates drones by their own rules. And if we expected that US would be highlight and set as an example of good practice, this was not the case. On the contrary, we perceived that respondents do not consider the US legislation as good, although no one explicitly said it. Whereby, New Zealand and Finland were pointed out as countries with good legislation, while China was mentioned as a country that quickly adapts its regulative frame to technological changes and development. In order to ensure such regulative framework that would facilitate drones' business various experts from Slovenian companies gathered and formed the so- called »Institute for development of unmanned systems« in 2015, which discussed all important issue while the legislation was still in preparation.

Regarding the then non-existent legislation, two respondents were quite critical as they believe there are competent experts in Slovenia, while the crucial problem lies in government/ CAA's attitudes toward the whole matter. For this reason experts from various companies formed the »Institute for development of unmanned systems« in 2015, with a view to design a relevant legislation, which would enable effective business practices in drone industry and thus act as voice of industry on one hand, and government's agencies partner on the other.

In addition to answering our research question, the purpose of interviews was also identifying examples of good practices from legislative framework of other countries (EU and USA) and give proposals for improving the Slovenian legislation. But our respondents did not explicitly reveal their legislative proposals and ideas. As well as, they did not explicitly point out limitations or directions, which hinder or harm their business in this sector, they solely highlighted the problem of non-harmonized legislation in the EU.

Even when we tried to find reviews and reservations regarding the legislation from analyzed material in the theoretical part, we have not managed to get anything concrete. On this basis, we can not point out any specific proposals to improve the regulatory framework in Slovenia, but at the same time the latter confirms that the topic of

UAVs/drones' legislation is still quite »shrouded in fog« and in the stage of completion. The latter was confirmed also by the majority of our respondents as they stated the same for Slovenia, as well as for the EU and US.

Despite the fact that we conducted four interviews with relevant respondents (CEO's of Slovenian companies in the industry of drones) we did not gather the material we expected. Indeed, according to number of companies that deal with drones (UAVs) in Slovenia, four companies represent a quite large sample, and the fact that we interviewed the most competent persons in enterprises (CEOs), with some of them (actively) involved in proposals for legislative framework, we were expecting more comprehensive answers which would represent valuable material and serve as proposals for improving the field of drones' legislation. We assume that our respondents' answers were so sparse because of the fact that they have made considerable efforts with the proposals for new legislation, but were ignored by the Government (and the CAA).

This can be a significant step backwards in the progress of drones' industry in Slovenia, which in the global market represents a great potential for job creation as well as economic growth and consequently an increase of general welfare. Apparently, Slovenia is not yet ready for such a venture as it can be observed in other countries (including developing economies, for example BRIC countries).

CONCLUSION

In the present master's thesis, we analyzed the topic of drones (UAVs), which arouse ambivalent feelings and stirs strong debates in countries from all around the world. This is due to a still quite unregulated field, non-existing or fuzzy legislation, which further blurs operating in this field. Furthermore, also issues regarding privacy issues represent an important point of disagreement between the experts and rise concerns about potential abuse of drones in data collection, accumulation and transmission. Additional controversial issues emerge also in connection with the use of drones for purposes of law enforcement (by the police), connected with individuals' privacy, which could be violated in the case of drones' use in police missions (for example while investigating someones' private property, etc.). But despite these issues, experts are quite optimistic about further projections in the industry of drones, for which they predict golden times in the coming years.

Beside military and police usage, drones/UAVs has spread in hobbyist and commercial purposes, for which it is estimated to be sharply on the rise in the following years. Indeed, drone industry represents a huge potential for generating astonishing profits, creating new jobs and growth in national economies. That is why drone industry continues to pressure on government agencies, which regulate this area. Some countries already have a legally regulated drone filed, but in many countries this segment is still subjected to chaos and

vagueness of regulations, which need to be adopted and consolidated.
From this perspective, we focused on the legal framework and regulations in the US, the EU and Slovenia, deriving from the main research questions: How legal regulations affect the use of drones for business purposes abroad and how would regulations impact business practices in Slovenia? In the teoretical part we examined legal framework of these three, and found out that none of the mentioned has yet an already fully adopted and integrated legal framework in this field. Some regulations have already been adopted (in 2015 or 2016), but they are still at the stage of completion. And meanwhile governments and agencies, which are responsible for these arrangements seek ways to regulate this segment, businessmen operating in this niche are becoming quite impatient and urge the government for a rapid adoption and implementation of a proper legal regime, which would be favorable for businessmen, who operate in the drone industry.

There are companies that deal with drones (production and/or provision of services) also in Slovenia, therefore we conducted a survey among four Slovenian companies in order to analise what is the situation in Slovenia and how businessmen dealing with drones perceive it. Businessmen from our sample (Mr. Peljhan, from C – Astral d.o.o., Mr. Mesarič from Modri Planet d.o.o., Mr. Thaler from Airnamics and Mr. Verlič from OneDrone), either transformed their love for drones (from hobby) into a business, either started their business from various projects. Regardless the reason, the latter is particularly interesting and positive for such a small country like Slovenia as it represent an important business opportunity, which could contribute to new job positions and thereby boost the economic growth. Yet it seems that, individuals who work professionally in this field face a number of constraints and difficulties due to the legislation. Indeed, until recently, Slovenia still had no proper legislative framework in this field, but in summer (2016) a Decree on unmanned aircraft systems has been adopted, which defines and regulates commercial and hobbyist usage of drones. And regardless all debates that took place during the preparation of this Decree between the law-makers and experts from this industry, the latter are rather critical to the final outcome (the Decree).

We find that legislative framework is still rather vague, fuzzy and/or unclear, or it is still in preparation, transformation and/or completion, either in Slovenia or in the US and the EU. Namely, regulations and decrees are not explicit or do not benefit businessmen operating in drone industry. To this end, Slovenian experts (businessmen) from drone industry are critical to the fact that some of them even actively participated in the preparation process of Slovenian legislation in this field, whether in negotiations or by giving proposals, they even established the »Institute for development of unmanned systems«, but their suggestions were not taken in consideration by the law-makers. It looks like that Slovenian Government and the CAA were deaf to experts' recommendations and suggestions who actively work on this field for years. Only one of the interviewees was benevolent to the Slovenian profession, which was engaged in preparation and adoption of the legislation. It seems that Slovenia is not aware of the opportunities and potentials of this niche, although

it constantly pointed out that legislation will be designed in the way that it will facilitate and boost drone industry.

Even within the EU, the situation is quite similar, as the biggest problem lays is the fact that each EU country regulates this area under own policies and rules, consequently the European legislation is not harmonised and unified, which hinders international commerce. The US is a story for its own, but also shrouded in fog, which we found surprising as we would thought that the US legislation would be well organized and functioning, and would be pointed out as an example of good practice by interviewed Slovenian experts. Moreover, these experts did not highlight any country as an example for Slovenia to design its own legislation. And nevertheless, that the Decree has already been adopted and just entered into force, it would need further corrections and updates.

Finally, it can be summed up and concluded that there is still a lot of work to be done in order to design a proper legislation (in Slovenia and also in the US and the EU), which would be optimal for business in this area. But, at the same time experts would have to take into account the need to ensure all the necessary safety standards for individuals, who are not directly involved in drone operation or usage, both in terms of physical security (prevention of injury and accidents), as well as data privacy, as modern drones/UAVs are equipped with cameras, which could therefore lead to abuses of these devices.

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APPENDIX

APPENDIX: Questionnaire

1. Can you please briefly present your company and business area. Do you operate primarily in Slovenia or worldide?

2. If it is no trade secret, can you tell us who are your biggest clients (customers) for your service? For what do they need drones (hobby, business, etc.)?

3. Why did you decide precisely for this business niche, which is relatively new and unknown to the general public in Slovenia?

4. If you do business abroad do you perceive differences in usiness practices in Slovenia and foreign countries? Do you encounter difficulties in terms of legal regulations (restrictions)? Is the latter compatible or not with Slovenian legislation (which is still in the preparation phase)?

5. What problems do you face in the context of legal restrictions or legislation framework relating drones' business? Does the non-existent (loose) legislation in Slovenia harm or hinder your business?

6. Is it possible that any law (legislation) proposition, which we hear bout in the media, could have a negative impact on your business (both in Slovenia and abroad)?

7. Do you think that experts from this field have addressed properly the problem of non-existent or fuzzy legislation in connection with drones? Do you think that experts engaged in this field in Slovenia, are sufficiently competent?

8. If you compare drones' legislation in the USA, EU, SLO and other countries, how would you comment the latter? What practices should be applied in designing and implementing dornes' legislation in Slovenia?

9. Do you have any suggestions regarding the Slovenian legislation concerning drones?

10. Would you like to add a comment or highlight something elese, which was not covered by this questionnaire?