

## THEORETICAL CONSIDERATIONS ON POSSIBLE INSURANCE OF DRONES AGAINST DAMAGE AND THEFT

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***Abstract:** The diversity of missions and drones use areas has led to the development of their performance and thus the increasing the risks to which they are subjected. Material damage, which may be suffered or caused by drones due to risk manifestation, can reach high values, so it is recommended an optional insurance of drones from damage and theft.*

***Keywords:** drone, risk, damage, theft, optional insurance*

### 1. INTRODUCTION

In the last few years, the terms “unmanned aircraft system”, “unmanned aerial vehicle”, “remotely piloted aircraft system” and “drone” are becoming synonymous with two things: a death dealing machine flying high above Afghanistan and hobbyist equipments that are popping up everywhere [1]. “Drone” historically refers to an unmanned aircraft system which exists to act as a target for live-fire air defense weapons training by armed forces [2]. Popular culture, particularly the media, uses the term “drone” as a generic descriptor for all classes of unmanned aircraft systems [2]. For this scientific approach, we chose to use the term “drone” because it is expressed best the class equipment for which we are trying to develop insurance policies.

Drone, according to specialty literature [3, 4, 5], are both air vector with equipments placed on board and ground command - control station that can operate either by remote control or autonomously. In recent years the technical performance of drones developed, in maximum speed, flight autonomy or operational ceiling.

With the development of technical performance arising from limitations and requirements drones diversified along with the fields of use. They are no longer the preserve of military missions but became accessible to civilians users such as legal entities or individuals [6, 7].

The diversifying of the areas of use of drones, the increasing complexity and difficulty of flying missions that are used for risk diversification led to accidental damage and theft. On the other hand, with the increased performance of drones their prices increased. Considering the latter, material damage caused by these risks can reach high levels. Therefore, it is increasingly imperative that these risks can be transferred by drones’ owners to insurance companies by the conclusion of an optional insurance for damage and theft.

This paper examines some aspects of the optional insurance contract regarding the damage and theft of drones, such as: the object of insurance, insured risks, situations in which compensation may be guaranteed exclusions in accordance with the law [8, 9, 10, 11].

## 2. CONSIDERATIONS REGARDING THE OPTIONAL INSURANCE CONTRACT OF DRONES

The optional insurance contract applied to the drones can be made after the known model of voluntary insurance contract of auto theft and damages, known by the acronym CASCO [8, 9].

The necessary elements to drones optional insurance contract conclusion are: the insured object (approved according to law) [8, 9, 10, 11]; the existence of a contract of compulsory insurance for damages caused to third parties; operator (authorized) and specifying conditions of use (weather, missions), shown in Fig. 1.

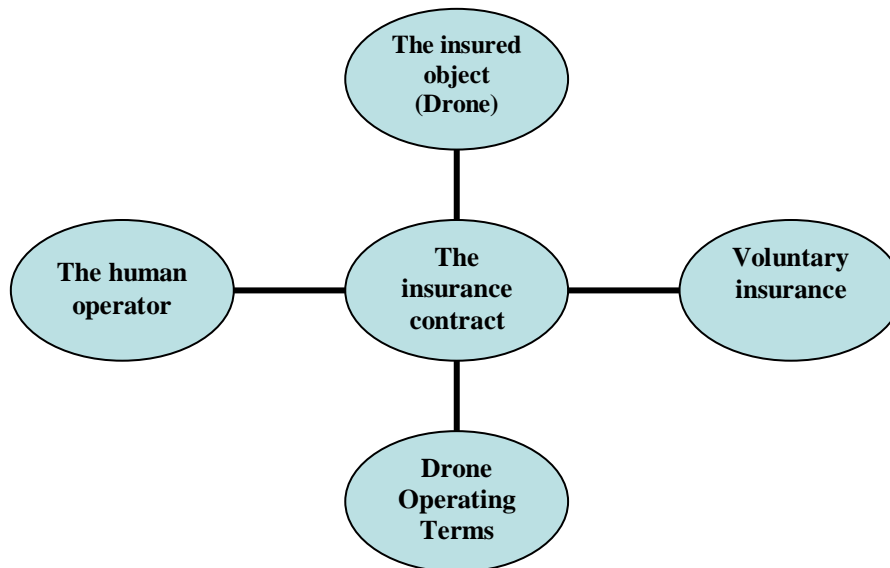


FIG. 1 Necessary elements for optional insurance contract conclusion

**2.1 Object of insurance.** The object of insurance in case of damage and theft of drone's are the following categories: natural and legal persons; structures of the national defense, security and public order. The drones that are not registered at Romanian Civil Aeronautical Authority or National Military Aviation Authority and don't have the compulsory insurance for damages to third parties can not be insured.

**2.2 Insured risks.** Safety Risk Management (SRM) is the tool that:

1. ensures that risks associated with operations/ activities are managed effectively;
2. allows obtaining approvals to conduct such operations;
3. enables pricing/ cost of insurance.

Thus, insurance becomes an integral part of risk management that provides financial compensation when the safety management system has failed to prevent an accident or a loss has been suffered due to an unforeseen event [12, 13]. Insurance is one of the present requirements related to drone operations by the side of privacy and data protection, operational safety and liability.

Insurance can be taken in the following *categories of risk*:

a. Basic risks such as collisions, accidental collisions with other bodies outside the ensured drone, its fall (on the ground in the ravine, water, etc.), falling bodies on the drone.

b. A number of additional risks, such as:

- ✓ fire, lightning, explosion, falling aircraft and sonic boom;
- ✓ natural disasters: earthquakes, floods of natural causes and landslides;

- ✓ atmospheric phenomena, a category which includes: hail, windstorm, weight of snow or ice and avalanche;
- ✓ theft and vandalism, namely: total theft, burglary and / or robbery and vandalism.

**2.3 Situations of granting compensation for damage of the drones.** Drones belonging to military organizations are compensated in situations such as: during any military applications (if accidentally hit by flying objects); during any military applications, (where drones are hit by bullets, or projectiles used by tanks, artillery and anti-aircraft except drones used as targets); during the conduct of surveillance missions and reconnaissance of targets; during the course of rescue missions; during the training and instruction program conducted in authorized institutions; aeronautical rallies.

Drones belonging to legal persons are compensated in the following situations:

- Flying surveillance of their targets or third parties that are requested;
- Flights for rescue operations;
- Flights authorized or licensed for the transmission of images or footage of events such as concerts, sporting events, weddings, and so on;
- Training flights.

Drones belonging to individuals are compensated in the following situations: pleasure flights and authorized filming of events.

**2.4 General exclusions.** They do not include insurance and no liability for:

A) damage of drones due to events such as:

- ✓ war (declared or not), invasion or action of an external enemy, civil war, revolution, rebellion, insurrection, military dictatorship, conspiracy, strikes, civil unrest, terrorism;
- ✓ confiscation, expropriation, nationalization, requisition, seizure, destruction or damage by order of any de jure or de facto government or any public authority;
- ✓ atomic explosion, radiation or radioactive infestations as a result of using atomic energy or fissile materials;
- ✓ pollution or contamination of any kind and from any cause.

B) damage of drone in the following cases :

- ✓ the event was caused deliberately or by gross negligence of the insured, the beneficiary, user, contractor or any other person treated them. Is deemed to be serious misconduct, situations such as leaving/ maintenance drone in hangars / unlocked room, not taking measures to change the locks of the hangar / premises as a result of an attempted theft by forcing locks or loss or theft of keys and so on;
- ✓ at the time of the event the drone was operated by a person who is not licensed in that category;
- ✓ the event was produced during handling drone drunk, under the influence of narcotics or drugs that are not compatible with the permission of handling drone;
- ✓ after the event, the person handling drone refuses to submit harvest biological samples to determine alcohol or consumption of goods / drugs or medication or does leave the place of the event without prior approval from the authorized authority when the incident occurred as a result of crime;
- ✓ drones damaged/ destroyed during flights in the airspace of other states when the flight is not authorized / approved by the State;
- ✓ drones damaged/ destroyed during flights over areas of private individuals or legal entities, when these flights are made without their consent and authorized institutions;
- ✓ drones damaged/ destroyed during flights over areas of state institutions, national companies, autonomous bodies when these flights are not approved by them;

- ✓ drones damaged/ destroyed during flights over areas of military or intelligence services organizations, when these flights are not approved by them;
- ✓ drones damaged/ destroyed because they did not respect flight altitudes and distances from airports, recommended by the aeronautical authorities;
- ✓ drones damaged/ destroyed while being used in acts of terrorism.

An insurance contract for damage and theft of drones also includes a number of elements, among which may be mentioned: definition of the terms used in the agreement: the insured, the insurer, customer, contractor, road, compensation, franchise, period of insurance, an so on; conclusion of insurance; commencement and termination liability insurer; insured period; insurance premiums; policyholder obligations and special obligations after the occurrence of the insured risk; finding and paying compensation; final provisions.

### CONCLUSIONS

Due to the many risks to which drones are subjected during ground and flight operation and the fact that the damage that can affect drones that can have a high value and major implications on the development of business in the future, a contract of optional flexible and personalized insurance is required.

The voluntary insurance damage and theft of drones contract offers complementary advantages to the compulsory insurance contract by protecting all or part of the initial investment on technical system configured or in the case of the upgrade during operation considered in the contract under the aeronautical specific legislation.

This paper is required to be continued with the development of a software model for calculating insurance premiums in multi-criteria concept, starting from existing models used in CASCO insurance.

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