

A Study on Drone's Liability on Flight in South Korea*

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Abstract

Purpose – This paper analyzed the accident of drone and related insurance goods which can be coverable with regard to drone accident. The study range is limited in the owner's care, custody, and the control of drone in South Korea, but military area and law and regulation of the drone would be exceptional.

Research design, data, and methodology – With regard to drone's flight, drone can make possible risks and can give severe damage to the people. To carry out this research, literature survey and review such as journal, thesis and publications were adopted.

Results – As for the insurance coverage from drone's accident involved in the purpose of business, insurance coverage depends on 'commercial general liability insurance'. However, in case of personal hobby including leisure intention, insurance coverage depends on 'living liability insurance'.

Conclusions – From a drone's accident, operator and owner of the drone may face the property damage to the drone itself, and then can give severe damage or loss to the people such as physical injuries and property damage. Peoples should be concerned about having the awareness of drone's accident with insurance coverage.

Keywords: Parcel Service of Drone, Logistic, Drone's Liability, Accident of Drone, Third Party Legal Liability, Liability Insurance.

JEL Classifications: L93, K33, G22.

1. Introduction

Recently many adult buy various Drones by the reason of curious and old memory, and quite a number of Drone are now being flown for recreational purpose in the sky above our apartment and building.

Distribution rate of Drone in South Korea is so faster than anticipated. The more Drone's flight becomes, the greater the concern as to any possible accident will be. The concern is related to a) drone's flight accident b) infringement of privacy, excepting military purpose. Actually, South Korea was greatly surprised at the news that Drone from North Korea was found at the Blue House in the air.

Drone can deliver commercially goods. Drone's commercial use will be realized in the near future. Regardless of commercial or non-commercial flight, the more the number of Drone's flight becomes, the greater Drone's flight accident will be.

With regard to Drone's flight, Drone can make possible risks such as crash, falling, collision, fire on the ground and can give severe damage to people and all kinds of property on/under the ground. Accidents of Drone have two types of loss or damage, i.e., the damage of drone itself and the third party's damage. Also in case of parcel service on logistic industry, drone can make a severe damage to parcel or cargo which is carrying to the client.

This paper analyzed the accident of drone and related insurance goods which can be coverable with regard to drone accident. This paper is related to drone's accident and its coverable insurance, but military area(purpose) and law and regulation of the drone would be exceptional. Therefore, study range is limited in the owner's care, custody and the control of Drone in South Korea.

In this paper, Drone means that drone includes all the meaning of unmanned aircraft system, unmanned aerial vehicle and all kinds of unmanned objectives. The term of 'Drone' is not legal terms in South Korea, and it is just generally used by the peoples as a byname of drone.

2. Present Status of Drone in South Korea

2.1. Literature Review

Precedent researches regarding drone were wholly focused in the view of technical development and usage or adoption of drone towards industry as shown Table 1. Thus it is very difficult to find a 'study on the drone's accident' in South Korea, whilst foreign case study of drone accident will be performed.

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<Table 1> Literature Review

Author	Year	Subject
Choi, Cho, Kim, & Chung	2015	Walking Guidance of a Blind Person with a Drone
Kim, Kim, Kim, & Lee	2015	Drone Control System Using Android Smart Phone
Lee, Kim, Kim, Lim, & Lee	2014	Design and Implementation of a Location-based Unmanned Drone Unmanned
Park & Yi	2015	Indoor localization of mini drone through the edge detection of camera image
Song	2015	Developing a Safe Drone with Intuitive Control System

source: Choi et al.(2015); Kim et al.(2015), Lee et al. (2014), Park & Yi (2015), & Song(2015).

2.2. Overview of Drone in South Korea

As previously mentioned, drone in recent years has become more cheaper, lighter and more easier to use. The use of drones has grown exponentially in recent years, especially by built-in camera on it. In view of technology, camera adopted to drone can take a photo upto 1600 megapixel and take video upto 1080 high definition grade. On the contrary of this high technology, price of drone is more cheaper. A newer model is now selling for less than krw100,000(equivalent to USD90.00). Drone commercially uses parcel service. Usage of Drone in commerce will definitely be realized within a couple of years by virtue of fast technology.

<Table 2> Unmanned Aerial Vehicle's Market Size anticipated (unit: dollar)

Year	2014	2023
whole aero space market	470.0 billion	670.0 billion
Unmanned Aerial Vehicle	5.3 billion	12.5 billion

source: Korea Aerospace Research Institute (2015).

Increasing Drone's flight both in respect of business and in respect of non-business, that is, recreational purpose from ev-

<Table 4> Regulation for Unmanned Aerial Vehicle & Unmanned Aircraft System

Kinds		aircraft report	hull inspection	operator identification	approval flight	operator observance	business registration
12kg over	business	O	O	O	O	O	O
	non-business	O	O	X	O	O	X
less than 12kg	business	O	X	X	X	O	O
	non-business	X	X	X	X	O	X

Source: National Assembly Research Service (2015).

erybody irrespective of professional or amateur can be inevitable, causing direct and indirect loss to peoples with threatening.

Korea Aerospace Research Institute in South Korea has tried to develop a unmanned aircraft system such as TR-60 200kg-class Tiltrotor, EVA-2H Scaled Electrically Powered HALE UAV and Tilt-duct VTOL Aerial Robot etc.

<Table 3> Unmanned Aerial Vehicle being developed by Korea Aerospace Research Institute

	TR-60 200kg-class Tiltrotor	EVA-2H Scaled Electrically Powered HALE UAV	Tilt-duct VTOL Aerial Robot
maximum takeoff weight (kg)	200	20	20
maximum speed (km/h)	240	28	150
maximum safe altitude (km)	4	10	2
running time	5 hours	25 hours 40 minutes	1 hour
fuel	reciprocating engine (diesel)	solar cell	reciprocating engine (diesel)

source: Korea Aerospace Research Institute(2015).

2.3. Act and Regulation in relation to Drone

In view of regulation of drone, kind of Unmanned Aerial Vehicle is distinguished 12kg over and less than 12kg based on weight. Less than 12kg of Unmanned Aerial Vehicle must register to government authorities in case of commercial purpose, and also 12kg over both commercial and non-commercial must register but less than 12kg of non-commercial is not required to register to government authorities now.

In Korea, whoever want to fly a Unmanned Aerial Vehicle should use it within flight zone of ultra-light flying device. Kinds of ultra-light flying device are engine-flying-device under 115kg with single seat, hang-glider, paraglider, kind of balloon, kind of parachute and unmanned aerial vehicle, but excepted airplane and light aircraft.

If air space is a kind of 'control air space', 'restricted air space' and 'air space requiring attention', operator of drone must have flight permission in advance. Concerning no-drone zone, in case of Seoul operator of drone must have flight permission of CDC(capital defense command) in advance, and in case of other area permission of MND(ministry of national defense) respectively. Further Drone is to fly under 150m of the ground level in the sky even if zone is a drone zone.

For the sake of safety of citizen, all countries try to make act and regulation in relation to possible risk of drone in order to prevent or control a certain Drone's accident.

In case of USA, some key limitations include the following :

- No operations beyond visual line of sight
- No operations over any person not directly involved in flight operation
- Operators are required to obtain an unmanned aircraft operator certificate, be at least 17 years old, and be vetted by the Transportation Security Administration
- Operations are limited to daytime hours only (sunrise to sunset)
- Operations are limited to 500 feet above ground level

3. Drone's Liability on Flight in South Korea

3.1. Issues of Liability

With regard to purpose of drone's flight, Drone can classify business and non-business. Business purpose of operation is well controlled by the act and regulations, but non-business purpose's operation does not have any act and regulation. This paper is not a study on act and regulations of drone, but is a study on an accident and loss/damage caused by the drone with insurance matters for recovery after occurrence of accident.

As for drone's flight and liability, most of loss/damage to people and property is related to civil compensation to the victim from ac-

cident of drone. Matter of Crime Act is excluded in this paper.

Civil compensation to the victim from accident of drone regardless of business purpose and non-business purpose is basically originated from Civil Act. Hence the offender has to pay indemnification to the victim based of Civil Act, indemnification of which is coverable under present Non-marine insurance in South Korea.

In case of non-business purpose, anybody can buy various size of drone and can fly Drone in the sky with no limit, and then they do not report and register to the authority since there is no act and regulation of the individual owner or operator. No one do register the fact of buy and own of drone to government, which makes exact quantity of drone uncountable and impossible now.

Moving to aspect of drone's accident, once an accident of drone takes place arising out of malfunction of itself, inherent defect, mishandling of remote controller by operator, manager, the accident can be resulted in personal injury and death and property damage from owner, operator, manager of drone to innocent people by way of collision, contact, fallen down, hit and fire etc.

3.2. Accident Case of Drone

Drones are penetrating everyday life, bringing with them exciting and changes to the peoples. Even though drones are being extremely sold to individuals than anticipated, government authorities can not control every drones and can not check how many drones are sold to all kinds of customers such as commercial purpose, non-commercial purpose and personal hobby including leisure intention.

Accordingly the exact quantity of drone is not unknown upto now, which will not be easy in future. It is impossible to count how many drones are sold to the customers in the world. However, case of accident caused by drone on mess media reported is as under :

<Table 5> 11-month-old girl hit in head by crashing drone; FAA investigating

Drone crash injures baby in Pasadena. A baby is injured after a drone crash in Pasadena. The Federal Aviation Administration announced Wednesday that it will investigate a drone accident that injured an 11-month-old girl in the head when it crashed last weekend on a Pasadena street.

Authorities said the baby was being pushed in a stroller by her mother when she was hit with debris from a small, privately-owned drone that came down on Marengo Avenue near Union Street about 6:30 p.m. Saturday.

The baby suffered a large contusion on her forehead and a small cut to the side of her head, according to police. She was treated at a hospital and released. Her mother also was hit by parts of the aircraft, but was not injured.

Police said they found the owner of the drone at the accident site. He reportedly told officers that he lost control of the unmanned aircraft while attending an event at Pasadena City Hall. After the accident, he said, he waited for authorities to arrive.

Police said they forwarded their report to the FAA's Flight Standards Office at Van Nuys Airport to see if the owner of the drone had violated federal regulations. The name of the operator was not available Wednesday.

FAA officials said they would look into the incident. Depending on the seriousness of the violation, anyone who carelessly or recklessly flies a drone can face fines between \$1,000 and \$25,000.

The agency has become concerned about a growing number of reports complaining about unsafe flights of unmanned aircraft. As a result, it has stepped up its education of operators and enforcement efforts related to hazardous drone operations.

FAA officials say they have initiated more than 20 enforcement cases. Five have resulted in settlements in which operators paid fines while penalties have been proposed in five other cases.

Government authorization is not required to operate a drone for hobby purposes. However, there are laws and guidelines prohibiting drone flights that endanger manned aircraft and people on the ground. For example, drones should be flown below 400 feet and not over unprotected people or vehicles.

3.3. Drone Accident and Nature of Damage

As mentioned before in Introduction, accident of Drone has two types of loss or damage, i.e., the damage of drone itself and the third party's damage. Also in case of parcel service on logistic industry, Drone can make a severe damage to parcel or cargo which is carrying to the client.

Nature of damage from drone accident can be distinguished owner's loss and third parties' loss. Owner's loss consists of property damage of Drone itself and cargo damage in transit. And third parties' loss is a third party legal liability, which also divides bodily injury or death and property damage as shown <Table 5>.

<Table 6> Nature of Damage form Drone accident

owner's loss	insurance cover	third parties' loss	insurance cover
property damage of Drone itself	aircraft damage	third party legal liability	bodily injury or death
cargo damage in transit	legal liability to cargo owner		property damage

note: There is 'No injury or death' of the owner and/or operator due to Unmanned Aerial Vehicle

Source: Author's analysis based on relevant data

3.3.1. Risks associated with drones

There are many risks associated with drones as under, definitely excepted malicious acts by the operator :

- Property damage to the drone itself
- Property damage to drone accessories (cameras, applicators, other payload)
- Theft of drone/accessories
- Liability due to property damage caused by drone (accidentally flying through window, etc.)
- Liability due to bodily injury caused by drone (flying drone into person or object that causes bodily injury)
- Libel or slander due to privacy issues from data collection
- Cyber liability due to theft of data collected by drone
- Product liability from the drone manufacturer

3.3.2. Third-party Legal Liability

Owner, operator and manager of drone must hold the responsi-

<Table 7> Insurance goods for Drone

	classification	coverage	deductible
business	commercial general liability	loss or damage by insured's negligence or fault for a living under insured's care, custody and control of Drone	variable range Krw100,000 to unlimitd
non-business	personal living liability	loss or damage by insured's negligence or fault for a living under insured's care, custody and control of Drone	Krw100,000~Krw500,000

note1: Both commercial general liability and personal living liability cover risk of third party legal liability, so the same could not be coverable loss and/or damage of the owner and/or operator of Unmanned Aerial Vehicle.

note2: Fire Insurance, Package Insurance, Float Insurance could be coverable loss and/or damage of Unmanned Aerial Vehicle itself.

Source: Author's analysis based on relevant data

bility of any loss/damage for the innocent people on/under ground regardless of extent of loss/damage whilst care, custody and control of drone by owner, operator and manager. Third-party Legal Liability is composed of bodily injury, death and property damage.

On the other hand, regarding third-party legal liability, in parcel service the carrier also must take the responsibility to the cargo owner in accordance with a transportation contract for the indemnification of cargo at the time of accident. During transit on cargo by drone, if drone carrying the cargo hits and/or strikes the other things, such as man, animal and plant etc, the carrier must assume the responsibility against the owner of such man, animal and plant etc.

3.3.3. Insurance Coverage

Insurance coverage from drone's accident varies with ownership, namely according to business or non-business purpose.

For the purpose of business, Insurance coverage depends on commercial general liability insurance, in which claim payment can proceed to the third-party both bodily injury, death and property damage. However, loss of owner, operator and manager does not cover and damage to drone itself not cover under the same insurance.

However, in case of personal hobby including leisure intention, Insurance coverage depends on living liability insurance, in which claim payment can proceed to the third-party both bodily injury, death and property damage. By the same token, loss of owner, operator and manager does not cover and damage to drone itself not cover under the same insurance.

Living liability insurance makes a effect upto Krw one hundred million as a limitation with deductible of Krw 100,000~500,000 on each occurrence to the victim not the insured. Because of the increasing usage of drones, there is a growing segment liability that is not currently covered in traditional general liability policies.

Under the above circumstances, everybody needs to recognize any problems that from Drone's accident, operator and owner of Drone may be faced with property damage to the Drone itself as private asset, and then can give severe damage or loss to the innocent and faultless people on the ground by types of bodily injury and property damage. From the same the reasons, peoples should be concerned about having awareness of Drone's accident with insurance coverage, which is really valuable for the people's safety life.

4. Concluding Remarks

Drone's commercial use will be realized in the near future. With regard to Drone's flight, Drone can make possible risks such as crash, falling, collision, fire on the ground and can give severe damage to the people and to all kinds of property on/under the ground. This paper analyzed accident of drone and insurance matter for the people.

In the light of Drone's accident, everybody needs to recognize any problems that from Drone's accident, operator and owner of Drone may be faced with property damage to the Drone itself as private asset, and then can give severe damage or loss to the innocent and faultless people on the ground by types of bodily injury and property damage. By this reason, peoples should be concerned about having awareness of Drone's accident with insurance coverage for the safety life.

Meanwhile meaningful point of the study is contributed to relative insurance claim originated from drone's flight as basic source, which kind of claim has to be further considered for each individual. In future research, the author pays attention to case study of drone's accident and law suit cases for the deep study on matters.

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