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# ARE DRONES A THREAT TO CIVIL AVIATION? A RETROSPECTIVE ON POLICIES OF DRONES IN THE UNITED ARAB EMIRATES

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## ABSTRACT

In this modern era, the influence of technology is more crucial and critical. The technology provides luxury to the society and at the same time technology's negative effect also affects the society adversely. All the aspects of drone technology are challenged: its innovation, validity, ethics, effectiveness, and future expansion. The capacity is to stay for the long haul, and we should deal with the difficulties it conveys and we have to exploit its military and civil applications. This paper reviews a retrospective on the United Arab Emirates aviation policy on drones. It also examines aviation safety; aviation security; identifies emerging issues in drone's technology; mitigating the negative side of drones and the strategic effects of a lethal drone policy of United Arab Emirates.

**KEYWORDS:** Drones, Drone Policy, Drone Law, UAE Civil Aviation, Dubai Airport, FAA, GCAA

## INTRODUCTION

Dubai Airports have confirmed that air space around Dubai International (DXB) was closed for 69 minutes since 11:36-12:45 Local Time today due to unauthorized drone activity resulting in a number of delays and flight diversions.[1] This is the second time such an incident has reported within a span of less than two years in Dubai[2]. Across the globe, the airlines expressed concern over drone activities. Safety reports from a number of civil aviation and safety authorities in the world have revealed a significant number of near-collisions. Unmanned Aerial Systems (UAS) are a new component of the aviation system, which would depend upon critical developments in aerospace technologies, providing improvements which may exposednovel and upgraded commercial applications along with advances to the safety and effectiveness of all civil aviation[3]. According to Federal Aviation Administration (FAA), "an unmanned aircraft system (UAS), sometimes called a drone, is an aircraft without a human pilot onboard – instead, the UAS is controlled from an operator on the ground"[4].As per the International Civil Aviation Organization's (ICAO) Global Air Traffic Management (ATM) operational concept (Doc9854) state that "[a]n unmanned aerial vehicle is a pilotless aircraft, in the sense of Article 8 of the Convention on International Civil Aviation, which is flown without a pilot-in-command on-board and is either remotely and fully controlled from another place (ground, another aircraft, space) or programmed and fully autonomous."[5]

[1]Dubai Airports. 2016.
[2]Arabian Business. 2016.
[3] ICAO Circular 328-AN/190
[4]U.S. Department of Transportation
[5]"Hernandez, Victor", ICAO, 2015.

## BACKGROUND OF THE STUDY

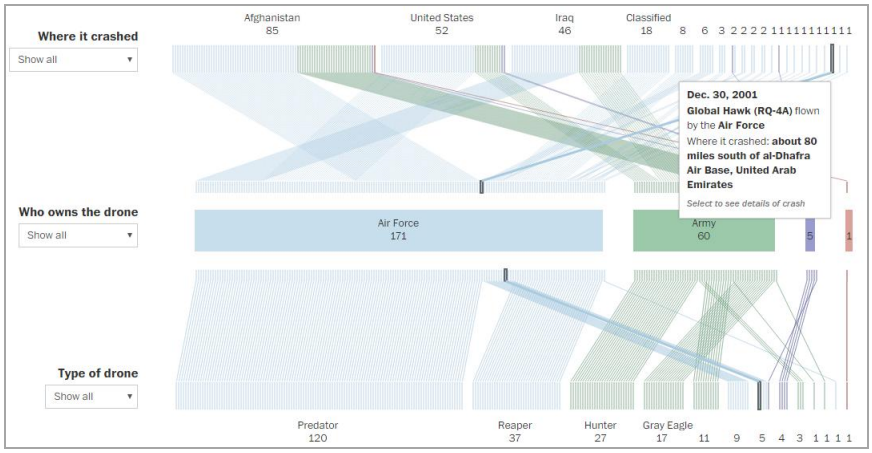
Over previous years, the drone accidents reported around the globe are enormous. Searching up What's more seeing a drone buzzing around in the sky these days may be not a surprising event. Most of the developed nations are facing threats in their airspace due to the operation of the unmanned aerial vehicles. Though we call it as unmanned aerial vehicles, but it has many names viz, "killer drones", "attack drones", "spy drones", or "surveillance drones"[6]. The recent closure of airspace due to the unauthorized drone activity in Dubai, one of the busiest airports in the world is clearly indicating the need for the legislative requirements for the usage of drones. Back in January the closure of the airport has led to a reported loss of 55 million dollars.[7] Drones are turning into an instrument to criminals as well as terrorists, varying powers who say those little unmanned airships are being troublesome to identify what's more prevent[8]. Therefore, it is the responsibility of the authorities to decide that UAV's can be operate in controlled airspace, what are the technologies to reduce its impact and to improve the regulations for the UAS operation.

## PROBLEM STATEMENT

Civilian drones are progressively becoming a real threat to the commercial aviation. Nowadays, drones are very cheaply available in the market and this made the UAV very handy for the public. Though the drones are having many more advantages at the same time the technology has its own negative effects. The sales outlet for the drones are increasing their markets in UAE and generating most of their revenue from this fast growing market. This causes a lot of chaos to the aviation authorities to control the operation of drones flying in the low altitudes. According to the Washington Post, national drone crashes (military drones) data base shows that the majority of the drone crashes is happening in Afghanistan, United States, and Iraq respectively[9]. A major drone crash was reported in United Arab Emirates about 80miles south of Al-Dhafra Airspace and estimated damage was about 40,600,000 dollars because of a metal fatigue after it came in contact with an improperly installed bolt[10]. According to statista.com, military drone crashes are climbing year by year[11]. The European Cockpit Association (ECA) has summarized and published the major civil drone incidents and accidents for the year 2016 until may in five major regions in their incidence directory (volume 2) as follows:

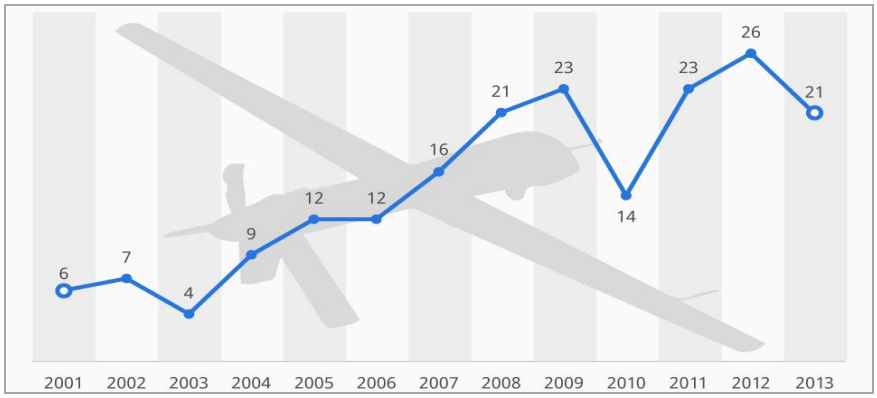
1. Europe - 14
2. North & South America - 09
3. Asia - 07
4. Africa - 01
5. Australia - 01

[6]Phil for Humanity. 2016.
[7]Kelly Clarke. 2016.
[8]Jack Nicas. 2016.
[9]Washington Post. 2016
[10] ibid
[11]Niall McCarthy. 2014.



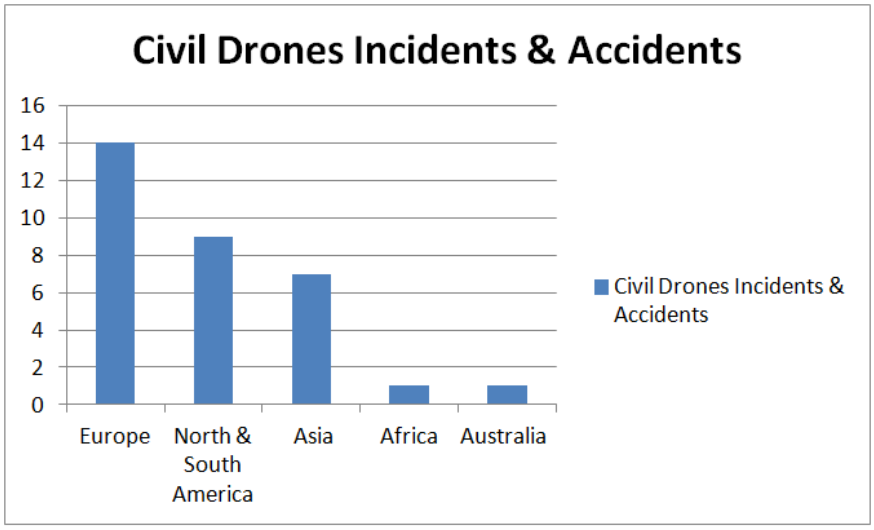

**Source:** https://www.washingtonpost.com/graphics/national/drone-crashes/database/

**EXHIBIT I: World Wide Drone Crashes**




**Source:** https://www.statista.com/chart/2382/military-drone-crashes-are-climbing/

**EXHIBIT II: Us Military Drone Crashes**




**Source:** https://www.eurocockpit.be/sites/default/files/summary_rpas-uav_incidents_directory_16_0531_f.pdf

**EXHIBIT III: Us Military Drone Crashes**

Even though there are enormous business opportunities, a major commercial or private drone accident, possibly will creel the whole industry's growth. So far globally the accidents and incidents with drones are increasing day by day. According to the FAA, in the US, a total of 650 incidents involving drones flying too close to aircraft in 2015, compared to

238 for all of 2014[12]. This increment in the numbers opens the eye of policy makers to provide an overview of the regulatory frameworks for the UAS activities and how to ensure safe operations in the ATS system.

## OBJECTIVES OF THE STUDY

The objectives of the study are:

- To assess that whether the drones are a real threat to aviation industry.
- To provide strategies for mitigating the risk associated with drones along with the usage of controlled airspace.
- To assess the various strategies/policies adopted by United Arab Emirates Civil Aviation Authority's on Drones.

## SIGNIFICANCE OF THE STUDY

The WWI & WWII witnessed the first real drones, viz, Nazi V1 and V2 flying bombs[13]. Usage of drones has grown rapidly in the recent years, unlike manned aircraft. According to General Civil Aviation Authority in their CAR PART VIIII Sub part 10 clearly defined Unmanned Aerial System (UAS), Remotely Piloted Aerial System (RPAS) is any unmanned aerial system, including the aircraft and associated system elements such as radio control transmitted, received and cameras. Unmanned Aerial Vehicle (UAV), Remotely Piloted Aerial Vehicle (RPAV) or Drone is the actual unmanned aerial vehicle, other than a balloon, or kite which is intended to be operated with no pilot on board.[14] The study provides a framework for the detailed understanding of drones and its importance, and safety policies which helps the usage of drones in a better way for the mankind and the aviation policy on Drones in UAE and globally.

## LIMITATIONS OF THE STUDY

One of the main limitations of this study is that an independent empirically driven process is not being employed, meaning that some reliance is being placed upon the accuracy of data provided by external sources; however, it is anticipated that this issue will be minimized through cross-referencing and the approach of identifying as many separate reports as possible.

## RESEARCH METHODOLOGY

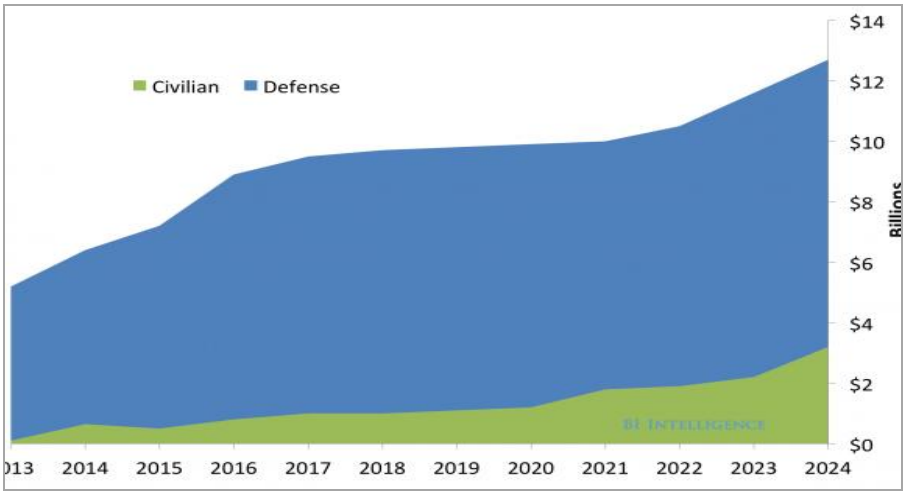
This review specifically assesses the available literature dedicated to measuring the impacts of aviation safety and its importance. The main focus is on research undertaken for measuring the probable impact of usage of drones on globally as well as in United Arab Emirates.

## DISCUSSIONS AND ANALYSIS

As per a report from BI Intelligence, there will be an increment in the global production of commercial drones, or unmanned aerial vehicles (UAVs). This report provides a statistic of revenues from drones sales to top $. 12 billion in 2021 compared to $8 billion in the last year. The various companies, government bodies, and universities are actively involved in their research in developing new applications of drone, so that it will become a creative and innovative business models to others. The Government of United Arab Emirates launched an annual international completion on drones to encourage

[12] Statement, FAA 2015
[13]Richard Hollingham. 2014.
[14]GCAA. 2015.

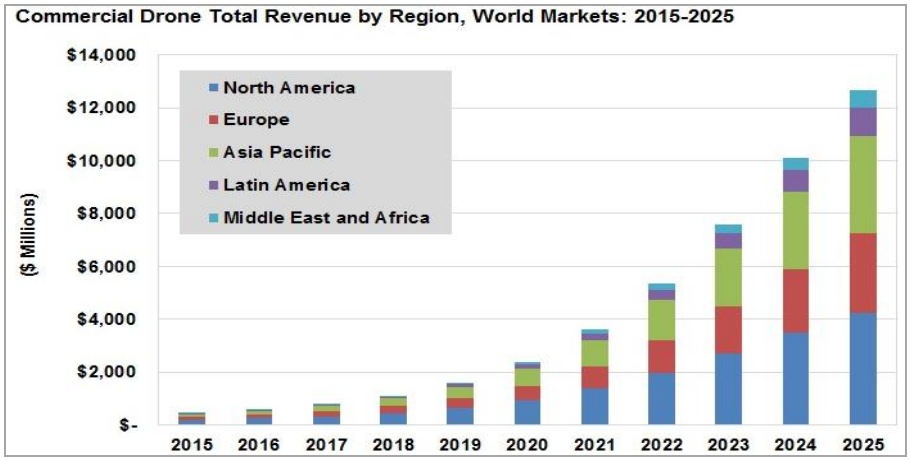
the innovative technologies behind civilian drones into practical, reliable solutions for improving people's lives today[15]. The regulators are keen on setting rules for usage of drones, the fast growing global drone industry moving ahead in search of applications to land management, agriculture, energy and aerospace industry. By the application of Geo fencing and collision avoidance systems will make the flying drones safer and ensure smooth regulations for the usage of drones[16].




**Source:** http://www.businessinsider.com/uav-or-commercial-drone-market-forecast-2015-2

**EXHIBIT IV: General Drone Area Market**

According to the reports from the www. Tractica.com states that utilizing drones for commercial purpose will increase the commercial grade UAV from 80,000 in 2005 to 2.6 million units annually by 2025[17].




**Source:** https://www.tractica.com/wp-content/uploads/2015/07/DCA-15-chart.jpg

**EXHIBIT V: General Drone Area Market**

The recent reports on the commercial drone accidents by ECA for the year 2015- 2016 is quite alarming in the major regions. To list a few commercial drone accidents in the year 2015-2016 are as follows in the region wise.

[15]Drones for Good. 2014.
[16]DRONE SAFETY. 2016
[17]Tractica. 2016

**EXHIBIT VI: Recent Commercial Drones Accidents& Incidents (2015-2016)**

**Table 1**

| Region | EUROPE |
|---|---|
| **Month & Year** | **Drones Accidents & Incidents** |
| May 2016 | Prague (Czech Republic) – UAV forces Czech airliner to abort takeoff |
| April 2016 | Amsterdam (NL) – KLM E190 |
| | F70 and Easyjet A319 at Schiphol – incident with a flock of drones |
| March 2016 | Glasgow (UK) – The drone was flown into conflict with the B737 |
| February 2016 | London (UK) – A drone flown into conflict with the A319 at Heathrow |
| | France – Plane narrowly misses drone near Paris CDG Airport |
| | France – A drone escorted by a Rafale crash near Reims |
| | Newcastle – Drone flown into conflict at Newcastle airport |
| | Spain – A drone crashes into a car in Navarra |
| December 2015 | Italy – Drone crashes onto the ski-slopemisses champion skier by inches |
| September 2015 | Norway – a near collision between a drone and a private plane |
| September 2015 | Hamburg, Germany – Police hunt drone pilot in near-miss |
| April 2015 | London City Airport UK – Drone comes as close as 50 meters to Passenger aircraft in 'possibly catastrophic' near miss |
| April 2015 | Manchester, UK – Flights diverted at Manchester airport as drone sighted over the runway |
| April 2015 | Bristol Airport – Royal Navy Lynx helicopter |

**Table 2**

| Region | North & South America |
|---|---|
| **Month & Year** | **Drones Accidents & Incidents** |
| May 2016 | Seattle (USA) – Drone crashes into Capitol Hill home |
| April 2016 | Florida (USA) – Drone crashes into Marco Island condo; video records incident |
| April 2016 | Charlotte (USA) – Man accused of purposely flying drone near CMPD helicopter |
| March 2016 | Oklahoma (USA) – Drone crashes while attempting to drop cell phones Over Cimarron Correctional Facility |
| March 2016 | Los Angeles (USA) – Lufthansa jumbo reports near miss with drone over Los Angeles |
| February 2016 | New York (USA) – Drone Hits Empire State Building; man arrested |
| January 2016 | San Francisco (USA) – Man Crashes Drone Into Farmers' Market |
| November 2015 | New Jersey (USA) – Small UAV crashed into a truck |
| October 2015 | California (USA) -– After drone crashes into power lines West Hollywood cracks down |

**Table 3**

| Region | ASIA |
|---|---|
| **Month & Year** | **Drones Accidents & Incidents** |
| May 2016 | India – Drone crashes at event |
| October 2015 | China – Drone crashes into Taipei 101damage still unknown |
| September 2015 | Maebashi, Japan – Fiery drone crash disrupts bicycle race in Gunma Prefecture, hurting none |
| | Hyogo Prefecture, Japan – Man admits crushing drone into a Unesco World Heritage Castle |
| April 2015 | Singapore – Two incidents with drones falling on MRT Rails |
| | Tokyo, Japan – Drone lands on roof of the Prime Minister’s office |
| March 2015 | Kuala Lumpur, Malaysia – Drone flies near Malaysian airportpilot flies away scot-free |

**Table 4**

| Region | AFRICA |
|---|---|
| **Month & Year** | **Drones Accidents & Incidents** |
| April 2016 | Cape Town – South Africa Drone Crashes Through Window |

**Table 5**

| Region | AUSTRALIA |
|---|---|
| **Month & Year** | **Drones Accidents & Incidents** |
| February 2016 | Canberra – Drone crashes in middle of the ceremony at the Australian War Memorial in Canberra |

**Source**: https://www.eurocockpit.be/sites/default/files/summary_rpas-uav_incidents_directory_16_0531_f.pdf

## ADVANTAGES OF DRONE

Drones have come a long way in many advantages in regards to day to day life. Their major advantages of a drone would be considered to be in the Military, Community and Environmental Point of View. Below mentioned are a very few random advantages of using drones.

- **Life Saver:** The drones have been a major life saver as they have highly diminished the chances of putting any military personnel life in the path of danger. [18] It has come to a point that any country could blindly say there has been no cost of life even if they were attacked by the enemies.[19]When compared to the out fashioned method of using weaponry such as bombs, shells and mines, the high precision and accuracy of drones have limited the death toll to mere soldier on the enemy side in the desired target location. A life lost during the World War II of the civilians is said to be 40% - 67% of the total loss due to death.[20] It is said the death toll of civilians in Pakistan, Yemen and Somalia after the attacks on the World Trade Center ranged to be from 174 to 1047 which is drastic makeover since the time of World War II.[21]

- **High Resolution Imagery Taker:** The Low flying ability of drones in the range of 50m to 300 m enables the user to take highly defined three dimensional images. At this flying range, specific trees and forest canopy gaps can be easily monitored. This could lead to the identifications of issues like forest degradation and loss and frequent follow ups could be done, if any. Other applications include the use of coupling imagery through drones helps in identification of a specific variety of tree species. The mapping of different stages of forest regeneration and degeneration can also be identified. The above mentioned applications can be done with the help of ground surveys, however the use of drones maps a larger area when compared to the normal surveys.

- **Cost Saver:** The costs of purchasing drones and the maintenance required are cheaper than when compared to regular aircrafts. The cost required for fuels is also reduced in case of drones. The drone program of the United States of America constitutes of hardly 1% of the entire annual military budget. Due to the lower purchase and maintenance costs of Drones, community drone users has the opportunity to have a better survey equipment and have shorter frequency intervals of surveys. This also enables the user to have a monitoring of the environment throughout the year, which is a necessity in order to keep a record of forest degradation and deforestation.

- **Operator Saver:** The drones can stay in the air for a longer period of time without even an operational pilot. Even more the drone operator could hand over the controls to new operator without the need of any operational downtime. When compared to the life of a traditional aircraft pilot, the drone operators face lesser challenges as they don't have to be present in the area of attack. Hence, they save the risks of carrying heavy injuries and can

[18]Phil for Humanity. 2016.
[19]Sam. 2016.
[20]William Saletan. 2013.
[21]The Bureau of Investigative Journalism. 2017.

continue their life of non-military life. Studies held by Dr. Wayne Chappelle and Kent McDonald suggest that only 4% of the drone operators are in the risk of Post-Traumatic Stress Disorder (PTSD) when compared to 12%-17% of traditional aircraft fighters.[22]

## DISADVANTAGES OF DRONE

As much as the advantages a drone has, there are also its limitations and disadvantages for drone. Here we discuss the disadvantages in a very broad sense in respect to the field of military, community and environmental point of view.

- **Less Payload Carrier:** The small drones that are generally used for surveillance has the limitation of carrying very small size and low weight equipment.[23] This brings on a huge limitation on the imaging sensors and equipment that can be fitted for carrying out above mentioned function. This therefore limits the type of data acquisition that can be done by drone.
- **Privacy Invader:** Certain drones and UAS are enabled by the provision of carrying high powered zoom lenses which come along with features like night visions, and can be even used to see through clouds. In a larger point of view, drones break the freedom of many countries by spying over the region. Many of the drone attacks that were held by the United States of America were without the consent and acknowledgement of the targeted country. In a survey conducted by the Pew Research Center in 39 countries, only 6 of these 39 countries approved the attacks held by the US in countries like Pakistan, Somalia and Yemen with the help of Drones.[24]
- **Work-Life Destroyer:** Many drone operators face issues between work and life. This is said to be mainly because of the lack of movement during work.A recent study by the Department of Neuropsychiatry in the US Air Force's School of Aerospace Medicine has found that the drone pilots experience severe trauma during working hours and hence face issues like unable to have a clear distinction between combat and family life, a high conflict with the conscience brought over by the regret and the guilt of being an "aerial sniper".[25]Depression, unable to maintain civil and personal life relations are common among the drone operators. In a study held by Dr. Jean L. Otto amongst 709 drone operators, 8.2% were reported with the above mentioned disorders.[26]
- **Poor Geometric Performers:** Since drones are much lighter than the normal aircrafts or helicopters, they are much more prone to perturbations due to pitch, roll, and yaw. This affects the accuracy of geometric image sensing. Low cost small drones that are used for the environmental geometrical image sensing are more prone to this. For proper image sensing, the drone pilot would require a proper ground control point, which is difficult for the pilot to collect due to the absence of a distinct landmark in the middle of forest. However such drawback is only a minor setback when the users require high end accurate images and results and is said to be over taken in the years to come.

### The Regulation of Unmanned Aircraft in International Law

The law defines an unmanned aircraft as "an aircraft that is operated without the possibility of direct human

[22]Wayne Chappelle and Kent McDonald,2016
[23]Phil for Humanity. 2016.
[24]Pew Research Center. 2014.
[25]The New York Times. 2014.
[26]Jean, L, 2013.

intervention from within or on the aircraft" (Public Law 112-95, Section 331 (8)), it is also called as drones, these unmanned aircraft does not have a human pilot on board.[27]

## CONCERNS FOR THE INTEGRATION OF UNMANNED AERIAL SYSTEMS (UAS) IN NATIONAL AIRSPACE

The regulatory strategy for the use of Unmanned Aerial Systems within the airspace of the Dubai aims to have well defined aviation regulatory environment so that it can maximize the social benefits of this innovative technology and deal with the concern of citizens through protective action These regulations shall also render necessary conditions for creating a strong manufacturing and services industry in par with the global market. The integration of Unmanned Aerial Systems into the airspace must be led by the promise to citizens on various social concerns, including safety, security, privacy and data protection, third-party obligations and insurance. The regulations for integrating UAS into the airspace present specific challenges in a number of areas: [28]

- **Security:** UAS is always potential to cause unlawful actions. Unmanned Aerial Systems could be used as weapons, where the navigation or communications signals of other Unmanned Aerial Systems could be jammed or even cause ground control stations to be hijacked.
- **Safety:** The integration of UAS into the airspace shall be based on the principle that safety will not be compromised by any means and should be as safe as manned aircraft insofar as they must not present or create a greater hazard to persons, property, vehicles or vessels, while it is in the air or on the ground.
- **Citizen Concerns:** Among the many potential civil applications of a UAS, its operations must not lead to any concerns of the citizens, especially preserving the right to privacy in regard to private and family life and the protection of personal data.
- **Economic and Environmental Concerns:** Many attempts to integrate UAS into the airspace have resulted in moderate to severe interruptions to the commercial aircraft services. The consequence of this is additional track miles from the commercial aircraft with the associated extra fuel consumption resulting in increased costs, noise pollution and increased aircraft emissions.

### Issues Faced in the Use of Unmanned Aerial Systems (UAS)

It is important to consider the issues regarding the use of drones, whether it may be a commercial or recreational[29]:

- **There are Restrictions as to Where Drones Can Fly[30]:** Drones may not be operated within a certain radius of an airport
- **Drones are not Easy to Fly:** Drone operators must apply for an appropriate level of skill set because UAS are generally not easy to control and inexperience may result in the damage or injury resulting in following claims for compensation under various provisions of the law.

[27]Federal Aviation Administration. 2016.
[28]Al Riyami, Waleed, GCAA 2015.
[29]Al Tamimi& Company. 2016
[30]Al Riyami, Waleed, GCAA 2015.

- **Privacy is an Essential Consideration:** As drones become more common it is important for drone operators to be aware of the potential legal consequences of their actions (the penalties for breaching the Penal Code prohibits and Cyber Crimes Law prohibition mentioned above, generally include a fine and/or imprisonment and may also include confiscation of the drone and any other associated equipment).

**Classification of Unmanned Aerial Systems (UAS)**

The following six classifications are deemed applicable for UAS operation within the UAE Civil airspace:

- **Category 1:** This UAS classification shall be restricted to aircraft having a mass of 5 kg and less. These Category 1 UAS are then sub categorized as Category 1A and Category 1B where Category 1A is used only for private leisure and sport purposes and Category 1B is used for Commercial purposes which includes purposes such as parcel delivery, Surveillance Security/ Safety, Environmental Monitoring, Agricultural Monitoring, Transport Ergonomics, etc..
- **Category 2:** This UAS classification shall be restricted to aircraft having a mass more than 5 kg and less than 25 kg. Similar to Category 1, Category 2 are also sub-categorized into two further divisions based on the purpose of use
- **Category 3:** This UAS classification shall be restricted to aircraft having a mass of 25 kg or more. Even more, they are categorized to Category 3A and Category 3B

**EXHIBIT VII: Table of UAS Classifications in UAE National Airspace**

**Table 6**

| Category | Mass | User Subclass |
|---|---|---|
| 1 | 5 Kg and less | A. Private<br>B. Commercial/State |
| 2 | More than 5 Kg and less than 25 Kg | A. Private<br>B. Commercial/State |
| 3 | 25Kg or more | A. Private<br>B. Commercial/State |

**Source:** CAR PART VIII SUBPART 10, GCAA

The regulations for the UAS classifications outlined above are detailed below with mandatory requirements and recommendations for UAS operators are mentioned in Exhibit VIII. [31]

**EXHIBIT VIII: United Arab Emirates (UAE) regulations on Unmanned Aerial Systems (UAS)**

**1. CATEGORY 1A:**

- Unmanned Aerial Systems (UAS) Category 1A operation shall not be permitted in Controlled Airspace.
- Unmanned Aerial Systems (UAS) Category 1A operations shall only be permitted in segregated areas approved by the GCAA in compliance with Minimum Operator Requirements listed in d.
- Minimum Equipment Requirements:

    a) A direct radio control link between the remote pilot and UAV.

[31] ibid

b) Frequency Band Restrictions (29.7-47.0 MHz with Max Power: 10 mW OR 2400-2500 MHz with Max Power: 100 mW).

- Operational requirements and restrictions:

a) All UAS components are in working order in accordance with the supplier's User Manual.

b) Remote Pilot shall maintain the UAV within visual line of sight at all times and maintain an altitude not above 400ft AGL.

c) The UAS shall not be operated within 300 Meters of any person, vessel, vehicle or structure not under the control of the UAS operator; and additionally, during take-off or landing the UAS shall not be flown within 200 Meters of any person, unless that person is under the control of the aircraft operator.

d) Remote Pilot shall be responsible for avoiding collisions with people, objects and other aircraft and shall not harass or endanger people or threaten to damage property.

e) UAV shall not be operated over congested areas, except with the permission of the GCAA; it shall not fly over public or private properties, or within 5km of UAE's airport's outer fence, Heliports, Helicopter landing Sites, and airfields and shall remain clear of control zones.

f) A UAV operator shall at all times give way to other aircraft.

g) Whenever the UAV Operator hears or sights another aircraft in the vicinity of the UAV operation, the UAV shall be landed.

h) Operator of a UAV shall not cause or permit any article (whether or not attached to a parachute) to be dropped from a UAV.

i) Only day time operation is permitted.

j) Use of video or image capturing devices shall be prohibited.

- GCAA Requirements: GCAA requires for UAV which have a total mass including batteries and equipment greater than 1/2 kg. Registration shall be done through Licensing Department.

**2. CATEGORY 1B:**

- UAS Cat 1B operation shall not be permitted in Controlled Airspace.
- UAS Category 1B operation permitted in Uncontrolled Airspace not above 4500 ft. AGL
- UAS Category 1B operations in Segregated Airspace shall be permitted subject to:

a) GCAA UAS Approval.

b) Segregated Airspace Approval.

- Minimum Equipment Requirements

a. A direct radio control link between the remote pilot and UAV.

b. Frequency Band Restrictions (29.7-47.0 MHz with Max Power 10 mW OR 2400- 2500 MHz with Max Power 100 mW).

- Minimum Operator Requirements

a) All components are in working order in accordance with the supplier's User Manual.

b) Avoiding collisions with people, objects and other aircraft. Do not endanger people or property.

c) GCAA security permission is required before using camera or any other scanning or surveillance equipment.

d) A UAV operator shall at all times give way to other aircraft.

e) Whenever the UAV Operator hears or sights another aircraft in the vicinity of the UAV operation the UAV shall be landed.

- GCAA Requirements

a) GCAA UAV Registration shall be done through Licensing Department

b) GCAA E-Service, UAS Operating Approval.

c) GCAA Security Approval when equipped with a camera or other scanning or surveillance equipment.

**3. CATEGORY 2A:**

- UAS Category 2A operation shall not be permitted in Controlled Airspace.
- UAS Category 2A operation permitted within flying clubs or allocated zone as defined by the GCAA.
- Minimum Equipment Requirements:

a) A direct radio control link between the remote pilot and UAV.

b) Frequency Band Restrictions (29.7-47.0 MHz with Max Power 10 mW OR 2400-2500 MHz with Max Power 100 mW).

- Operating Restrictions and Requirements

a) GCAA approval shall be obtained if operating outside flying clubs airspace or the GCAA allocated defined zones.

b) The operating range is restricted to within line-of-sight and not more than 400' above ground level.

c) UAV shall not be operated near public and private properties.

d) Use of video or image capturing devices shall be prohibited.

e) A drop or release of any article from the UAV shall be prohibited.

- GCAA Requirements

a. GCAA UAV Registration.

b. The applicant shall fill GCAA form to purchase this category. The form can be obtained from Licensing Department.

c. The applicant shall meet GCAA security requirements.

**4. CATEGORY 2B**

- UAS Category 2B operation shall not be permitted in Controlled Airspace.
- UAS Category 2B operation permitted in Uncontrolled Airspace not above 4500 ft. AGL.
- UAS Category 2B operations in Segregated Airspace shall be permitted subject to:
    a) GCAA UAS Approval.
    b) Segregated Airspace Approval.
- Minimum Equipment Requirements
    a) A direct radio control link between the remote pilot and UAV.
    b) Frequency Band Restrictions (29.7-47.0 MHz with Max Power 10 mW OR 2400- 2500 MHz with Max Power 100 mW).
- Minimum Operator Requirements
    a) All components are in working order in accordance with the supplier's User Manual.
    b) Avoiding collisions with people, objects and other aircraft. Do not endanger people or property.
    c) GCAA security permission is required before using camera or any other scanning or surveillance equipment.
    d) A UAV operator shall at all times give way to other aircraft.
    e) Whenever the UAV Operator hears or sights another aircraft in the vicinity of the UAV operation the UAV shall be landed.
- GCAA Requirements
    a) GCAA UAV Registration
    b) GCAA E-Service, UAS Operating Approval.
    c) GCAA Security Approval when equipped with a camera or other scanning or surveillance equipment.

**5. CATEGORY 3A**

- The UAS Category 3A operation shall not be permitted in Controlled Airspace.
- UAS Category 3A operation permitted within the allocated zone as defined by the GCAA.
- Minimum Equipment Requirements:

a) A direct radio control link between the remote pilot and UAV.

b) Frequency Band Restrictions (29.7-47.0 MHz with Max Power 10 mW OR 2400-2500 MHz with Max Power 100 mW).

- Operating Restrictions and Requirements

a) GCAA approval shall be obtained if operating outside flying clubs airspace or the GCAA allocated defined zone.

b) The applicant shall be at least 21 years of age and shall obtain the necessary security clearance.

c) The operating range is restricted to within line-of-sight and not more than 400' above ground level.

d) UAV not be operated near public and private properties.

e) Use any video or image capturing device shall be prohibited.

f) A drop or release of any article from the aircraft shall be prohibited.

- GCAA Requirements

a) GCAA UAV Registration shall be done through Licensing Department

b) The applicant shall fill GCAA form to purchase this category. The form can be obtained from Licensing Department.

c) The security clearance shall be a prerequisite for the permission of operation.

**6. CATEGORY 3B**

- The UAS Category 3B operation shall not be permitted in Controlled Airspace.
- UAS Category 3B operation permitted in Uncontrolled Airspace not above 4500 ft. AGL.
- UAS Category 3B operations in Segregated Airspace shall be permitted subject to:

a) GCAA UAS Approval.

b) Segregated Airspace Approval.

- Minimum Equipment Requirements

a) A direct radio control link between the remote pilot and UAV.

b) Frequency Band Restrictions (29.7-47.0 MHz with Max Power 10 mW OR 2400-2500 MHz with Max Power 100 mW).

c) Transponder Mode C

- Minimum Operator Requirements

a) All components are in working order in accordance with the supplier's User Manual.

b) Avoiding collisions with people, objects and other aircraft. Do not endanger people or property.

c) GCAA security permission is required before using camera or any other scanning or surveillance equipment.

d) A UAV operator shall at all times give way to other aircraft.

e) Whenever the UAV Operator hears or sights another aircraft in the vicinity of the UAV operation the UAV shall be landed.

- GCAA Requirements

a) GCAA UAV Registration

b) GCAA E-Service, UAS Operating Approval.

c) GCAA Security Approval when equipped with a camera or other scanning or surveillance equipment.

d) Source: CAR PART VII, Sub Part 10; www.gcaa.gov.ae

**Summary of Laws and Regulations for Unmanned Aerial Systems (UAS) in the UAE**

Hence there are various laws and regulations that apply to the use of drones in United Arab Emirates which can be summarized as below[32]

- **Civil Aviation Regulations**: The Civil Aviation Regulations prohibit any 'man-made object' from flying above a height of 200 feet above ground level within 8 kilometers of an airport, or 300 feet above ground level elsewhere within the UAE unless approved by the Emirate Department of Civil Aviation.
- **Penal Code**: The Penal Code prohibits the publication of any pictures of an individual's private or family life without their consent. The Assistant Director General of the Department of Transport and Rescue of the Dubai Police has been reported as saying that "flying drones fitted with cameras in residential areas is a punishable offense as per the [Penal Code]".
- **Cyber Crimes Law**: The Cyber Crimes Law has prohibitions similar to those in the Penal Code. The Cyber Crimes Law prohibits the use of any information technology devices to overrun the privacy of others by recording audio or visuals and saving or publishing photographs without legal authorization or consent.

**DUBAI NO FLY-ZONES**

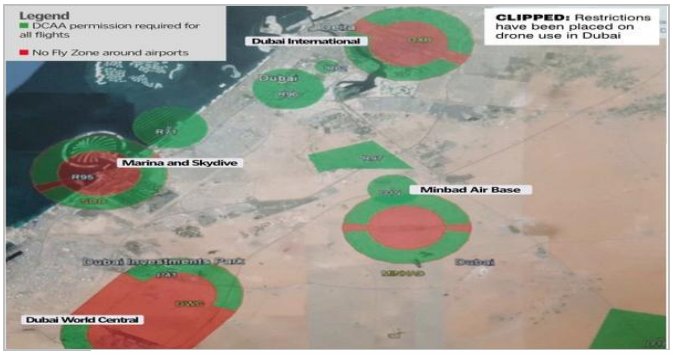
A law for the registration of drones went into force last April 2016 after a recreational drone strayed into the flight paths at Dubai airport and led to the grounding of passenger planes. The incursion of a drone on February, 2016 resulted in the shutdown of the emirate's airspace for 55 minutes, costing its economy Dh3.7 million per minute. Michael Rudolph, Head, Aviation Regulations and Safety, Dubai Civil Aviation Authority (DCAA) had said "We are the only country in the world to have set up a similar system. Others are still in the process of studying and finalizing a similar mechanism" [33]

The delegates of World Aviation Safety Summit 2016 were informed of the four drone no-fly zones and nine areas requiring registration that have been established across Dubai. The General Civil Aviation Authority (GCAA) notified that

[32]Al Tamimi& Company. 2016.
[33]Joseph George. 2016.

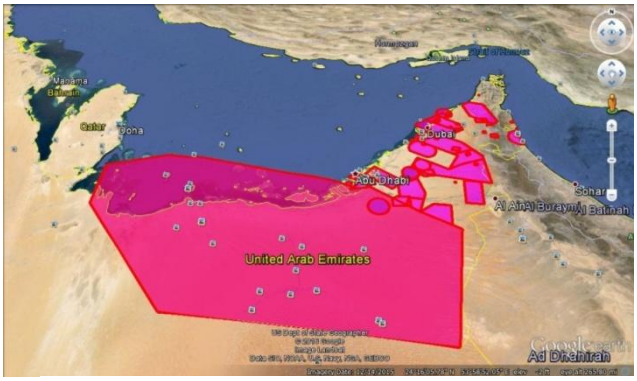
the International Airport, Al Minhad Air Base, the Palm Jumeirah around Skydive Dubai and Al Maktoum Airport were designated no-fly zones, while flying unmanned aerial vehicles (UAV) in nine other areas, including Downtown Dubai around the BurjKhalifa and the Skydive Dubai desert campus, will require permission.[34]

The new designated no fly zones can be seen in the below picture, with red being completely off limits and green requiring DCAA permissible:




**Source:** http://7days.ae/new-no-fly-zones-drones-revealed-dubai

**EXHIBIT VIII: No Fly Zone in Dubai [35]**




**Source:** https://www.gcaa.gov.ae/en/PublishingImages/UASNoFlyZonesOverlayImage.jpg

**Exhibit IX: No Fly Zones in UAE[36]**

## CONCLUSIONS

It is evident that drone technology is a significant part of the future of warfare and is established to become a vast improvement in commercial industry. The fact that drones competencies provide a threat to the rights and freedom of mankind around the globe is also apparent. Regulations on drones now are of principal importance because it sets the required boundaries to protect rights as drones are used in the future. Since the technology is so advanced, it is hard for legislators know where to restrain its use. The helplessness and reluctance to standardize drone use by the government, stops its success in war and its increasing importance in other fields. To overcome this misperception everyone must be more educated on the use and potential of drones in our day to day life, economy and safety. A registration system for drones would make the users of drones more responsible and accountable for their usage and actions such as flying near airports. As more and more countries develop drone technology, the threat of foreign drone fly-overs has also come up and

[34]Flight paths: Dubai sets out zones for drones, The National. 2016.
[35]7DAYS UAE. 2016.
[36]United Arab Emirates- General Civil Aviation Authority. 2016.

led to much confusion. The best and proper policy for the use of drones would include more international standardization, transparency and cooperation, and a proper system to keep track of the owner of drones. More clarity could be obtained from an obligation that any drone attacks and strokes on any foreign land is to be reported along with the report on all the casualties and not just the targets. If there are no international laws limiting this specific technology, it could lead to increased international tension similar to that of the Cold War.

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