

A Comparative Study on the UAV Flying Regulations of Korea and Japan

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무인항공기(UAV) 비행규제에 관한 한·일 비교연구

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연구목적 : 한국과 일본의 UAV 비행 관련 규제 사항을 비교·검토하여, 일본의 UAV 관련 법 규제의 시사점을 도출하고 이를 통해 우리나라 UAV산업 발전에 있어 개선이 필요한 항목들을 도출하고자 한다. **연구방법** : 일본의「항공법」과 한국의「항공안전법」내용을 비교 검토를 통해 일본「항공법」의 시사점을 고찰과 참고 문헌을 활용한 문헌연구를 실시하였다. **결론** : 첫째, 일본은 200g 이상, 한국은 25kg이상으로 중량에 대한 차이가 많았으며, 일본의 경우 UAV추락시 안전사고 발생에 대한 고려가 있었으며, 둘째, 일본의 경우 UAV의 비행시 사람 또는 물체에 대하여 30m이상의 안전거리를 확보하도록 규정하였고, 셋째, 일본의 경우 UAV기체의 안전성 인증 면제 중량 200g미만이며, 한국의 경우 12kg이상이었다. 우리나라의 UAV산업 활성화 개선 사항으로는 첫째, 법 규제 완화를 통한 산업 확장성 유도이다. 둘째, UAV기체 의무등록제를 통한 안전성 재고이다. 셋째, UAV 관제기관 신설이다.

주요어 : 무인항공기, 일본 항공법, 한국 항공안전법, 국제비교, 4차 산업혁명

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I . Introduction

Based on the leading-edge Information Communication Technology, the modern industry is proceeding with creating innovative ICT new technologies dubbed IoT, 5G, AI, big data, cloud computing while advocating the 4th industrial revolution. With the application of these ICT technologies, the world is making more effort to develop AI(Artificial Intelligence) technology. Especially, "Unmanned Aerial Vehicle(hereunder called UAV)" using AI technology is a field that the world is intensively fostering, thereby being expected the great industrial development henceforth(Kim, 2016).

UAV has been mainly used only for the military or public interests in the sphere of the military and police forces, but is being applied to diverse industries in many industrial areas such as transportation, communication, agriculture, measurement, shooting, observation and inspection with being called as 'drone' recently in the private sector. A drone market size in the whole world for 2017 amounts to nearly 6 billion dollars, thereby reaching about 6.8697 trillion won. A market size for the year in 2020 stands at 11.2 billion dollars, thereby being predicted to likely grow to a scale in more than about 12.8288 trillion won(Korea Local Information Research & Development Institute, 2017). Particularly in case of China, the UAV industry is exceptionally applied a negative regulation in the form of pre(先)-permission-post(後)-supplementation. Thus, Chinese UAV companies had a great influence upon taking the lead in commercial UAV market of the world. As Japan is also pushing ahead with vitalizing UAV industry, it is driving business for commercializing UAV delivery in mountainous and underdeveloped regions as a way to solve social issues such as low fertility and aging(Lee, 2017).

However, prior to seeking for the development in UAV industry, there is a matter that needs to be certainly agreed socially. It is just safe operation, namely, a preparation plan for the occurrence of problems about the risk of safety accident incidence and the infringement of personal privacy. With having been supplied an unmanned helicopter for farming since 1980 in Japan, the Japanese Agriculture-Fishing Aeronautic Association did spread guidelines such as 「Guidelines for technology of using an unmanned helicopter」, and 「Operation method of an unmanned helicopter for industry」 as the operational standard pertinent to the utilization for agriculture in an unmanned helicopter. Excluding these unmanned-helicopter guidelines by private association, there had been no regulations of an unmanned air vehicle until 2004. Moreover, it was a situation that was nonexistent in the definition on UAV and in a regulation related to the airspace management(Choe, 2015). Meanwhile, in the wake of an incident of being discovered the airframe of UAV, which

crashed from the rooftop of the prime minister's official residence in April of 2015, a bond of sympathy with the necessity for a legal regulation on UAV was formed. Hence, 「Civil Aeronautics Act」 in Japan was revised on July 14 of the same year. The provision of a legal ground pertinent to the regulation of UAV was arranged.

As UAV is a promising business in the 4th industrial revolution, there may be a need to introduce a flexible regulation, not the existing type of regulation, for developing and activating the relevant industry with making a necessary regulation for the law. As the government announced the 4th industrial development policy, the excessive reinforcement of regulation will come to have a negative impact on the industrial innovation and development.

Accordingly, the purpose of this study is to make an itemized consideration on with which method UAV is being defined, on which regulation is being enforced pertinent to an operation method of UAV, to the certification of safety in airframe, to pilot qualification and to pilot license, on the basis of 「Civil Aeronautics Act」 that is the UAV law in Japan, which has implemented legal systems and contents similar to Korea. Through this, the aim is to examine implications of UAV law in Japan and to elicit improvements necessary for the development in UAV industry of our country after comparatively inquiring into the UAV flying regulations between Korea and Japan.

II . Current status of relevant legislations to UAV in Japan

The Ministry of Economy, Trade and Industry in Japan declared the industrial activation with pointing out traffic, medical treatment(the revision of the Long-Term Care[介護]), manufacturing, farming, food, disaster prevention, energy field as the major industries while unveiling Society5.0 as the people-oriented society based on big data and AI in order to develop economy and solve a social task in June of 2016 as part of carrying forward the 4th industrial revolution(Japan cabinet office, 2019). Especially, as the UAV industry, which is called "drone," is the next-generation new growth industry along with automatic driving, a support such as the relevant de-regulation was mentioned(Lee, et al., 2016).

1. Concept of UAV

The definition and the designated terminology in UAV(Unmanned Aerial Vehicle) are different depending on country and period. But it generally implies a powered aircraft available for

remote-controlled flying or automatic flying without human on board. UAV is being commonly dubbed ‘UAV(Unmanned Aerial Vehicle),’ ‘UAV system(Unmanned Aerial System, UAS),’ ‘RPAS(Remotely Piloted Aircraft System),’ ‘Drone.’ ‘Drone.’ is being recently used as the term of representing UAV.

In accordance with Article 2 No. 22 of 「Civil Aeronautics Act」 in Japan, UAV was named 「Unmanned Aerial Vehicle」 and then was defined as follows. It means what is available for flying by remote control and automatic pilot(implying what is automatically controlled by program) [excluding what was determined by the decree of the Ministry of Land, Infrastructure, Transport and Tourism as what has no concern about damage to the navigation safety of aircraft by flying and to the safety of persons & goods on the ground and on the water in consideration of reasons other than weight(200g)] among apparatuses unavailable for human on board in light of structure as the equipment fixed by other government ordinances other than airplane of being offered for flight, Rotary Wing Aircraft(回轉翼航空機), sailplane(glider) and airship.

Table 1. Names and Concepts of UAV

Names	General Concepts
UAV(Unmanned Aerial Vehicle)	It implies a flight vehicle itself and is used in the majority of the countries such as Korea.
UAS(Unmanned Aerial System)	It is a generic term of including UAV, mission equipment, ground-control equipment, and ground support system.
RPA(Remotely Piloted Aircraft System)	As a term that began to be newly used in ICAO, it is available for a controller to be called to account.
Drone	It is a general term of UAV that is primarily used in the public and media.

Data: Ahn Jin-yeong(2015), 'Global trends on the regulation of civil UAV system(UAS),' Korea Aerospace Research Institute, p.4.

2. Classification of UAV

In Japan, 'UAV(Unmanned Aerial Vehicle)' is being categorized on the basis of the Civil Aeronautics Act. This leads to possibly confirming the appearance of an application target such as a flying method and no-fly airspace of UAV. In 「Civil Aeronautics Act」 of Japan, the regulation of UAV has been enforced from December 15, 2015. Examining the regulation contents of Article 5 No. 2 in 「enforcement rule of the Civil Aeronautics Act」, UAV with less than 200g is excluded from the application object of the Civil Aeronautics Act according to the decree of the Ministry of Land, Infrastructure, Transport and Tourism. Thus, UAV with under 200g is

deregulated 「Civil Aeronautics Act」 in principle. In other words, UAV with less than 200g does not become the application subject of the Civil Aeronautics Act. The target standard signifies the weight of UAV, namely, the total weight that adds up the weight of the system unit and the battery. The weight of accessories and parts with defection probability is ruled out.

Also, in accordance with Article 32 No. 3 of 「Civil Aeronautics Act」 and Article 236 No. 7 or No. 8 of 「enforcement rule of the Civil Aeronautics Act」, a person, who is determined by the police in Prefectures of Japan(都道府県) and additionally by the decree of the Ministry of Land, Infrastructure, Transport and Tourism, is not applied a related article as to the flight of UAV in case of the aim at investigation and rescue action in a situation of being recognized emergency such as investigation and rescue as for UAV accident and other incidents.

Consequently, the classification of UAV in light of the Civil Aeronautics Act in Japan is divided into the appearance of UAV as the subject of application and the appearance of UAV as the exclusion from application. UAV as the exclusion from application is again assorted into whether or not it is aeroplane with less than 200g that is exempted the application of a related regulation to UAV in light of the Civil Aeronautics Act, and whether or not it is UAV with the aim of investigation and rescue as a special case of being exempted a related article.

Table 2. Comparison of UAV Classifications and Regulations Between Korea and Japan

Country	Korea		Japan		
Classification	UAV	Unmanned Airplane	Weight in less than 200g	UAV	
				Application target	(Special case) Investigation·rescue
Contents	With more than 1 motor flying by remote control without human on board, 1) aeroplane with weight in more than 150kg 2) airship with weight exceeding 180kg 3) airship with length in excess of 20m	As a plane without human on board 1) airplane, helicopter and multi-copter with weight in less than 150kg, 2) Airship with weight in less than 180kg and length in less than 20m	'UAV' does not conform to the Civil Aeronautics Act in Japan.	With weight in more than 200g, it is the equipment available for flying by automatic or remote control among apparatuses unavailable for human on board.	In a condition of a radio plane as the object of application to the Civil Aeronautics Act, UAV in a case with the aim of investigation and rescue in a situation of being recognized emergency such as investigation and rescue according to the demand of a country or local government.

Data: Rearrangement of the contents as for Article 2 No. 1, Article 7 of the Aviation Safety Act in Korea, Article 2 No. 1, No. 2 of the enforcement rule, Article 2 No. 22 of the Civil Aeronautics Act in Japan, Article 32 No. 3 of the same law, Article 236 No. 7, No. 8 of the enforcement rule.

3. Prohibited airspace and a flying method in UAV

In accordance with Article 132 of 「Civil Aeronautics Act」 in Japan, anybody is being prohibited flying in i) airspace decided by the decree of the Ministry of Land, Infrastructure, Transport and Tourism as what has a concern about likely affecting the navigation safety of airplane by the fly of UAV, ii) the sky of the district that is concentrated people or houses as what was fixed by the decree of the Ministry of Land, Infrastructure, Transport and Tourism as well as the airspace other than the above airspace, excluding a flight that the minister of Land, Infrastructure, Transport and Tourism permitted with acknowledging that there is no concern about the occurrence of damage to the airplane flying by the flight of UAV and to the safety of people and goods on the ground and on the water.

In addition, 「law on the flight restriction of Small UAV and others」 was enacted to be enforced in 2016 for the flight restriction in the sky of the districts around the National Assembly building, prime Minister's residence, the country's important facilities, overseas official residences, and nuclear-power business place. Also, in accordance with 「guidelines for safe flight in UAV(drone, a model aeroplane, etc.)」 by the Transportation Bureau in the Ministry of Land, Infrastructure, Transport and Tourism, which was revised in April of 2019, the prohibited airspace is being prescribed to include (A) airspace with height in more than 150m from the surface of the earth or the surface of the water, (B) airspace above the approach surface, the movement surface, the horizontal surface, the expanded approach surface, the conical surface or the outer horizontal surface, which was established around airport and helicopter as the airspace around the airport, (C) the sky of a densely populated area.

In the meantime, Article 132 No. 2 of 「Civil Aeronautics Act」 is providing a flying method for the safe flight of UAV in case of being not against the legislation pertinent to the prohibited airspace such as i) the need to have a fly between sunrise and sunset, ii) the necessity of flying with always keeping an eye on the corresponding UAV and the surroundings, iii) the need to make a flight with maintaining distance(30 meter) that was determined by the decree of the Ministry of Land, Infrastructure, Transport and Tourism between the corresponding UAV and people or goods on the ground or on the water, iv) the necessity of flying in the airspace except the sky of a place that is implemented a festival, an exhibition, and an event of being gathered a number of people, v) the need not to transport goods decided by the decree of the Ministry of Land, Infrastructure, Transport and Tourism as the explosive or inflammable goods caused by the corresponding UAV, and the goods of having a concern about inflicting harm on other persons or damaging other goods, vi) the necessity of not dropping items from the relevant UAV excluding a case determined by the decree of the Ministry of Land, Infrastructure, Transport and Tourism as what has no concern about inflicting harm on or damaging people or things on the ground or on

the water. Still, in accordance with Article 32 No. 3 of the same law, a person, who is determined by the police in Prefectures of Japan(都道府県) and additionally by the decree of the Ministry of Land, Infrastructure, Transport and Tourism, is not applied to its UAV flying in case of being recognized emergency such as investigation and rescue.

Table 3. Comparison of the Prohibited Airspace and a Flying Method Matter Between Korea and Japan

Country	Korea		Japan	
Prohibited airspace by legislation	Article 127, Clause 1 of the Aviation Safety Act	For the flying safety in an ultra-light flying device, it may designate and notify the airspace of restricting the flight of an ultra-light plane(hereunder called "restricted flight airspace of ultra-light plane").	Article 132 of the Civil Aeronautics Act	i) Airspace that was determined by the decree of the Ministry of Land, Infrastructure, Transport and Tourism as what has a concern about likely affecting the navigation safety of aircraft caused by the flight of UAV, ii) Flight restriction in the sky of a region that was concentrated people or houses as well as the airspace other than the above airspace.
	Article 308, Clause 6, No. 1, No. 2 of the enforcement rule in the Aviation Safety Act	1. District that is concentrated people or architectures: 150 meter from the top of the highest obstacle within the range of 150 meter(500 feet) in horizontal distance centering on the corresponding ultra-light flying device. 2. Region except No. 1: 150 meter from the surface of the earth, from the surface of the water, and from the top of the object.	Article of the law on the flight restriction of small UAV and others	Flight restriction in the sky of the districts around the National Assembly building, prime Minister's residence, the country's important facilities, overseas official residences, and nuclear-clear-power business place.
	Article 308, Clause 7, asterisk 23 of the enforcement rule in the Aviation Safety Act	Grade A~Grade E as the controlled airspace(管制空域). No-fly zone, flight prohibited area, flight restricted area of an ultra-light plane as the control airspace(統制空域)	Safe-flight guidelines for UAV	(A) Airspace with height in more than 150m from the surface of the earth or the surface of the water. (B) Airspace around the airport (C) The sky in a densely-populated district
Flying method	(Pilot's compliance details) Article 310, Clause 1 of the enforcement rule in the Aviation Safety Act	1. Prohibition of dropping(投下) a fallen object of concerning the cause of a danger to human life or property. 2. Flight restriction to a concern about causing a danger to human life or a disaster in the sky of a densely-populated region or a place of being gathered many people. 3. Flight restriction in the controlled airspace · control airspace · cautioned airspace according to Article 78, Clause 1 of the law. 6. A night flight ban from the time after sunset to the time before sunrise.	No. 2 of Article 132	i) Daily flying(from sunrise to sunset) ii) Always keeping an eye on. iii) Keeping distance(30 meter) fixed by the decree of the Ministry of Land, Infrastructure, Transport and Tourism to people or goods on the earth or on the water. iv) Airspace except the sky of a place that is implemented a festival, an exhibition, and an event of being gathered a number of people. v) Necessity of not transporting dangerous object determined by the decree of the Ministry of Land, Infrastructure, Transport and Tourism. vi) The need not to drop an object from the corresponding UAV excluding a case that was decided by the decree of the Ministry of Land, Infrastructure, Transport and Tourism.

4. The Safety Certification and the Pilot Licensing in UAV

When UAV with weight in more than 200g of being applied the revised 「Civil Aeronautics Act」 in Japan makes a flight with obeying the relevant regulations, there is no license of being demanded to UAV pilot, or certification matter on UAV in light of the current law in Japan. Nevertheless, it is not that anyone can optionally fly anytime, anywhere. The flight of UAV is being applied the regulations such as 「Civil Aeronautics Act」, 「Law on flight restriction of small UAV, etc.」, 「Radio Waves Act」, 「Road Traffic Law」, 「Civil Law」, 「By-law」. Thus, a necessary permission needs to be gained.

Aside from this, a situation to which some of the above-mentioned regulations are applied takes place in case of managing business or being engaged in work through using UAV. Thus, there is even a case of requiring pilot's license or qualification of being necessary. The authorized license or pilot qualification of UAV in Japan is classified into the national qualification and the private qualification. The national qualification includes Level 4 amateur radio pilot license, Level 3 ground-special radio operator license. The private qualification involves JUIDIA, DPA, DJI, Level 1~4 examination for a license by the Drone Testing Association.

Table 4. Comparison of UAV Safety Certification and Pilot Qualification Between Korea and Japan

Country	Korea		Japan	
Safety certification	Exemption	Under 12kg	Exemption	Less than 200g
	Necessary	More than 12kg, Less than 150kg	Necessary	Over 200g
Flying qualification	Non-service	Unnecessary	Non-service	Unnecessary
	Program (Mandatory)	Education completion and qualification-exam taking State-led(issued by Korea Transportation Safety Authority)	Program (Required)	(National) Level 4 amateur radio pilot license Level 3 ground-special radio operator license (Private) JUIDIA, DPA, DJI, Level 1~4 examination for a license by the Drone Testing Association

III. Problems and Improvements According to the Expansion in the Use of UAV

As a result of examining about a legal system in both Korea and Japan relevant to the application of UAV, complementation can be considered to be needed yet for the universal use and the industrial activation of UAV.

1. Problems According to the Expansion in the Use of UAV

1) A Lagging Legislation Behind Coping with a Change in the 4th Industry

In the wake of the recent activation in the 4th industry, the world is proceeding with being connected more and more environmentally, economically, socially and technically. The private sector is being made a lot of new technologies such as the use of drone, the unmanned autonomous driving vehicle, genetic engineering, cloud funding, AI, etc. However, these new technologies are functioning as a big burden for the government and the legal action(Park Yeong-suk et al., 2017). Understanding will be easy given taking a typical example of a friction condition between the conventional industry and the new industry surrounding the current ride-sharing industry. Hence, it is thought to be likely not simple to pursue the development in the 4th industry with the present legal system with the exclusive regulation. Therefore, to vitalize the industry of UAV as the contents of the 4th industry, there is a need to seek for a plan between the related department and the business operator in order to enhance a gap between the industrial change speed and industrial perception along with the institutional improvement in the current law.

2) A Rise in Safety Problems According to Non-implementation of a UAV Owner Registration System

Both countries could be known to being limited the use of UAV on the basis of Civil Aeronautics Act. Especially, Japan additionally enacted 「Law on flight restriction of small UAV, etc.」 with taking the opportunity for the incident of drone, which crashed to the prime minister's residence, and minutely providing no-fly zones places and regulations, thereby supplementing the regulations pertinent to UAV in light of the Civil Aeronautics Act and making aviators available for clearly understanding about the approval of flying. Still, it is not easy to cope with the crime occurrence using UAV caused by the third party after receiving the flight approval. For instance, in case of the drone flight infiltration incident into the prime minister's residence that took place on April 9, 2016, it is what a 40 something man, who was discontented with nuclear energy

policy, loaded the drone with sand 100g of having been collected in Fukushima Prefecture and then made it fly to the prime minister's residence. What was discovered after this is the 22nd of the same month. Thus, even a fact of infiltration failed to be detected for 13 days until the drone was found(The Asahi Shimbun[朝日新聞], April 22, 2015). On top of this, a crime of using UAV such as guns, explosives and drugs continues to occur. It may be difficult to fundamentally prevent all these problems. But an action will need to be taken that is available for the vitalization of UAV even with reducing the probability of crime occurrence.

3) Absence and Un-professionalism of Agency in Charge

Industry of using UAV is certainly the one that can be extended to diverse industrial fields down the road. However, in case of Korea, there is no agency that is exclusively in charge of aeroplane like FAA(Federal Aviation Administration) in America. In our country regarding UAV, the budget execution and the validity review are being made now by the Ministry of Economy and Finance. It is in the status of being dispersed such as being undertaken the technical development & support by the Ministry of Trade, Industry and Energy, the frequency allocation & operating system by the Ministry of Science and ICT, the certification or operation support by the Ministry of Land, Infrastructure and Transport, and the military use by the Defense Acquisition Program Administration. The control organization related to the flight of UAV henceforth is absent. In this way, a great difficulty may be caused in implementing an efficient and systematic cooperation and a support system in a situation of being dispersed or absent. Thus, for optimization, there will need to be a pursuit for establishing and operating agency in charge.

2. Improvement Plans According to the Expansion in the Use of UAV

1) Inducement of Industrial Extendability Through Relieving a Legal Regulation

The core regulation, which will need to be improved the most in activating UAV industry, can be considered to be 'invisible area flight' and 'night flying.' Japan approved the invisible area flight to some mountainous districts, thereby being under the trial run. America is allowing night flight even without a document in case of installing the anti-collision light after receiving special training.

In our country for now, maximally 90 days are required after getting or applying for 'specific approval of the authorities' to obtain the approval of 'invisible area flight' or 'night flying.' Procedure or standard is also picky, thereby being difficult for flying in reality. Accordingly, to promote UAV industry, a regulation needs to be eased with premising the safety assurance. To

invigorate the industry of using UAV, there will be a need to seek for a plan of allowing ‘invisible area flight’ and ‘night flying’ just in case of being the business operator if the corresponding business operator satisfies the safety standard in light of 「Aviation Safety Act」 with regard to the contents of 「Article 310, Clause 1 of the enforcement rule in the Aviation Safety Act」.

This will lead to offering benefits to dwellers in mountainous area or island region that had been difficult for the access, thereby being able to increase residents' quality of life. New services will be possibly provided like drone taxi, parcel delivery service, emergency medical service using UAV regardless of day and night. To vitalize UAV industry as the universal industry from now on, the deregulation may be surely needed.

2) Improvement in Safety Through a Mandatory Registration System of UAV Airframe

An object like automobile and aircraft is a thing of possessing various merits, which was made for a human being's convenient & safe movement and time saving. Nevertheless, it may be an object of offering benefits to a human being, or a dangerous thing of inflicting harm on a human being's life depending on with which intention a user applies this thing. In that sense, it is being followed the occurrence of privacy invasion, object destruction caused by a plunge, and terrorism damage using the nonregistered UAV. Thus, there is a need to carry out a registration system of clearly stating an owner like the vehicle registration system, and then to clarify the taxation obligation, the responsibility relation given the occurrence of an incident, and the identification of an owner when being lost. Our country is currently making the registration requirement for UAV with more than 12kg. However, recently in America, a hefty penalty was allowed to be imposed given violation through confirming more than 5kg in consideration of riskiness such as terror

Consequently, to block this riskiness in advance, there is a need to make it implement registration in a buying place through requiring a purchaser's identification and airframe registration at the stage of buying UAV regardless of an individual or a business operator in case of weight with more than 5kg. It is requirement to relieve unnecessary regulation in order to vitalize UAV industry. Yet, to enhance safety and to clear up whether or not having responsibility for an incident, the mandatory registration system of airframe will be an efficient method.

3) Foundation of UAV Control Center

In order for aeroplane to fly, an aircraft identification unit should be obligatorily installed. This leads to allowing an air-traffic controller to trace the relevant airplane and to monitor airspace on land or at sea in our whole country through NOTAM(Notice to Airman).

UAV is different from this though. If UAV industry comes to be actually invigorated, hundreds

or thousands of UAV will come to fly at the same time across our country. It is in a state of being entirely unable to confirm UAV type, membership, location, registration number, flying process like aircraft. Personnel and materiel damage may be great given the occurrence of a plane crash caused by the plane-to-plane collision or fault around city center that is the densely-populated area.

Therefore, to previously prevent the occurrence of personal-material damage caused by a plane-to-plane crash, there is a need to operate the state-led UAV control center and facilities using the communications network of LTE, 5G. It will be all right given additionally establishing regionally 'UAV Management Division' that has a similar function to the existing Traffic Management Division of ATS and Communication Bureau for the Aviation Administration.

IV. Conclusion

This study examined the regulations related to UAV in Korea and Japan as for UAV that is a major field of the 4th industrial revolution. This led to eliciting the following improvements in UAV regulations necessary for the development in UAV industry of our country.

Arranging the contents of relevant regulations to UAV, first, in accordance with Article 2 No. 22 of 「Civil Aeronautics Act」 in Japan, UAV was named 「Unmanned Aerial Vehicle」 and then was defined as what is available for flying by remote control or automatic pilot[excluding what was determined by the decree of the Ministry of Land, Infrastructure, Transport and Tourism as what has no concern about damage to the navigation safety of aircraft by flying and to the safety of persons & goods on the ground and on the water in consideration of reasons other than weight(200g)] among apparatuses unavailable for human on board in light of structure as the equipment fixed by other government ordinances including airplane of being offered for flight. Especially in terms of the weight as the application target to the regulations, there was a great difference in weight such as Japan with over 200g and Korea with more than 25kg. Japan could be known that there was a consideration on a safety accident available for the occurrence given the crash of UAV. Second, both countries were similar as for the prohibited airspace and the flying method of UAV. But in case of Japan, it could be known that there was a consideration on prevention and reduction in the occurrence of human life or property damage through providing the establishment of a safe distance in more than 30m from a person or an object given the flight of UAV. Third, in case of Japan, the exemption weight with the safety certification in UAV was less than 200g. In case of Korea, it was over 12kg. Japan was thought to have made a certification

mandatory as for UAV with more than 200g in consideration of a case that will commonly use UAV for the dishonest purpose such as terrorism.

In this way, as a result of examining the regulations of both Korea and Japan in relation to the use of UAV and the activation of industry, Korea can be especially considered to necessarily need supplementation yet for the universal application of UAV and the stimulation of industry. For this, first, it is the inducement in industrial extendability through relieving legal regulations. There will be a need to deregulate so that the business operator can offer benefits to dwellers in mountainous district or island area, which had been difficult for the access, to increase residents' quality of life, and to provide new services such as drone taxi, parcel delivery service, emergency medical service using UAV, by allowing 'invisible area flight' and 'night flying' just in case of being the business operator if a business operator satisfies the safety standard in light of 「Aviation Safety Act」.

Second, it is the improvement in safety through a mandatory registration system of UAV airframe. To cut off riskiness of UAV in advance, there is a need to make it compulsory for a purchaser's identification and airframe registration in a buying place at the stage of buying UAV regardless of an individual or a business operator in case of weight with more than 5kg. To invigorate UAV industry, it is the requirement to ease an unnecessary regulation. But the mandatory registration system of airframe will be an efficient plan for enhancing safety and clarifying the matter of responsibility such as accident and others.

Third, it is the foundation of UAV control center. To previously prevent the occurrence of personal-material damage caused by a plane-to-plane crash of UAV, it will be all right if additionally establishing regionally 'UAV Management Division' that has a similar function to the existing Traffic Management Division of ATS and Communication Bureau for the Aviation Administration, in order to operate the state-led UAV control center and facilities using the communications network of LTE, 5G.

REFERENCES

- Aviation Safety Act in Korea.
- Ahn, J. Y. (2015), Global trends on the regulations of the civil unmanned aircraft system(UAS). *Current Industrial and Technological Trends in Aerospace*, 13(1), 51-67.
- Asahishinbun.(2015.4.22.). 首相官邸屋上にドローンセシウム由来の放射線検出. Retrieved Jul, 10, 2019, from <http://www.asahi.com/articles/ASH4Q3SV1H4QUTIL015.html>,
- Choi, W. Y. (2015). The present and prospect of UAV utilization policy in japan. *Current Industrial and Technological Trends in Aerospace*, 13(2), 39-51.
- Civil Aeronautics Act in Japan.
- Japan cabinet office, Retrieved Jul, 10, 2019 http://www8.cao.go.jp/cstp/society5_0/index.html,
- Kim, J. I. (2016). Study on autonomous vehicle's safety from angles of public law. *Journal of Law Review*, 16(4), 49-71.
- K. L. I. D. (2017). Drone industry in the 4th industrial revolution. *Local Informatization Magazine*, 106, 34.
- Kye, K. M. (2017). A study on legal problems over unmanned vehicle of the fourth industrial revolution-focusing on the autonomous driving vehicle and drone-. *Journal of Electromagnetic Engineering and Science*, 28(7), 519-527.
- Lee, A. R. (2017). Drone market and technological trends. *Convergence Weekly Tip*, 53, JAN.
- L. H. Y., & C. S. M. (2016). A comparative study on drone policy. *Korean Comparative Government Review*, 20(4), 305-324.
- Ordinance for Enforcement of the Aviation Safety Act in Korea.
- Ordinance for Enforcement of the Civil Aeronautics Act in Japan.
- Park, Y. S., & Jerome, G. (2017). *Grobal future rrpport 2050*. Kyobo: Seoul.

Abstract

A Comparative Study on the UAV Flying Regulations of Korea and Japan

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Purpose : To compare and review the UAV flight regulations in Korea and Japan, to elicit for the regulation of UAV laws in Japan, and to derive items that need improvement in the development of Korea's UAV industry. By comparing and reviewing the UAV flight-related regulations of Korea and Japan, we will draw implications of the regulation of UAV-related laws in Japan. **Methods :** A comparative study was conducted on the contents of the Japanese Civil Aeronautics Act and the Korean Aviation Safety Act. **Conclusion :** First, Japan had more than 200g, Korea had more than 25kg, and there were many differences in weight. In Japan, there were considerations for safety accidents during UAV crash. Secondly, in Japan, it is required to secure a safety distance of 30m or more for people or objects during UAV flight. Third, in the case of Japan, the UAV safety certification exemption weight less than 200g, in Korea was more than 12kg. UAV industry revitalization improvement in Korea. UAV industry revitalization improvement in Korea: The first is to induce industrial expansion by easing regulations. Second, safety rethink through the UAV mandatory registration system. Third, the establishment of a UAV control body.

Key Words : Unmanned Aerial Vehicle, Civil Aeronautics Act in Japan, Aviation Safety Act in Korea, International Comparison, 4th Industrial Revolution