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Aviation Safety Response to Unmanned Aircraft Systems Operations Through the Lens of International Air Law

*By Manana Wanyonyi Rodgers **

Abstract

The rapid increase of non-military operations of Unmanned Aircraft Systems (UAS) across the globe poses safety challenges to aviation, that require countermeasures. The applicable relevant international air law statute is the Chicago Convention, which created ICAO, with mandate to regulate air safety of international civil aviation. This article analyses the applicability of international aviation law from an international and national perspective. The Convention specifically provides the basis for the regime of special permission of aircraft crossing international borders in flight, intended at averting safety concerns arising from possible accidents or collisions. This article demonstrates that despite the existence of robust safety legislation, and guidance materials plus circulars by ICAO, operation of UAS continue posing safety challenges.

Like manned aircraft, operators of international UAS flights should comply or be within the realm of Annex 19 of the Chicago Convention on Safety Management and ICAO Manual Doc 9859, Annex 2 on Rules of the Air. Circular 328-AN/190, first published in 2011 is of a historical value, as the first ICAO document providing guidance to States and industry to initiate regulation of civil operations of UAS, addressing safety concerns. Annex 19 obligates ICAO Contracting States to ensure that safety measures are in place through establishment of State Safety Programme (SSP), while at the same time ensuring that UAS regulations speak to the needs to address aviation safety to avert danger.

Introduction

This article provides substantive elements of how existing international air law on air transport operations provides the basis to regulate aviation safety encompassing as well as the use of UAS. These provisions are located in different ICAO documents such as Annex 1, 2, 6, 7, 8, 13, 14 and 19 of the Chicago Convention and the ICAO RPAS Manual Doc 10019, whose first edition was published in 2015. The article discusses how the rules of international air law including the Conventions, Annexes and other instruments address safety challenges that emanate from the operation of unmanned aircraft systems in different jurisdictions. Based on Article 44 of the Convention and spelled out in the ICAO RPAS CONOPS[1], domestic operations of UAS are not subject to ICAO provisions.

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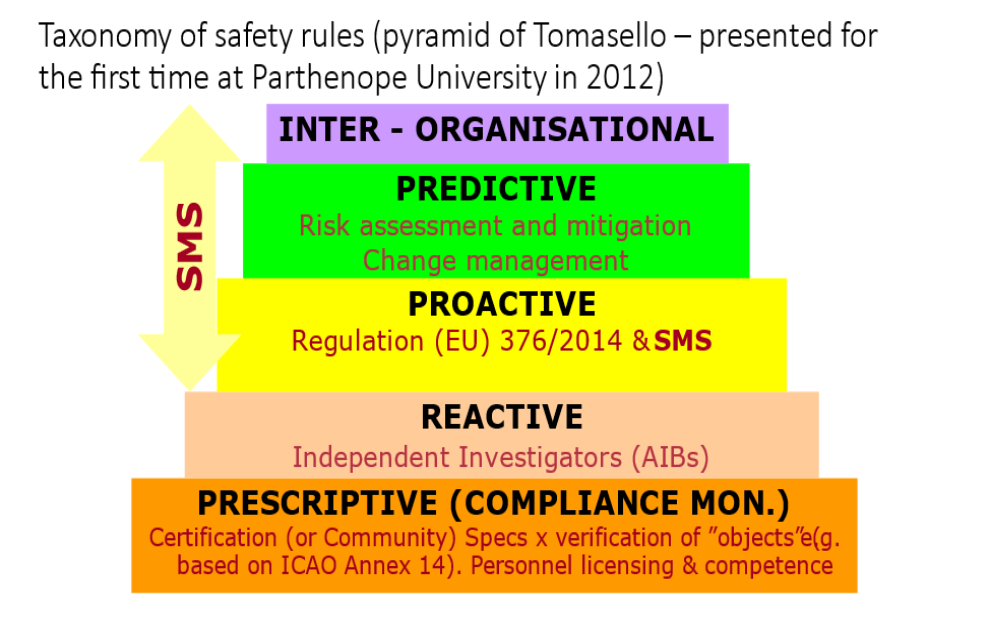
International and Domestic Response to Aviation Safety in UAS Operations

Aviation safety is defined under ICAO Annex 19[2], Safety Management Manual Doc 9859, ICAO Annex 2 on Rules of the Air and RPAS Manual Doc 10109[3] as the state in which the possibility of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and safety risk management.[4] From the definition, it emerges that the obligation of ensuring the safety of UAS is a two-fold process. It involves identifying safety risk and managing the risk. The risk management aspects encapsulate reactive and proactive approaches to management of safety concerns.[5] According to the Tomasello's pyramid, safety management includes also the levels of prescriptive safety, predictive safety and interorganisational safety.
The challenge of safety in the use of UAS arises from the lack of Detect and Avoid



(DAA) technology in some UAS. When such technology lacks in UAS, there are increased chances of collision, unless the risk is mitigated through ground based technologies or procedural means. The international general principle is that the UAS use and operation must be safe and not compromise the lives of others.[6] In full realization of this general principle, a framework for redressing safety challenges was contemplated by the contracting parties through the establishment of frameworks for aviation safety in the Chicago Convention.[7] Instructively, the Chicago Convention established the ICAO, with mandate to regulate air safety, communication and technological aspects of international civil aviation, including aspects of UAS.[8], of course when flying internationally. Article 8 of the Chicago Convention specifically provides the basis for regime of special authorisation of aircraft intending to cross national borders in flight, without pilot on board. The objective of the special authorisation is to prevent obvious safety concerns arising from possibility of accidents and collisions if the pilotless aircrafts are left to operate unregulated in the international context. For example, neither in the USA nor in the European Union this 'special authorisation' is applied to domestic flights, to avoid unnecessary bureaucratic burden on Small and Medium-sized Enterprises (SMEs).

Still under the Chicago Convention, the contracting parties to the Convention are obliged to allow flights of non-scheduled aircraft into their territories.[9] However, this obligation, which translates into a right on the operators of the aircraft, may be limited, in case of movements where the States deem inaccessible. The limitation is at the discretion of the State, which can only be exercised on grounds of safety. In any case this provision applies only to 'manned' aircraft with the pilot on board. Otherwise the special authorisation would be necessary, unless it is waived by bi- or multilateral agreements of by law applicable on the regional scale[10].

Similarly, under Article 9(a) of the Chicago Convention, public safety considerations inform the basis upon which countries may restrict or prohibit the flying of aircraft. However, the discretion of the States has limitations and cannot be exercised when it is unreasonable in terms of extent or rather prevent aviation. Other than prohibited areas, circumstances such as public safety and emergency, without express prohibitions communicated to ICAO, may warrant a limitation on the right for aviation provided there is no discrimination of the aircraft on nationality basis.[11]

The safety considerations are traced to the airports of member States, who are required to have navigation facilities and meteorological service for safety of aviation.[12] Similar considerations are to be made by the States when imposing the cargo restrictions provided under Article 35(b) of the Chicago Convention. In order to breath more life into the stated provisions, ICAO is established with objective of ensuring 'safe and orderly growth of international aviation[13] and to 'promote safety of flight in international air aviation.'[14] Further, ICAO is mandated to adopt and amend SARPs from time to time, particularly, the Chicago Convention recognize that the standard may deal with, among others:

"…such other matters concerned with the safety, regularity, and efficiency of air navigation as may from time to time appear appropriate."

Based on above provision ICAO has already amended Annexes 1, 2, 7, 8 and 13 to standardise international operations of Remotely Piloted Aircraft Systems (RPAS), when under Instrument Flight Rules (IFR) higher than 500 ft above the ground and below Flight Level 600. Small UAS flying at Very Low Level (VLL) are hence not subject to the ICAO provisions.

From the above analysis, it is clear that the Chicago Convention's approach is establishment of broader frameworks for safety. The mechanism contemplated under Article 44(a) as read with 44(h) are dependent on the ICAO's development of relevant SARPs. Regarding other restrictions and prohibitions of flights, the measures for their achievement are significantly dependent on discretionary regulations developed at State levels. An example is Article 9, which begins with the words,

"…each contracting State may, for reasons of military necessity or public safety, restrict or prohibit."[15]

Lastly, the provisions of Article 15 of the Chicago Convention on requirement of facilities and meteorological services at the airports for safety, largely excludes the UAS which have the capability of being launched from anywhere and not necessarily from an airport. This is hence another topic on which ICAO may not guide States. Nevertheless a comprehensive regulatory framework, based on the 'categories' of UAS operations is emerging in the European Union[16], which could be a model to regulate operations of UAS beyond the remit of ICAO, while pursuing a reasonable balance between the need to protect citizens and the need to allow economic development, based similarly on SMEs.

Other than the broader framework, the Convention recognizes and regulates two other practical activities that have a bearing on mitigating safety concerns for UAS use. The first one is the certification of airworthiness envisaged under Article 31 of the Chicago Convention, absolutely necessary for RPAS crossing international borders in flight, but not necessarily applicable to smaller UAS. This means that every aircraft engaged in international navigation shall be provided with a certificate of airworthiness, issued or rendered valid by the State in which it is registered.[17] A certificate of airworthiness is a measure of an aircraft's suitability for safe flight, only applicable to certified UAS. It is conferred on an aircraft by the national aviation authority of a respective State and is maintained, subject to performance of the required maintenance and continuing airworthiness actions. Until such a time that this requirement is implemented, States continue to apply different criteria for certification.[18] For example, it has not been effectively possible to offer all UAS with certificates of airworthiness, due to rapid technological revolutions as many find themselves in the market without going through the procedural certification process. More often, they are used in social gatherings to take photographs without airworthiness authorization, a *lacuna* that has partly been associated with absence of effective UAS regulations or proper enforcement mechanisms in some jurisdiction.[19]

Clearly, it would be disproportionate to apply airworthiness certification to these small aircraft representing a reduced safety risk. And in fact in the European Union the certificate of airworthiness is not required for UAS in the 'open' category and not always in the 'specific' categories. Courses on this matter are provided at the JAA-Training Organisation[20].

The second practical regulation of safety is pegged on licencing requirements for the remote pilot. These requirements are made under Article 32 of the Chicago Convention. The article provides that:

"pilot of every aircraft and the other members of the operating crew of every aircraft engaged in international navigation shall be provided with certificates of competency and licenses issued or rendered valid by the State in which the aircraft is registered"

Licensing is the authorisation of defined events otherwise prohibited out of the hazards that would occur if poorly performed. This means that the licensing has safety of operation as one of its prime considerations when a decision to grant a licence is made by competent authorities. Applicants for a license must meet certain standards that are commensurate with complexity of the event to be performed.[22]

However, ICAO Doc 10019 in 2015 clarified that Art. 32 does NOT apply to Remotely Piloted Aircraft Systems (RPAS). And in fact, amendment 175 to Annex, applicable on 03 November 2022, states that the Remote Pilot Licence (RPL) is issued by the State of the Operator and not by the State of Registry. Furthermore the Licence is never required in the European Union in the 'open' and 'specific' category'.

The two practical activities of certification of airworthiness and licencing, without more, do not inspire full safety with regard to the Detect and Avoid technologies. From a plain reading of the provisions of Articles 31 and 32 of the Convention, the provisions focus on the 'international aviation'. This technically leaves out of its scope, the concerns relating to safety of domestic uses of UAS. Particularly, Article 32 of the Convention addresses the 'crew members' in licencing subjects despite that being uncommon for UAS.[23]
Ideally, aviation safety demands that remote pilots and other UAS crew need to be trained and competent in safety, with proper qualifications, appropriate licenses or certificates of competence to provide a modicum of integrity in safety of the civil

aviation system they eventually are part of. With little focus on the main conventional law, some States continue to operate without clear guidelines regarding pilots operating UAS.[24] Conversely, in the EU, while a formal licence issued by the Aviation Authority is not required to alleviate the workload on the administration, nevertheless attestations of competency issued by accredited and independent third parties (e.g. Qualified Entities[25]) are still required.

More practically, the ICAO has also developed Annex 2 on the Rules of the Air and a manual known as Safety Management Manual Doc 9859 providing guidance to States to develop their domestic legal framework supporting Annex 19 on Safety Management, this Annex. Also relevant to safety is the ICAO's RPAS Manual 10019. The Manual is instrumental since it has rationalised the application of safety considerations to UAS to member States.[26]

Annex 19 was developed to, among others; help achieve the two dimensions of safety. The Annex consisted of two programmes and systems, the first one being State Safety Programme (SSP) and Safety Management System (SMS). The two concepts are divided as between operators of UAS and the State, and are both aimed at ensuring that the sky is safe to all users.

State Safety Programme (SSP) is a programme through which ICAO ensures that States set of regulations and activities, with objective to improve safety of the airspace.[27] The Programme as a mandatory system recognizes the acceptable levels of safety in aviation practice. It is a system through which the civil aviation authorities, having regard to size and resource of the aviation system, regulate, monitor and administer safety.[28] The key areas of regulation include oversight of safety, which comprises monitoring of elements of safety oversight functions like areas of significant safety concerns and high safety risks. Others are risk management, safety assurance and safety promotion. It, therefore, contemplates the conduct policy formulation based on safety information such as identification of hazards and safety arising from management, conduct of stakeholder awareness and internal audits.[29]

The programme is very vital since it supports rule-making processes in the 193 ICAO member States in matter safety. Particularly, SSP supports an analysis of potential effects of safety of UAS and other third parties such as service providers regulated by civil aviation authorities.[30] This is in addition to determining the role of 'equivalent level safety' and 'acceptable means of compliance' in their possession. The SSP processes on safety assurance, risk management, and promotion are designed to be proactive in addressing hurdles that the use and operation of UAS pose while in the air; in other words, they are part of countermeasures from a legal perspective that address challenges regarding UAS safety operations.

Second, the Safety Management System (SMS) is a system to be adopted by the stakeholders. It flows from the SSP for each State on the basis of which it instructs the stakeholders to develop their respective SMS.[31] Service providers and operators under oversight of the State's implementation of ICAO Annex 19 that requires all contracting States to domesticate safety management measures within their jurisdiction establish the system, which targets a systematic approach to management safety through creating efficiency in organizational structures, accountability, policies and procedures, the SMS.

The SSP and SMS are, therefore, inseparable. Persons, be they pilots of UAS or manned aircraft, are required to bear similar responsibilities of being knowledgeable about rules of the air, flight performance, planning and loading, human performance, navigation, operation procedure and principles of flight.[32]

They have to get flight instruction, demonstrate skill and expertise as well as being licensed. Of necessity, correspondingly, they would need to be proficient in the language of radiotelephony as well as meet the required medical fitness levels. For purposes of UAS, the latter could be modified through integration of regulations to ensure that those who operate UAS meet the basic levels of space proficiency.

Further, SSP and SMS, require States to establish bodies with oversight of the safety mandate at the national level. The authorities specifically are responsible for extending safety considerations to UAS responsibility of giving assurance of introduction of UAS within the civilian airspace.[33] Further, SSP and SMS have influenced regulation of personal licencing in some ICAO member States, in effect helping to achieve integration of UAS into civilian application. This translates to personnel licensing harmonization in a single airspace across national and regional boundaries.[34]

Without a pilot, the SSP and SMS aside, UAS may still experience challenges in meeting safety requirements such as introduction of technology for detection and avoidance, command and control, communication with ATC and prevention of unlawful interference.[35] The interference may occur because UAS have no pilot on board and there may be no capacity to communicate with ATC and seek clearance before landing at an airport. The Chicago Convention attempts to resolve this challenge by imposing UAS regulation and stipulation of conditions under which UAS can operate. The import of Article 8 of the Convention is to prohibit flying of pilotless aircraft over territories of other States without authorization.

In addition to ICAO Annex 19, the Annex 2 on the Rules of the Air[36] is instrumental in ensuring safety in civil aviation. The Rules stipulate the responsibilities of the pilot-in-command to ensure the operation of the aircraft complies with rules of the air and punishes those who violate them. The pilot-in-command of unmanned aircraft systems is the person controlling it while airborne and has final authority over it.[37] The rules apply whether the pilot is on board or at a remote location in the case of unmanned aircraft systems. Further, it is the responsibility of a pilot operating a UAS to undertake a handing over process even where the aircraft is in flight.[38] Others are avoidance of collisions and development of flight plans, provision of signals and obtaining of air traffic control clearances.[39]

However, there is a challenge as regards the difficulty of implementing the ICAO Annex 2. This is so, since in UAS, remote pilots may be separated by long distances and expected to hand over to pilots in far-off places. Addressing hand over responsibilities by remote pilots is made even more complex by the reality that remote pilots may be operating from completely different States or even the high seas.[40] The other obvious challenge brought about by ubiquity in the use of UAS is the difficulty to develop and submit a flight plan, to be used for filming, for example. As it stands, therefore, there are impediments to the full attainment of safety in licensing and regulation of UAS. It is notable that this might be a missed opportunity since rules of the air are, by nature, binding upon member States to the Chicago Convention. Furthermore, flights of manned aviation below 500 ft above ground are not standardised in Annex 2. Below that height, each State should establish its own rules of the air. In the EU, EUROCONTROL in 2018 proposed a new set of 'Low-level Flight Rules'(LFR)[41].

Further, safety considerations also underpin the power of the States under international air law which according to Cooper, include jurisdiction over airspace and unilateral right to admit or deny entry, freedom over high seas, right of innocent passage, nationality of aircrafts, among others.[42] The above position in conventional, SARPs and the international customary law are supported by court opinions that consider safety as the basis for regulation of UAS.

For instance, the *Libyan Arab Jamahiriya v United Kingdom*[43] also known as the *Lockerbie case* has been instrumental in defining safety laws in the aviation sector. Though this case was applicable to manned aircrafts, the principles developed by the court would still apply to the UAS in the current framework under the Chicago Convention.[44] Perhaps, the only notable limitation is that the effect of the binding nature of the judgments are limited to those specific cases and respective parties alone.[45]

Safety concerns are also addressed through traffic clearances, which ensure flight completeness. In regards to the traffic management, it is clear that when the Chicago Convention was adopted, there was an agreement between parties that relates to traffic management. The Agreement stipulated at Article 12 of the Convention partly states as follows:

Each contracting State undertakes to adopt measures to ensure that every aircraft flying over or manoeuvring within its territory and that every aircraft carrying its nationality mark, wherever such aircraft may be, shall comply with the rules and regulations relating to the flight and manoeuvre of aircraft there in force.

The reference to 'aircraft carrying the nationality marks' under Article 12 of the Convention applies extraterritorially. This is a major achievement in ensuring that foreign UAS do not cause mayhem or disruptions in the aviation airspaces of other countries. However, the implementation of the provision is heavily dependent on development of laws at national levels and consequent harmonization of the said laws that are to be implemented through the enforcement of the criminal laws.[46]

Further, the Chicago Convention requires aircraft that are engaged in international navigation to fulfil certain conditions, one of which is carrying documents aboard.[47] These documents include: certificate of registration, certificate of airworthiness, appropriate licenses for each crew member, journey logbook, aircraft radio station license; if carrying passengers, a list of their names, places of embarkation and destination, and if it is for cargo, a manifest and detailed declarations of the cargo should be provided.[48] Other than, for purposes of identification, certification and ownership, the documents are meant to ensure safety of the aircraft, its crew and property, and persons on the ground. The list of passengers would allow for easier identification in circumstances where an accident occurs. Declaration of cargo would ensure that only legal and not contraband cargo is carried.[49]

The above regulatory approaches under Article 29 of the Chicago Convention may, however, prove difficult to enforce when dealing with UAS as at the moment, there are no cases of them carrying people. In fact, Doc 10019 proposes the alternative of fulfilling the documentation requirements of Article 29 of the Convention through electronic documents, some of them just at the level of the Remote Pilot Station and not in the aircraft. For example, whereas it would be easy for manned aircraft to carry specified documents on board the aircraft, carrying paper-based documents on board UAS is neither practical nor appropriate. In this context, electronic or alternative versions of the documents would need to be considered.[50] Secondly, it is commonplace that in the event an accident happens, most aircraft end up being burned completely, including paper-based documentation. It is, therefore, important to have a regulatory framework that ensures that advanced technology is fixed to UAS with backup to servers on the ground, which can be retrieved in case of accidents.

Regarding the implementation of the above provision, as Pevot *et al* notes, the international response to the safety is still faced with challenges of unmanned traffic management (UTM).

Generally, UAS would require an advanced traffic management ecosystem under development for autonomously controlled operations of UAS to ensure safety in entry into the airspace.[51] In particular the International Standard Organisation is developing the series of international standards 23629[52] on UAS Traffic Management. Ideally, the system comprises a system that can monitor increased activity based on sharing of each operator's scheduled flight details in a digital form. Unfortunately, most UAS lack these systems.

That notwithstanding, the international response under Article 8 of the Chicago Convention contemplates that the UAS must operate in the same airspace with the manned aircraft. This categorisation may be disruptive since the UAS comes in different shapes and may operate in much lower altitudes, which the aviation airspace was not originally designed to handle. This leads to concern over safety issues in entry of UAS into the airspace.

The rule of the air is to reduce the safety risks that may arise. Part 3.6 in particular deals with control of air traffic. It specifically provides as follows:

"An air traffic control clearance shall be obtained prior to operating a controlled flight, or a portion of a flight as a controlled flight. Such clearance shall be requested through the submission of a flight plan to an air traffic control unit."

The import of the word 'shall' makes it mandatory for the requisition of the air traffic control clearance to be obtained when a person submits an air traffic control plan after submission of flight plans by civil aviation operators including operators of UAS. Despite the provision, the requirements of ICAO Annex 2 still compellingly direct toward two conclusions on implementation challenges. First, some of the requirements for flight plans and flight clearance to pilots in command may be impracticable for certain uses of UAS. Secondly, the idea of control as stipulated in the Chicago Convention and ICAO Annex 2 do not specifically provide for the command and control system. Accordingly, it depends on the State resources and the design of the UAS to fully implement these provisions that are pivotal for safety in the airspace.

In order to further cure the challenges that relate to the unmanned traffic management in the ICAO Annex 2, ICAO developed Circular No. 328 AN 190. The Circular requires pilot-in-command to ensure operation of the aircraft complies with rules of the air and punishes those who violate them. The pilot-in-command for unmanned aircraft systems is the person controlling it while airborne and has final authority over it.[53] This applies, whether the pilot is on-board or at a remote location in the case of unmanned aircraft systems. Further, it is the responsibility of a pilot operating a UAS to undertake a handing over process even where the aircraft is in flight.[54] Other responsibilities are avoidance of collisions and development of flight plans, provision of signals and, obtaining of air traffic control clearances.[55]

The ICAO has, over the years, developed a series of traffic rights, known as Freedoms of the Air, which continue to form the basis of rights exchanged in air services negotiations today.[56] This study contends, however, that this principle and its effect on UAS may present a contradiction since although UAS may interact like manned aircraft, there are certain inconsistencies exist in the latter such as non-co-operation and non-compliance, which may complicate management of air traffic with current regulatory challenges.[57] The above provisions speak to the general rules on safety and do not specifically address the challenge of lack of the sense and avoid technology for some UAS.

The rule that specifically addresses the issue is the UAS principle of responsibility and accountability. Under this principle, it is expected that UAS missions will still need persons who are accountable, regardless of whether they are called commander or pilot.[58] From a legal perspective, action must be taken against persons or legal entities responsible for operations, in case of foul play. Particularly, the principle appreciates that the UAS involves novel technologies; hence, the need to create mechanisms to ensure responsibility and accountability in design, manufacture, maintenance and operations, equal to those of manned aircraft, even though the person in command is on the ground.[59]

Conclusion

The article has established that aviation safety is a cardinal ingredient for the operation of UAS in all 193 ICAO members States. The relevant international law applicable for the effective safety regulation for UAS is the Chicago Convention, which established ICAO, with mandate to regulate air safety. Article 8 of the Chicago Convention specifically provides the basis for regime of special authorization of aircrafts aimed at preventing safety concerns arising from likelihood of accidents and collisions of the pilotless aircrafts.

Under article 9(a) of the Chicago Convention, public safety considerations inform the basis upon which countries may restrict or prohibit the flying of aircrafts. Such discretion has limitations, hence need to be exercised reasonably. This means for example, States should not deny authorization during emergency. However, for the purpose of public safety or security, State may restrict or prohibit flying of UAS into a national Airspace as contemplated under Art 9 of the Convention.

The Convention inaugurates wider outlines for safety measures. The mechanism envisaged under Article 44(a) as read with 44(h) are dependent on the ICAO's development of relevant SARPs. More specific to aviation safety regulations of the operation of UAS, is Annex 19 to the Convention on Safety Management, Manual Doc 9859, Annex 2 on Rules of the Air and Circular 328-AN/190. This, international instrument obligates member States to ensure that safety measures are put in place through establishment of State Safety Programme (SSP).

Due to advancement of technology, that has seen UAS manufactured in different sizes, States will likely continue to encounter safety challenges in operation of UAS in the area of compliance with some safety requirements such as certificate of registration, certificate of airworthiness, appropriate licenses, insurance, and absence of unmanned Aircraft system traffic management in some developing countries. This requires continual improvement and counter measures coupled with dedication by States and none State actors support, as UAS are likely to increase in civil airspace as technology advances.

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[1] https://www.icao.int/safety/UA/Documents/ICAO%20RPAS%20CONOPS.pdf.

[2] Annex 19 on Safety Management to the Chicago Convention (hereinafter referred to as ICAO Annex 19).

[3] ICAO Circular on Unmanned Aircraft Systems No. 328-AN/190 (hereinafter refered to as ICAO Circular No. 328-AN/190). See section 2.16, 2.17, 2.18, 2.19, 2.20 and 2.21.

[4] See Safety Management Manual Doc 9859. Glossary and definition of terms at p vii.

[5] ICAO Annex 19, Paragraph 2.16.

[6] ICAO Circular 328-AN/190, Section 2.8 provides that: The principal objective of the aviation regulatory framework is to achieve and maintain the highest possible uniform level of safety. In the case of UAS, this means ensuring the safety of any other airspace user as well as the safety of persons and property on the ground.

[7] The Chicago Convention, Article 3 (d) which provides that: The contracting States undertakes when issuing regulations for their State aircraft, that they will have due regard for the safety of navigation of civil aircraft.

[8] The Chicago Convention, Article 44.

[9] The Chicago Convention, Article 5.

[10] E.g. European Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft.

[11] The Chicago Convention, Article 9(b).

[12] The Chicago Convention, Article 15.

[13] The Chicago Convention, Article 44(a).

[14] The Chicago Convention, Article 44(h).

[15] The Chicago Convention, Article 9(a).

[16] https://www.easa.europa.eu/domains/civil-drones-rpas/drones-regulatory-framework-background.

[17] The Chicago Convention, Article 31.

[18] Amendment 108 to ICAO Annex 8 applicable on 26 November 2026.

[19] Somalia hitherto, has no UAS regulation.

[20] https://jaato.com/courses-examinations-virtual/?cat=18&ct=all&d=all .

[21] The Chicago Convention, Article 32 (a).

[22] The Chicago Convention, Article 32 (a).

[23] Pepin E "Development of the National Legislation on Aviation since the Chicago Convention" 1957 *JALC* 1.

[24] ICAO Annex 19, Paragraph 4.13.

[25] Artcile 69 and Annex VI in EU Regulation 2018/1139.

[26] ICAO UAS Circular No. 328 AN 190. Section 2.16, 2.17, 2.18, 2.19, 2.20 and 2.21.

[27] ICAO Annex 19, Paragraph 2.19.

[28] ICAO Annex 19, Paragraph 2.19.

[29] https://www.iata.org/en/training/courses/state-safety-program/tcvg90/en/ (Date of use: 22 July 2020).

[30] https://www.iata.org/en/training/courses/state-safety-program/tcvg90/en/ (Date of use: 22 July 2020).

[31] https://www.iata.org/en/training/courses/state-safety-program/tcvg90/en/ (Date of use: 22 July 2020).

[32] ICAO Annex 19, Paragraph 2.15.

[33] Provided in relevant ICAO Annex 6 on Operation of Aircraft to the Chicago Convention (hereinafter referred to as ICAO Annex 6); Annex 11 on Air Traffic Services to the Chicago Convention (hereinafter referred to as ICAO Annex 11" and Annex 14 on Aerodromes Design and Operations to the Chicago Convention (hereinafter referred to as the ICAO Annex 14).

[34] The Chicago Convention, Article 8 on pilotless aircraft. It provides that each contracting State to ensure use of UAS by any contracting State shall be controlled to obviate danger to civil aircraft.

[35] ICAO Annex 19, Paragraph 2.15.

[36] Annex on the Rules of the Air to the Chicago Convention (hereinafter referred to as ICAO Annex 2).

[37] ICAO Annex 2, Paragraph 2.3.1.

[38] ICAO Annex 2, Paragraph 2.3.1.

[39] ICAO Annex 2, Paragraph 3.3-3.6.

[40] ICAO Annex 2, Paragraph 3.3-3.6.

[41] https://www.eurocontrol.int/archive_download/all/node/11149.

[42] See Cooper JC *"Backgrounds of International Air Law"* 1965 *YASL* 3.

[43] *Libyan Arab Jamahiriya v United Kingdom* 1992 88 (ICJ) Rep 3 [578].

[44] Bouve C "Regulation of International Air Navigation under the Paris Convention" 1935 *JAL* 299.

[45] The United Nations Charter of 26 June 1945 1 UNTS XVI (entered into force 24 October 1945) (hereinafter referred to as the UN Charter).

[46] The Chicago Convention 1944, Article 12.

[47] The Chicago Convention 1944, Article 29.

[48] The Chicago Convention 1944, Article 29.

[49] ICAO Annex 2, Paragraph, 2.1.1 also makes similar requirements.

[50] ICAO Annex 119, Paragraph 4.1.1

[51] Prevot *et al* "UTM" 3292.

[52] https://www.iso.org/committee/5336224.html.

[53] ICAO Annex 2, Paragraph 2.3.1.

[54] ICAO Annex 2, Paragraph 2.3.1.

[55] ICAO Annex 2, Paragraph 3.3-3.6.

[56] Manual on the Regulation of International Air Transport (Doc 9626, Part 4).

[57] DeGarmo M *Issues Concerning Integration* 8.

[58] De Garmo *Issues Concerning Integration* 8.

[59] De Garmo *Issues Concerning Integration* 8.

Covid-19 and Air Passengers' Rights: Latest Updates

By Ottavia Carla Bonacci* *and Seyma Aslan***

As emerged in the last two years, the harshest effects of the Covid-19 pandemic had been observed in the aviation sector[1]. After the peak of the contagion when, in order to prevent the spread of the virus, both domestic and international flights have been cancelled; safety and sanitary measures are currently applied to air passengers (i.e. the requirement of a negative resulted Covid test (PCR) to be taken 48 hours before departure, the obligation to wear masks on board, the proof of vaccination or of a Covid-19 recovery). Although these strict precautions ensure a safe flight, a crucial question is still represented by the consequences of the cancellation of a flight or of a denied boarding due to Covid-19 related issue.

European air passengers are always protected under (EC) No. 261/2004[2], which sets up rules for denied boarding, cancellation and delay of the flight; informing passengers of their rights and how to consciously exercise them. The Regulation applies when the flight is operated within the EU and by an EU or non-EU airline, if the flight comes in the EU from a non-EU country and it is operated by an EU airline and if the flight departs from the EU to a non-EU country and it is operated by an EU or non-EU airline.

The Regulation defines specific cases of protection of passengers' rights, that can be summarized as follows:

- delay: if the flight has arrived at its destination 3 or more than 3 hours later than expected;
- cancellation: if passengers have been informed of the cancellation less than 14 days before departure;
- overbooking: if the airline overbooked the flight and passengers could not find their seat on board (equivalent to denied boarding);
  missed connecting flight: if the destination is reached 3 or more than 3 hours later than expected, due to a missed connecting flight[3].

In these cases, passengers' rights shall be protected if the passengers, claiming for compensation for denied boarding, cancellation or delay of the flight, have not already received benefits (i.e. compensation, re-routing, assistance) for the same flight under the regulations in force in a non-EU country[4].

Even though the pandemic has been considered as an extraordinary circumstance beyond the control of airlines - therefore precluding passengers' right to claim for the compensation established by Article 5(3) of Regulation No. 261/2004 - to ensure the necessary level of protection, in March 2020 the European Commission set out interpretative Guidelines on passengers' rights in case of COVID-19 related issues[5].

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The Guidelines clarified that Regulation (EC) No. 261/2004 do not apply if passengers could not travel or if they decided to cancel a trip on their own initiative and that the chance of reimbursement, in such cases, depends on the type of ticket previously purchased (i.e. a reimbursable ticked or with possibility to rebook) and on the airlines terms and conditions of carriage.

Whilst, in case of a flight cancellation by the airlines or in case of delay, the remedies provided for in the Regulation apply. Therefore, the Guidelines stated that passengers have the right to choose between the reimbursement or the re-routing of the flight and that they shall also be offered care and assistance by the operating air carrier[6].

Moreover, the Guidelines have left several possibilities (i.e. refund of the ticked or alternative flight) to guarantee the rights of passengers in case of cancellation of flight due to Covid-19 related issues or restrictions, excluding however the possibility to accept vouchers instead of refunds for the cancellation[7].

Nevertheless, as emerged in the early phase of the pandemic, some airlines persuaded passengers to accept vouchers in compensation for their missed flights, acting against EU consumer protection rules[8]. The sacrifice of air passengers' rights emerged in the lasts two years has therefore prompted the European Commission to engage in a dialogue involving the European Consumer Rights Protection Groups (BEUC) and the major EU airlines.

Thanks to this joint action 16 leading EU airlines[9] have recently committed themselves to improve the compensation rights for those passengers whose flights were cancelled due to the pandemic and to adopt several measures that could be summarized as follows:

- For passengers who have not yet received a refund, airlines have committed themselves to settle the remaining claims within 7 days, as required by EU legislations.
- Airlines will inform passengers of their rights in the event of flight cancellation, in a clearer, more intuitive and more direct way, including the information in their corporate websites, in the emails and in other communications to passengers.
- Airlines will communicate passengers all the options at their disposal in the event of flight cancellation: these options include re-routing, reimbursement in cash and, only if offered by the airline, reimbursement via voucher.
- Airlines will not give priority to one solution over the others, nor can the other options be omitted; above all, passengers cannot be persuaded to accept one of the above-mentioned solutions, they shall always be free to express their preference and they may receive vouchers, instead of reimbursement of the flight price, only if they expressly choose the solution.
- Most airlines have agreed to refund in cash all the unused vouchers that passengers had to accept during the peak of the pandemic without being offered the option of a refund.
- Airlines have also undertaken to distinguish and to clearly communicate passengers not only the rights provided for in Regulation (EU) No. 261/2004 but also all contractual rights deriving from the terms and conditions of carriage.

In the upcoming months, while national authorities will be free to decide how to deal with outstanding issues related to non-refundable vouchers - which were impo-

-sed on consumers in the first phase of the pandemic - the Consumer Protection Co-operation (CPC) network will monitor whether the commitments of the airlines have been implemented and it will also investigate on the airlines intermediaries in order to assess whether they are properly informing passengers about the conditions and fares of air services.

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[1] See A. Masutti, *Covid-19 implications: the EU initiatives in support of the aviation sector*, in https://www.ibanet.org/article/24E95F6A-7839-40D9-8B71-98AF8BFC8028.

[2] Regulation (EC) No. 261/2004 of the European Parliament and of the Council, 11 February 2004.

[3] This provision also applies if the connecting flight was operated by another airline as long as the ticket is valid for both legs of the flight. See https://www.flightright.com/your-rights/eu-regulation.

[4] See https://europa.eu/youreurope/citizens/travel/passenger-rights/air/index_en.htm.

[5] European Commission, C(2020) 1830, *Commission Notice Interpretative Guidelines on EU passenger rights regulations in the context of the developing situation with Covid-19*, 18 March 2020.

[6] See A. Masutti, C. Matteuzzi, *European Commission: Interpretative Guidelines on EU passenger rights regulations in the context of the developing situation with Covid-19*, in *The Aviation & Space Journal*, 7 April 2020, http://www.aviationspacejournal.com/wp-content/uploads/2020/04/European-Commission-Interpretative Guidelines-on-EU-passenger-rights-regulations-in-the-context-of-the-developing-situation-with-Covid-19.pdf.

[7] Since refunds do not expire, they are more useful than vouchers if passengers do not plan a new trip any time soon. See https://www.cntraveler.com/story/why-an-airline-voucher-is-sometimes-better-than-a-cash-refund.

[8] See European Commission, C*onsumer protection: Airlines commit to timely reimbursement after flight cancellations,* press release, 30 September 2021, https://ec.europa.eu/commission/presscorner/detail/en/IP_21_4944.

[9] Including Air France, Alitalia, British Airways, EasyJet, Iberia, KLM, Lufthansa, Ryanair and Vueling.

The Implications of the COVID-19 Outbreak in the Space Sector: Impact Overview and Lessons Learned

By Miraslava Kazlouskaya *

Abstract

Operations around the world, in both developed and developing countries, have been slowed down or even halted due to restrictions imposed by governments to stop the spread of the Coronavirus Disease 2019 (COVID-19). During an economic downturn, innovation and research and development are always at risk, as they are the first industries to fall behind. This means that small and medium-sized enterprises and start-ups, frail motors of innovation, are becoming particularly vulnerable.[1] The space sector is feeling the impact of the crisis as well, with launches being cancelled,[2] operational missions are being cut,[3] and private companies shutting down.[4] At the same time, the coronavirus has given a new perspective on space applications in our daily life, allowing us to maintain both family and professional ties remotely, and also monitoring coronavirus measures using space data. However, the pandemic raised the concern not only of the interaction of the private and public sectors, but also brought the legal issues of mitigating contract liability in case of default, which has become a frequent occurrence during COVID-19.[5]

Introduction

The first chapter of this article will consider the impact of the coronavirus outbreak on the financing of space activities, changes in supply and demand in this area, as well as those cases when companies had to rely on force majeure or eventually faced bankruptcy. The second chapter focuses on the ways that have helped the space industry find its second wind in this challenging period, such as new technological and investment initiatives, as well as governmental support. The third chapter reviews aspects to consider in order to avoid potential disruptions in the space sector in post-covid times. Finally, the author comes to a conclusion on the pandemic's effects on the space sector.

Covid-19 Impact on the Space Industry

Changes in supply and demand

Prior to the coronavirus outbreak, the space technology supply chain was in relatively good shape. At the beginning of 2019, young space companies received an impetus for development by participating in investment rounds. At the agency level, this momentum was also noticeable in governmental donations and contracts awarded.[6]
However, the coronavirus has brought significant changes to all traditional processes in space companies. The direct impact on the workforce and operations was reflected in the use of teleworking and reduction of the number of employees to the number strictly necessary for that period, closing the premises as quarantine measures, which resulted in delays and disruptions in technical and business processes.

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Consequently, the business faced delayed payments and even cancelled orders. The broader impact was on a change in investment capacity in the space sector: in a situation of uncertainty about the future outcome of events and how this would affect a particular company, venture capital firms paused their investments in order to preserve their own capital.[7] Thus, the main problem for startups was the uncertainty in future contracts, as clients and private investors delayed their decisions. Telecommuting, international travel restrictions, and cancellations of conferences also have made new business deals much more difficult.[8]

Agency level

The described effects of the pandemic have influenced both government agencies and private companies. At the beginning of 2019, Roskosmos announced 45 planned launches,[9] but only 25 were carried out.[10] In 2020, only 17 launches were performed out of 33 planned.[11] Thus, Roscosmos estimates the loss at about 6 billion rubles. The reported losses are associated with the stoppage of production of satellites in Europe amid the coronavirus, as well as the obligation of Roscosmos to pay for non-working days of employees on the one hand,[12] and on the other hand, to take preventive measures to combat the pandemic. To cover the financial damages, Roscosmos' further plan is to lower the launch price to attract contracting demand.[13] National Aeronautics and Space Administration (NASA) currently estimates the cost of the pandemic impact at about $3 billion. However, the full amount is still needed to be calculated, as it is worth considering that the launches of several NASA missions have been postponed by 1-10 months.[14] Due to COVID-19, European Space Agency (ESA) has also suspended some missions such as Cluster, Trace Gas Orbiter, Mars Express, and Solar Orbiter. However, other missions, such as the BepiColombo spacecraft, which enters orbit around Mercury and requires significant support personnel involvement, will continue to operate.[15]

Private sector examples

Private companies have also suffered significant losses in their operations. A prime example is Bigelow Aerospace, which had to lay off all of its employees due to an order from the Governor of Nevada to close all non-essential businesses. If Bigelow Aerospace continued to operate, it would face heavy fines and revocation of the business license.[16]

Large manufacturers have done their utmost not to interrupt the supply chain. Airbus Defence and Space compared it to a string of pearls, which must be kept together permanently to fulfil its function. Accordingly, the company's policy was that the supply chain could not be interrupted for a long period of time, so that important suppliers did not lose experience and competence in the production of unique high-tech systems.[17]

Interestingly, the media criticism was caused by the uninterrupted continuation of the work of SpaceX after Musk's statements, in which he downplayed the danger of the pandemic.[18] With regard to SpaceX, it should be noted that in COVID-19 times government contracts remained a lifeline for private space companies.[19] Moreover, despite supply chain disruptions and launch delays, other areas of space applications have seen tremendous growth in demand. Governments and industries have requested data from companies that provide high-resolution imagery of the Earth and geospatial intelligence.[20] These peculiarities will be discussed in Chapter 2.

Thus, according to Euroconsult estimates, the consolidated space economy, including public investment in space, as well as commercial contributions, amounted to $385 billion in 2020, which is a record amount. However, commercial revenue of $315 billion in 2020 is down 2% from an estimate of $319 billion in 2019, in part due to the COVID-19 pandemic.[21]

Reliance on force majeure

Several space programs alluded to force majeure as a circumstance permitting the suspension of contractual obligations in connection with the pandemic impacts indicated in the preceding paragraph. For instance, though Maxar Technologies continued to work, it declared the coronavirus a force majeure to safeguard its legal rights in the case of a delay in the delivery of satellites.[22] Furthermore, the International Telecommunications Union (ITU) Radio Regulations Board has issued several decisions to prolong the term for states (Iran, Indonesia, and India) to launch their governmental satellites declaring COVID-19 a force majeure.[23]
Hence, the coronavirus outbreak has generated a fresh round of talks among experts concerning force majeure clauses in contracts. Lawyers agree that the pandemic should not be treated as a force majeure.[24] However, when referring to this clause in respect to the coronavirus, the side effects of the outbreak are considered, which are independent of the parties' will. As a result, the measures put in place by governments to counteract COVID-19 might be considered as a case of force majeure.[25] Indeed, the space sector was impacted by global isolation and border closures. In keeping with this, a recent note from the International Institute for the Unification of Private Law (UNIDROIT) secretariat recognizes that government acts do result in force majeure and that employers' and employees' health condition constitute a serious risk to contract performance.[26]

Pandemic - related bankruptcies

Despite the possibility of using the contractual provision of force majeure, this did not protect certain firms. The damage to the space industry caused in the first few months of the pandemic, forced some companies to face bankruptcy since investors withheld funds and companies could not attract new funds at that time. That was the reason for the bankruptcy filing of OneWeb when the company failed to find alternative investments after the termination of funding from Softbank.[27] OneWeb blames the pandemic for the collapse. However, analysts are of the opinion that the company's losses are the result of problems that existed even before the pandemic, and the economic downturn only exacerbated them.[28]
Other space firms such as Speedcast,[29] Phasor Solutions,[30] and Intelsat[31] also went bankrupt after not receiving planned funding. They did, however, manage to get out of such a bind, although by changing owners. Thus, OneWeb signed a sale agreement with a consortium of the UK government and Bharti, having received several new investments since then and resumed launches. Speedcast was acquired by Centerbridge following a bankruptcy auction, raising an equity investment of $500 million.[32] Phasor Solutions also changed ownership and was acquired by the South Korean defence company Hanwha Systems.[33] Intelsat emerges from bankruptcy by covering a significant portion of its debt.[34] Thus, space programs are continued, and the conversion of debt into equity has made private companies even stronger financially.

Concluding Remarks

The first wave of the COVID-19 crisis had a significant influence on the space sector. The restriction of enterprises' and people's activities, combined with a significant fall in investment due to investors' great uncertainty, resulted in a decrease in demand for specific space services. As a consequence, it increased the possibility of contract non-fulfilment, company bankruptcies, and significant losses for even market giants. However, with the passage of time and improving global economic prospects, the space sector has resurrected. The next chapter will take a closer look at the innovative efforts that are assisting the space sector's procurement at this trou-

-bling time.

Response to Covid-19 in space sector

New technological impetus

Although several processes were affected during the coronavirus, specialists were able to envision new uses of space to a better life on Earth. Hence, space technologies took on the incredible value these days. The uncertainty and anxiety it generated have prompted a thirst for observational information, which is exactly the type of data that space companies provide.[35] For example, Maxar and Planet, the companies that operate a fleet of Earth observation satellites, have seen an increase in demand for the space data they collect. They are helping to track global and regional trends in human activity through the development of layered landscape systems that help simulate the spread of disease by combining satellite imagery with thousands of open-source data.[36] Telecommunications companies such as Intelsat and Hughes have issued statements saying that they are working to expand the capabilities of their satellite networks to support remote education and provide remote access to hospitals and clinics services, thereby opening up opportunities for telemedicine.[37] Satellite imagery is also helping to identify and track the construction of healthcare facilities around the world in response to COVID-19.[38] In China, BeiDou satellites are used to track the location of infected patients and track the transport of goods to large disinfection sites.[39] Air pollution is also monitored using remote sensing data. For instance, data from the European Commission's Copernicus Earth observation satellite Sentinel-5P show that air pollution declined rapidly during this pandemic. Comparing air quality before and after an outbreak can help to discover a greener future with cleaner air. Besides this, satellite communications help us keep in touch with family, friends and work through popular video conferencing applications.[40]
Now, with the development of COVID-19 vaccines, the world needs logistics specialists to distribute vaccines accurately, fairly and quickly. For these experts, satellite data has proven to be an important tool. The US National Geospatial Intelligence Agency noted that the use of geospatial data has increased by more than 100%, and since the advent of COVID-19, the world has seen an influx of new users. Thus, satellite data is well suited as a tool to meet specific vaccination needs based on location, allow to adjust vaccination efforts from region to region.[41] Thus, Inpixon Mapping has been selected by one of the world's leading pharmaceutical companies to provide the imaging needed to track its critical COVID-19 vaccine assets.[42]
It is important to note that the deployment of space technology to battle coronavirus fulfils the duties of Article I of the Outer Space Treaty[43] on the conduct of space activities while benefiting all states by assisting less developed countries.[44] A wide interpretation of the resolution 41/65, which includes the "Principles Relating to Remote Sensing of the Earth from Outer Space,"[45] can also be utilized to demonstrate the relevance of remote sensing principles to global health goals and the fighting of pandemics such as COVID-19.[46] Thus, new technology introduced not only by governments but also by the private sector, contribute to the achievement of goals established decades ago.

Role of governmental support

The United States of America

In the US, governmental contracts with NASA and the Department of Defense have significantly supported the development of the space industry during COVID-19.
Even in the midst of the pandemic, such contracts did not end: in June 2020, NASA provided Astrobotic Technology from Pittsburgh, Pennsylvania, with $199.5 million

to launch VIPER to the moon's south pole;[47] in April this year, NASA selected SpaceX to land a human mission on the Moon.[48] That being said, the competition began back in 2020, with SpaceX competing with aerospace giant Blue Origin, as well as Alabama-based Dynetics.[49] And these are only a few examples. With similar governmental contracts, many US space companies have been classified as 'essential'.[50] This allowed them to continue to attract employees to work on all their projects, both governmental and commercial, without suspending activities under the pressure of the pandemic and having a reliable source of funding.[51] However, only 57% of enterprises received 'essential' status.[52] At the same time, many of the space startups supported by venture capital companies are denied the right to receive funds under the CARES Act,[53] which, among other things, is also designed to help small businesses stay afloat during the pandemic. Because venture capital startups are affiliated with the venture capital companies from which they receive financing, the total number of employees exceeds the 500-person limit, which does not qualify as a small business and so does not give a chance to acquire loans under the CARES Act.[54]

The Russian Federation

In Russia, a list of backbone enterprises was introduced to aid particularly impacted sectors during the pandemic by giving them more favorable conditions for governmental aid. This category equals essential business, i.e. companies that have a considerable effect on the growth of the country's economy, offer the greatest employment in their industries, and are the largest taxpayers.[55] In the Russian rocket and space industry, 20 enterprises were recognized as a backbone, while 18 of them are institutions of the state corporation Roskomos,[56] and 2 are state-owned companies established by the Ministry of Communications of Russia.[57] As a form of assistance, such companies can rely on a moratorium on bankruptcy without a penalty and consequences for late payments. They may also be eligible for subsidies to cover the expenses of manufacturing and service supply. The backbone enterprises are also given the option of obtaining a public loan, which will be reimbursed in full by the state, provided that at least 90% of employees are retained.[58]

The European Union

The approved EU space budget for 2021-2027 is €14.8 billion,[59] which is slightly less than the initial target of €16 billion. The necessity to mitigate the effects of the COVID-19 pandemic has primarily prompted the reductions in the space budget.[60] In doing so, most of the funding will be allocated to Galileo and European Geostationary Navigation Overlay Service (EGNOS), the navigation systems, and Copernicus, the EU's Earth observation program. These EU programs are critical to the implementation of European measures of virus-control.[61] Given the importance of space infrastructure, some members of the European Parliament have expressed worry about the reductions in previously projected spending, as this results in budget cuts for projects under the Horizon Europe program,[62] which invites small and medium-sized businesses with an innovative attitude to new space technology applications.[63] However, compared to the previous package for 2014-2020, the EU space budget has been increased by €3.8 billion, and two new initiatives, space situational awareness and European Union Governmental Satellite Communications (GOVSATCOM), have been added.[64]

Legislation, in addition to competent budget planning, plays a significant role in preserving such European critical infrastructures as Galileo and Copernicus.[65]

The present EU Directive on Critical Infrastructure Protection from 2008 does not address space,[66] although the services offered by this sector can indeed be considered "*essential for the maintenance of vital societal functions, health, safety,*

security, economic or social well-being of people, and the disruption or destruction of which would have a significant impact in a Member State as a result of the failure to maintain those functions".[67] The Directive is now being reviewed, and a proposal for a new Directive of the European Parliament and the Council on the Resilience of Critical Entities was announced in December 2020. The suggestion underlines the significance of broadening the list of critical sectors, especially in light of the consequences of COVID-19. Thus, it is proposed to include space in the list to ensure that the European Commission's best practices would aid the space sector's ability to react and recover from crises that might cause substantial, possibly cross-sectoral and cross-border disruptions.[68]

The United Kingdom

Companies in the UK and their supply chains have been able to respond to the constraints on doing business with little damage to supply chains. However, 44% of enterprises indicated that their output was below full capacity for a substantial length of time in 2020. Hence, the British government has produced a Space Sector COVID Support Plan[69] to assist the ultimate post-covid recovery. It aims to reach five main objectives: *first*, the development of underrepresented regions across the country through local growth initiatives to achieve an agenda for raising the level and strengthening the position of the country; *second*, the establishment of the so-called Export Academy for the Space Sector to lay the groundwork for international trade, investment skills, and knowledge among small and medium-sized space businesses; *third*, the development of new promotional materials to better represent the UK space sector to a global audience and attract domestic investment; *fourth*, the establishment of government bodies that are consistent with the UK's objectives in the space sector, as well as the representation of interests for the successful coordination of international interaction strategies; *fifth*, developing an effective consultation process with industry representatives to advise the government of the need for regulatory modernization.[70] Thus, for COVID-19 recovery, the UK government is relying on collaboration with local partners to develop new economic possibilities, compensating for pandemic losses while boosting exports and encouraging new investment to domestic enterprises.[71] Besides presenting a new strategy to support the space sector, UK Space Agency's National Space Innovation Program allocated more than £7 million to British companies in December 2020. In March 2021, five space technology innovation projects got another £1 million of governmental funding.[72]

Concluding Remarks

Throughout the pandemic, the demand for downstream space technology has skyrocketed, allowing many projects to stay afloat and offering up new opportunities for the utilization of space. At the same time, governments did not overlook the space industry but implemented varying ways for assistance.
The US and Russia mainly supported big companies, which, in the case of the Russian Federation, are also wholly state-owned. Due to the preservation of more employment and projects, this method is unquestionably well suited for market stability in the short and medium-term. However, it may have long-term negative implications owing to the closure of medium-sized businesses and start-ups, which may have difficulty attracting investment.
In turn, the EU and the UK have chosen the direction of equal support for all types of businesses, both through equal financial distribution and the creation of state multifunctional policies. As a result, they will be able to retain the space industry's current stability and mitigate the harmful implications of the pandemic in the long term perspective. Based on the pandemic's experience, the next chapter will high-

-light approaches to be considered for future actions to strengthen the space industry.

Post pandemic perspectives

Considerations for governmental space policies

It follows from the discussion above that national space agencies and governments should consider small and new businesses as vital sources of innovation, productivity, and growth in the economy while responding to the coronavirus crisis and preventing its recurrence together with the interruption in supply chains. Therefore, a more tailored effort for the most vulnerable players may be necessary in order to sustain a diversified and innovative space ecosystem.[73]
Thus, the state's primary responsibility in the short term should be to assure the continuity of corporate plans. This can be aided by the optimization of industrial supply chains in collaboration with stakeholders, taking into account the suggestions of smaller enterprises rather than only those on a government contract.[74] Long term, states should address small actors' fragility in their overall response to a crisis by streamlining procedures and adjusting selection criteria for assistance and procurement programs to promote access to public and private finance.[75] Furthermore, it is critical to maintaining investment in space both during and after the COVID-19 crisis. By accelerating progress, space adds value to both the economy and society. Thus, government support programs not only encourage innovation but also private funding by drawing investors to the space sector, assuring its continued development.[76]

Pandemic - sensitive contracts

A well-drafted contract with flexible provisions in the event of unanticipated occurrences can rescue many small businesses from liability for contract non-fulfilment and, as a result, bankruptcy. The ultimate objective of the contract's two parties should thus is to create a solution that would prevent either party from incurring losses in the case of a coronavirus-like upheaval while still allowing the project to be finished. Hence, contract law, with its well-developed force majeure concept, will enable continued development in the space sector by intelligently managing supply, notwithstanding delays or hurdles caused by the crisis.[77] Accordingly, in the light of COVID-19, when concluding new contracts, the words ‘pandemic’, ‘epidemic’, ‘action by state authorities’ and/or ‘state of emergency’ should be included as circumstances of force majeure. Using such concrete examples should effectively cover the present public health issue and the government orders that have resulted from it.[78]
Thus, while examining the impact of COVID-19 on contracts linked to space that cannot be performed in a timely or complete way, it is critical to recognize that activities connected to space are directly tied to the notion of such services, without which modern society cannot live. Therefore, the ability to use force majeure while eventually completing the obligation and preserving the business should be safeguarded in such instances.[79]

Concluding remarks

To reach its full potential in the realm of space technology, the country must act as a solid partner. Today, we are witnessing the beginning of a new era in the global space economy, in which space is no longer just the domain of governments, and a large number of initiatives are being driven by private firms. Taking this into consi-

-deration, it is vital to financially and legally support the activities of such companies.

Conclusion

While combating the epidemic on Earth, companies have made efforts to keep their initiatives in space alive. State limitations established in response to the pandemic have impacted all operations, including those in the space industry. Despite financial and legal constraints, there has been a surge in demand for space technology, particularly in the fields of Earth observation, space communications, and satellite navigation. The private space sector was able to sustain as a result of this, as well as the preservation of at least governmental contracts. In the interim, it has become clear how vital state support is for developing commercial space enterprises, particularly small ones that rely heavily on their governments as investors in new initiatives and regulators of their operations. Therefore, prudent government action is vital to weathering crises and recouping lost profits due to the pandemic. While the space industry has encountered significant obstacles, with well-designed national regulations and pandemic-sensitive contracts, the sector stands a good chance of the post-coronavirus thriving.

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2021 Events: An Overview

Air & Space Law Lectures, University of Bologna

Alma Mater Studiorum Università di Bologna,
Master in Legal Studies

Prof. Anna Masutti has invited

14 April 2021
Giorgio Saccoccia
President at A.S.I. Agenzia Spaziale Italiana

22 April 2021
Frances Ouseley
Non-executive director at I.T.A. Italia Trasporto Aereo S.p.A.

23 April 2021
Catherine Kavvada
Director for Innovation & Outreach at DG Defence Industry and Space
European Commission

29 April 2021
Costanza Sebastiani
Government Affairs for Italy and Southern Europe at Boeing
and
Valentina Vecchio
Sustainability Policy & Partnerships Europe at Boeing

30 April 2021
Fabrizio Cortese
CEO & Accountable Manager at Cargolux Italia S.p.A.

6 May 2021
Alessandro Perrone
Legal & Compliance Counsel of Brussels Airlines NV/SA at Lufthansa Group
and
Pietro Benintendi
Legal Counsel at Lufthansa Cargo – Lufthansa Group

7 May 2021
Morena Bernardini
Vice President Strategy at ArianeGroup

2021 Events: An Overview

Meet & Greet
Aviation Law Committee of the International Bar Association (IBA)
29 July 2021

As Membership Officer of the Aviation Law Committee (ALC) of the International Bar Association (IBA), Prof. Anna Masutti was speaker at The Meet & Greet of the ALC which was virtually held on 29 July 2021, from 16:00 to 17:00 CET.
The meeting started with an opening speech from ALC's Chair, Mrs. Serap Zuvin, who introduced a prominent speaker from the sector: with the initiation of the Committee's Diversity and Inclusion Officer, Mr. Neil Montgomery, the ALC arranged the presence of a speaker from the company Hybrid Air Vehicles to talk about the innovative Airlander. The speaker focused on the legal perspective of the Airlander, especially its aim to reach zero CO2 emissions. After the discussion, the participants had the opportunity to interact with the speakers during a Q&A session.
For more information, please click here:
https://www.ibanet.org/unit/Maritime+and+Aviation+Law+Section/committee/Aviation+Law+Committee/3097

Air Transport and Future Challenges for a Sustainable and Safe Mobility
AXA XL and ANRA Webinar, Milan
28 September 2021

The impact of the global Covid-19 pandemic and the subsequent travel restrictions on the air transport are well known. What we need to plan the restart?
AXA XL and ANRA discussed about such topic during the webinar "Air Transport and Future Challenges for a Sustainable and Safe Mobility" which was held on 28 September 2021, from 15:00 to 16:30 CET.
During the webinar Mrs. Federica Bisetti (Aviation Underwriter of AXA XL in Italy) analysed which insurance issues are related to the use of new technologies for environmental sustainability.
Prof. Anna Masutti discussed on the main guidelines for the aviation in order to facilitate the green transition.
Lastly, Mrs. Angela Natale (President of Boeing Italy) explained how to increase safety in flight through the use new technologies and how to evaluate effective screening protocols in order to promote a safe re-opening of international air traffic.

2021 Events: An Overview

European Air Law Association (EALA) Annual Conference

Copenhagen

4-5 November 2021

Prof. Anna Masutti was Speaker at the 33rd Annual Conference of the European Air Law Association (EALA) which was held in Copenhagen on 4-5 November 2021.

This Year's Conference Focused on the Following Themes: State Aid and Competition; Sustainable Aviation Future; the Impact of State Aid on the Level Playing Field; Recent EU Competition Law Trends; a New Wave of '261' decisions; Update on Brexit.

For more information, please click here: https://eala.aero/#events