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EDITORIAL

Centre for Aerospace and Defence Laws (CADL), NALSAR, as an institution stands for par excellence research and through its courses, journals, newsletters, moot courts, conferences and other activities, bringing the attention of the Aerospace and Defence community to forefront and highlighting its contemporary issues and challenges at a global level.

The *Indian Journal of Air and Space Law (IJASL),* an exclusive and vital part of the CADL, is inclusive of articles from authors, scholars, and students across the world. This area of study draws its relevance on various specialties: each of which is undergoing doctrinal and practical transformation as a result of new and emerging contemporary developments. This Journal was conceived with the intention to highlight recent developments, relate them to theoretical issues and critically analyse their implications. It caters to a broad spectrum of audience such as students interested in the field of International Aerospace and Defence Laws, practicing lawyers, judges, research scholars and for all the other interested professionals.

It gives me an immense pleasure and enthral to release the X and XI Issue of *Indian Journal of Air and Space Law.* I am thankful and grateful to all those who have contributed their research work in the field of Aerospace Laws. This issue of the Journal contains many contentious themes pertaining to the sphere of Air and Space Laws such as: Air India's Disinvestment, AERA Navigation Procedures, CORSIA in Aviation Emissions, Mergers and Acquisitions in Indian Aviation Sector, Law on Unruly Aircraft Passengers, Space

Tourism, Commercial Exploitation of Resources in Outer Space, NPS in Outer Space, Community Contact Tracing, Impact of COVID-19 on Aviation Sector, etc.

Advancement and implementation of ever-evolving aerospace technology has resulted in tremendous global impact to diversify the field on numerous levels and calls for a further heated debate and research in this field. Nevertheless, apart from the academic and practical point of view, such interest for increasing need for exploration and uses of outer space can also be seen through scientific thriller movies, books and illustrations as well.

With the augmentation of globalization, intermingling and interdependence of economies, liberalization of space policies, technological developments in aerospace industry, privatization of certain aerospace segments, and the growing trends in non-interventionist bilateral and multilateral agreements, there is a development of new trends that are emerging in the aerospace industries throughout the world. Privatization and intensified global competition are forcing the aviation and space industries to become responsive, increasingly competitive and committed by focusing more closely on their stake-holders.

The recent venture of the Indian space agency ISRO to explore the surface of Mars is one instance which shows that the Indian aerospace technology is fast evolving, in response to the development happening elsewhere. While, India has accomplished international acclaim in the area of aerospace technology development and utilization, there is still the need for integration for

efforts at the national level, from the standpoint of the private sector. Nevertheless, it is an undeniable fact that the Indian Aviation sector is still in need for reformation in terms of liability, compensation and regulation of competition. At the same time, military missiles and satellites technology requires at par development with the International standards, in an effective and efficient manner as opposed to purchasing the same from other states at an exorbitant price. Therefore, the efforts of this Journal would be to promote and encourage a healthy and innovative debate on all facets of aerospace industry and ensure that the ethical standards of research are complied with.

The publication of IJASL is only possible with the relentless effort put in by **Prof. Faizan Mustafa-Vice-Chancellor, NALSAR University** and his constant, unequivocal and fortifying support coupled with his exemplary leadership, pleasing personality and brilliant administrative skills that have been a source of inspiration for us. He has continuously and regularly steered the academic path to evolve avenues for research and publication and attain higher levels of excellence.

I, on the behalf of the Editorial Team, profoundly and gratuitously thank our Patron for bestowing his faith in our ability to publish this Journal. I extend our gratitude to our National and International advisory board, whose valued suggestions and advice has guided the Journal in every aspect.

I would like to give a special thanks to our Research Associates of CADL-NALSAR, Ms. Ruchi Jain and Ms. Bangaru Laxmi Jasti, for

their hard work and efforts which contributed to the publication of this volume. I would also extend my heartfelt appreciation to our student editorial team.

The Journal is our modest venture in further and advance research in the field of aviation and space law, and we at Centre for Aerospace and Defence Laws, sincerely hope, to keep up with our efforts for the continuation of the Journal.

I also sincerely hope that you enjoy reading this Issue as much as we enjoyed working on it.

V. Balakista Reddy
Editor-in-Chief

CENTRE FOR AEROSPACE AND DEFENCE LAW (CADL)

The NALSAR University of Law has always endeavored to promote quality research in contemporary legal issues. One of the contemporary but neglected areas in the Indian legal realm is Air and Space laws. To fill this gap and to promote further studies and research in the aerospace law, the University established the advanced Centre for Aerospace and Defence Laws (CADL) in 2005 with object to contribute to the development of aviation and space laws and related policies by conducting and promoting research and teaching at different levels. Since then, NALSAR-CADL has been continually promoting the study of Air and Space Law by conducting National and International Conferences, Workshops and Publishing Newsletters, Books and Articles in the Aerospace law field.

The University has been teaching the subjects of air and space law for the past ten years. Till date, there are many students with degrees in air and space law who have now been absorbed in the national mainstream and are working with the airlines, airports and the multinational corporations. Recently, NALSAR-CADL has also launched few innovative On-site and Online courses which include the Two-Year Master's Degree in Aviation Law and Air Transport Management (MA ALATM); Two-Year Master's Degree in Space and Telecommunication Laws (MA STL); Two-year Master's Degree in Security and Defence Laws (MA SDL); Two-Year Master's in Maritime Laws; One-Year Advanced Diploma in Aviation Law and Air Transport Management; One-Year Advanced

Diploma in Maritime Laws and One-Year Advanced Diploma in GIS & Remote Sensing Laws. The objectives of these courses are to cater to the needs of unprecedented aviation growth coupled with commercialization of space and telecom industries, and moderinisation and indigenisation of defence and maritime Industry, which calls for thousands of skilled manpower to meet the managerial requirements of rapidly growing airports, airlines, aerospace, defence, shipping and telecommunication sectors. CADL also undertakes collaborative research activities in areas of common concern with state governments, NGO's and other international organizations.

WHY AIR INDIA'S DISINVESTMENT MAY HAVE JUST BECOME EVEN MORE DIFFICULT?

Vikrant Pachnanda[*]

Abstract

The Ministry of Civil Aviation, Government of India, vide notification dated 20th March 2020, has in exercise of its power vested as per Section 5 of the Aircraft Act, 1934 (hereinafter referred to as "the Act") amended the Aircraft Rules, 1937 (hereinafter referred to as "the Rules") by altering the definition of "Indian national" for the purpose of substantial ownership and effective control. This paper delves into whether this notification could directly impact the Indian government's efforts to find a buyer for its national flag carrier Air India.

Key words - Air India Disinvestment, substantial ownership, effective control.

Introduction

As per the said notification, only Indian passport holders, whether residents or non-residents, are to be treated as Indian nationals for the purpose of interpreting paragraph 1(ii)(c) of Schedule XI of the Rules for substantial ownership and effective control. Furthermore, as per the said notification, anybody possessing an Overseas Citizen of India (hereinafter referred to as "OCI") card within the meaning of Section 7A of the Citizenship Act, 1955 or had a Person of Indian Origin (hereinafter referred to as "PIO") card and

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was deemed as an OCI cardholder as per notification dated 9th January 2015 published in the Gazette of India, would not fall within the definition of an Indian national for the purpose of interpreting paragraph 1(ii)(c) of Schedule XI of the Rules for substantial ownership and effective control. [1]

Concept of Substantial Ownership and Effective Control

The concept of the 'substantial ownership and effective control' clause in Bilateral Air Service Agreements (hereinafter referred to as "BASAs") derives its origin from the International Air Services Transit Agreement[2] (hereinafter referred to as "the IASTA") and the International Air Transport Agreement[3] (hereinafter referred to as "the Transport Agreement"). The aforementioned agreements empower each contracting State to withhold or revoke a certificate or permit an air transport enterprise of another State when it is not satisfied that substantial ownership and effective control are vested in nationals of the contracting State. The 'substantial ownership and effective control' clause is based on a policy of protectionism to ensure that operators who essentially belong to a third State would not benefit from the advantages mutually exchanged between the parties to the BASA. Ownership clauses in BASAs restrict the grant of the relevant freedoms of air to airlines owned and controlled by nationals of the State concerned. If an airline of one State takes over the airline of another State, this could nullify the third, fourth, and fifth freedoms of air held by the airline being

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1 Ministry of Civil Aviation, Notification No. G.S.R. 192(E) (Notified on March 20, 2020).

2 International Air Services Transit Agreement, Article 1, Sec 5, Dec. 7, 1944, 252, U.N.T.S, 84.

3 International Air Transport Agreement, Article 1, Sec 6, 7, Dec. 7, 1944, 502, U.N.T.S, 171.

taken over, on the basis that it no longer qualifies as a national airline of the State concerned.[4]

The 'ownership clause' in a bilateral agreement can be justified by the general principle of international law that "A treaty does not create either obligations or rights for a third State,"[5] thereby reflecting the legal maxim *'pacta tertiis nec nocent nec prosunt.*' The limitation on an airline's ability to have access to foreign capital makes it difficult for it to compete against foreign airlines that have access to the capital markets of several nations. Foreign investment provides airlines the capital that they require to remain financially.[6] Furthermore, liberalization of the foreign direct investment laws would allow airlines to engage more in global diversification. This would, in turn, lead to the stabilization of the volatile airline industry.[7] Substantial ownership generally means that the majority ownership, i.e., more than 50%, although linguistically, the word 'substantial' would not impose such an interpretation at all.[8]

While substantive ownership is a *de jure* condition, effective control, on the other hand, is a *de facto* condition that must be judged according to the precise facts of every case. In the United States, substantial change in operations, ownership, or

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4 International Air Transport Agreement, Art 1 Sec 1; Hanlon, *Global airlines*, 324(Butterworth-Heinemann Maryland Heights 2006).

5 Vienna Convention on the Law of Treaties, Article 34, May 23, 1969, 18232, U.N.T.S, 1155.

6 S Linzell 'Ownership and Control Restrictions in US Aviation Law' XXXV Air and Space Law 379 (2010).

7 M G Whitaker, '*Hearing On Foreign Investment In U.S. Air Carriers'* Senate committee on commerce, science, and transportation (subcommittee on aviation) (109 CONG, 2006) 6, (7 Jan 2011), <http://commerce.senate.gov/pdf/whitaker-050906.pdf>.

8 ICAO, *The European Civil Aviation Conference (ECAC)* (3rd Session) (Records of the Session) (1959) I ICAO Doc 7977 ECAC/3-I 35.

management includes (1) *the acquisition by a new shareholder or the accumulation by an existing shareholder of beneficial control of 10 percent or more of the outstanding voting stock in the corporation;* and (2) *a change in the president, chief executive officer or chief operating officer, and/or a change in at least half of the other key personnel within any 12-month period or since its latest fitness review, whichever is the more recent period.*[9] These regulations also define 'substantial interest' as 'beneficial control of 10 percent or more of the outstanding voting stock.'[10]

Similarly, there is no agreed benchmark as to what is 'effective control' and whether it would include a majority of the voting shares or a majority in the board of directors.[11] States are not obligated to invoke the substantial ownership clause and revoke the air operating permit if they believe that the conditions are not satisfied; its use is discretionary and could be motivated by extraneous political considerations.[12] During the US Department of Transportation's (hereinafter referred to as "DOT") approval proceedings of KLM Royal Dutch Airlines' buyout of the ailing Northwest Airlines, the DOT held that '*the analysis of 'actual control' has always necessarily been on a case-by-case basis, as there are myriad potential avenues of control. The control standard is a de facto one - we seek to discover whether a foreign interest may be in a position to exercise actual control over the airlines, i.e., whether it will have a substantial ability to influence*

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9 Aeronautics and Space Code of Federal Regulations, Title 14, Docket No. 47582, 57 FR 38766 regs 204.2(1)(3) & (4).

10 *Ibid* reg 204.2(m).

11 *Supra* note 5.

12 *Ibid;* PPC Haanappel 'Airline Ownership and Control, and some related matters' XXVI Air and Space Law 90 (2001).

the carrier's activities.'[13] DOT stated that a large number of equity shares in the carrier were in foreign control, even though the interest was not voting stock. DOT permitted KLM to own 49% of the total equity investment in Wings, where KLM was to own less than 25% of the voting stock and allowed increased representation of three out of fifteen members on the Wings' board of directors. DOT attached conditions to its approval to ensure that Northwest airlines could retain its independence in making decisions from KLM.[14]

In the *Page Avjet Corporation case*,[15] all the voting stock was vested in possession of American citizens, and the foreign party owned all the non-voting stock. However, the Board restated that "*We look beyond the bare technical requirements to see if the foreign interest has the power- either directly or indirectly to influence the directors, officers or stockholders*" and "*under no circumstances can the power that the nonvoting stockholders hold over this company be considered anything less than substantial.*" The 'numerous business relationships' between the U.S. and foreign interests created a citizenship problem in the eyes of the DOT. DOT held that it was not enough to satisfy the citizenship requirement that the President and two-thirds of the directors were U.S. citizens if there was a substantial threat of foreign influence. If foreign interests are entitled to control privileges or can exercise influence over the company's financial decisions, or if

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[13] VP Nanda '*Substantial Ownership and Control of International Airlines in the United States'*, 50 The American Journal of Comparative Law, 357-368, (2002); *Wings Holdings Inc.* (1989) DOT Order 89-9-51.

[14] United States General Accounting Office, GAO-04-34R, 'Foreign Investment in U.S. Airlines', (30 October 2003).

[15] Supra note 16 at 376; *Page Avjet Corporation* (July 1, 1983) DOT Orders 83-7-5, 82-8-41 Docket No. 40, 905.

shareholders, directors, or management have close relationships with foreign operations, that may effectively exercise influence over the company's decisions.[16] In the *Intera Arctic Services case*,[17] 82% of the outstanding stock of both voting and non-voting equity was held to amount to substantial control because the non-voting interests could also force the company to buy them out, and that would result in the foreign non-voting interests receiving most of the company's profits, if any, upon dissolution.

Position in India

Schedule XI of the Rules deals with the grant of permission to operate scheduled air transport services. As per the said schedule, permission to operate Scheduled air transport services in pursuance of sub-rule (1) and (1A) of rule 134 of the Rules may be granted either— (i) to a citizen of India or (ii) to a company or a body corporate provided that— (a) it is registered and has its principal place of business within India; (b) the Chairman and at least two-thirds of its Directors are citizens of India; and (c) its substantial ownership and effective control is vested in Indian nationals.

In India, the issue of substantial ownership and effective control came up for consideration during the investment by Etihad Airways PJSC (hereinafter referred to as "Etihad Airways") in Jet Airways (India) Limited (hereinafter referred to as "Jet Airways"). Under the Department of Industrial Policy and Promotion's Press Note No. 6 of 2012,[18] while monitoring investment in Indian

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16 *Ibid.*

17 *Supra* note 16 at 368; *Intera Arctic Services Inc.* (18 August 1987) DOT Order 87-8-43 Docket No. 44,723.

18 Press release, Government of India, Ministry of Commerce and Industry, Department of Industrial Policy and Promotion, (Jan 12, 2019), <https://dipp.gov.in/sites/default/files/pn6_2012_2.pdf.>

airlines by foreign airline operators, one of the conditions stipulated therein was that a scheduled operator's permit can be granted only to a company where the substantial ownership and effective control is vested in Indian nationals. The Securities Exchange Board of India (hereinafter referred to as "SEBI") vide its order dated 8th May, 2014, gave a clean chit to the aforesaid transaction. The order relied on the lack of substantial controlling powers with Etihad Airways, which included inter alia (a) Etihad Airway's right to nominate only 2 out of 12 directors, (b) Etihad Airways not having any quorum rights at the board or general meeting, (3) lack of any veto/affirming voting rights with Etihad Airways and (4) Promoters being able to nominate the chairman of the board of Jet Airways who would have a casting vote. It also noted that the commercial cooperation agreement dated 24th April, 2013, was entered into between Etihad Airways and Jet Airways and not the Promoters. Furthermore, the SEBI order also relied upon the decision rendered by the Hon'ble Supreme Court of India in *Daiichi Sankyo v. Jayaram Chigurupati*,[19] whereby an acquirer could not be a 'person acting in concert' with the target company under the SEBI (Substantial Acquisition of Shares and Takeover Regulations), 2011.

In the light of the aforesaid requirement of substantial ownership and effective control in order to obtain a permit to operate scheduled air transport services, the preliminary information memorandum for inviting expression of Interest for Strategic Disinvestment of Air India Limited, by the Ministry of Civil

[19] M/S Daiichi Sankyo Company vs Jayaram Chigurupati & Ors, AIR 2010 SC 3089.

Aviation, Government of India[20] also contains a similar requirement. As per clause 10.20 of this memorandum, stipulations under the extant Aircraft Rules regarding the composition of Board of Directors and management structure for the Companies which inter alia include (i) Chairman and at least two-thirds of directors to be citizens of India; and, (ii) Substantial ownership and effective control to be vested in Indian nationals, shall have to be adhered to.

Conclusion

In the light of the above decisions, it may be concluded that there is no rigid formula for change of substantial ownership and actual control. Selling away of even non-voting equity may amount to change in ownership or control or both, and such change is thus determined on a case-to-case basis. As per various newspaper reports, the Hinduja brothers were at one point in time contemplating to bid to acquire grounded air carrier Jet Airways that is currently facing insolvency proceedings before the National Company Law Tribunal. Two of the Hinduja brothers are British citizens; however, earlier, they would have been able to pass this test of substantial ownership and effective control as the aforesaid amendment only came on 20th March 2020 and did not exist when they had planned to bid for Jet Airways.

Hence, in my opinion, this notification could have a direct impact on the Indian government's efforts to find a buyer for its national flag carrier Air India. This is because any company that proposes to bid for Air India would have to ensure inter alia that if it wins

[20] Government of India, Ministry of Civil Aviation, Preliminary Information Memorandum for inviting expression of interest for strategic disinvestment of Air India Limited, <https://indiainvestmentgrid.gov.in/assets/iigNew2/pdf/AirIndia/AI_Preliminary_IM_Jan2020.pdf.>

the bid to take over Air India, the Chairman and at least two-thirds of the Directors of the newly acquired Air India would have to possess Indian passports and to be an OCI cardholder would not make them eligible to meet the said requirement.

"LAW GOVERNING UNRULY AIRCRAFT PASSENGERS; AN ANALYSIS FROM TOKYO CONVENTION TO MONTREAL PROTOCOL"

Shruti Kakkar[*]

Abstract

Air travel demand has grown on an unparalleled scale in the last two decades. With more and more people becoming accustomed to air travel, incidents involving 'unruly passengers' onboard have proliferated. This article discusses the underlying causes for such behvaiour by passengers. It then proceeds with a discussion of the major legal frameworks which deal with the issue of unruly passengers. Finally, the article analyses the various shortcomings in the major laws governing the issue of unruly passengers (the Tokyo Convetion and the Montreal Protocol).

Introduction

There exists an apparent dichotomy in the data presented by the air transport industry. On the one hand, it shows that the air transportation has become safer by each passing year[1] while on the other hand, incidents of unruly and disruptive behavior in the aircraft cabin and the airport terminal seems to have increased.[2] The International Air Transport Association (IATA) has collected statistics on unruly passengers from its database known as the

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1 According to IATA- The year 2017 was claimed the safest year for air transport, with no fatalities.

2 RUWANTISSA ABEYRATNE, LEGAL PRIORITIES IN AIR TRANSPORT (1st ed., Springer 2019)

Safety Trend Evaluation, Analysis, and Data Exchange System (STEADES). This database is owned and managed by IATA, to which close to 170 Member airlines submit periodic reports voluntarily. Crew members typically write a short narrative of events after each flight and classify them to several pre-determined database descriptors. Participation in STEADES is entirely voluntary and, therefore, the data collected, while constituting a significant sample, does not purport to represent a comprehensive industry-wide view of all unruly passenger events on all flights worldwide.[3]

STEADES statistics show a clear upward trend in unruly passenger incidents since 2007. The number of incidents per 1,000 passengers increased from 0.736 in 2010 to 0.834 in 2011; a staggering 14 percent increase. In other words, in 2010, there was one unruly passenger incident for every 1,359 flights, which increased to one disruptive passenger incident for every 1,200 flights in 2011. The 2012 statistics show an easing in the number of raw incidents reported from 6,004 in 2011 to 5,220 in 2012. IATA reports that in 2016 the rate of unruly behavior was one in every 1424 flights[4] and between 2007 and 2017, over 66,000 reported unruly passenger incidents on board aircraft in flight. In 2017, there was one disruptive passenger incident for every 1,053

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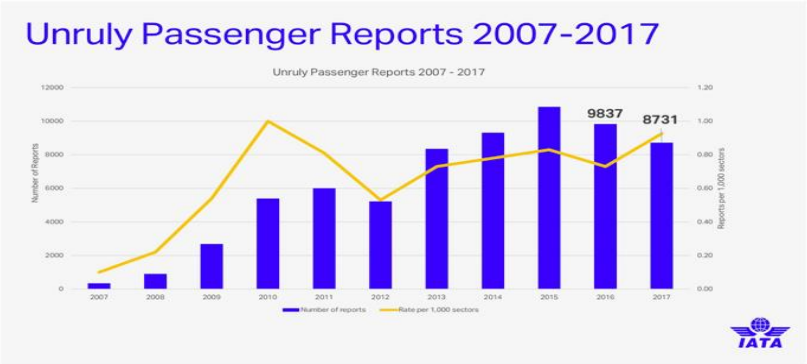
3 International Air Transport Association, 'THE VIEWS ON SOME PRACTICAL ASPECTS OF THE ISSUE OF UNRULY PASSENGERS' (26 Mar., 2014), available at https://www.icao.int/Meetings/AirLaw/Documents/DCTC_23_en.pdf.

4 Rajiv Singh, *How unruly passengers are making flying a nightmare for others*, THE ECONOMIC TIMES, (Mar. 11, 2018), https://economictimes.indiatimes.com/industry/transportation/airlines-/-aviation/how-unruly-passengers-are-making-flying-a-nightmare-for-others/articleshow/63248476.cms?from=mdr.

flights.[5] Following Chart presents the number of unruly passengers reported from 2007 to 2017[6].



Who is a disruptive passenger?

A disruptive passenger is defined in Annex 17 to the ICAO Convention[7] as: *"A passenger who fails to respect the rules of conduct at an airport or onboard an aircraft or to follow the instructions of the airport staff or crew members and thereby disturbs the good order and discipline at an airport or on board the aircraft."*

Disruptive/unruly behaviour is further categorised into certain behaviour patterns. IATA has established the following non-exhaustive list of examples of "unruly/disruptive" behaviours on board:

a) Illegal consumption of narcotics;

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5 International Air Transport Association, 'UNRULY AND DISRUPTIVE PASSENGER INCIDENTS AND WHY NO ONE LIKES THEM', available at https://www.iata.org/contentassets/b7efd7f114b44a30b9cf1ade59a02f06/unruly_pax_infographic_2017.pdf

6 Unruly Passenger Incident Rate Rises, IATA Data Shows, APEX | AIRLINE PASSENGER EXPERIENCE (2018), https://apex.aero/2018/12/13/unruly-passenger-rate-rises-iata (last visited Sep 17, 2020).

7 Convention on International Civil Aviation (1994) 15 U.N.T.S. 295.

b) Refusal to comply with safety instructions; (examples include not following Cabin Crew's Requests, e.g., instructions to fasten a seat belt, not to smoke, turn off a portable electronic device or disrupting the safety announcements)

c) Verbal confrontation with crew members or other passengers;

d) Physical confrontation with crew members or other passengers;

e) Uncooperative passenger (examples include interfering with the crew's duties, refusing to follow instructions to board or leave the aircraft);

f) Making threats (includes all types of threats, whether directed against a person, e.g., threat to injure someone, or intended to cause confusion and chaos, such as statements referring to a bomb threat, or simply any threatening behavior that could affect the safety of the crew, passengers and aircraft);

g) Sexual abuse / harassment; and

h) Other type of riotous behavior. (examples include- screaming, annoying behavior, kicking and banging heads on seat backs/tray tables)[8]

There are multiple factors and triggers that leads to an unruly behavior for example; increasingly reduced seat pitch[9]; larger bags

[8] International Air Transport Association, 'Guidance on Unruly Passenger Management and Prevention' (1st ed., Dec. 2012), available at http://3rxg9qea18zhtl6s2u8jammft-wpengine.netdna-ssl.com/wp-content/uploads/2013/10/Guidance-On-Unruly-Passenger-Prevention-And-Management-1st-Edition.pdf.

[9] David Kerley, Matt Hosford, Aaron Katersky, and Michael James, *Legroom Wars: Another Plane Diverted After Reclining Seat Fight*, ABC NEWS (Aug. 29, 2014), https://abcnews.go.com/Travel/legroom-wars-plane-diverted-reclining-seat-fight/story?id=25168675.

fighting for smaller bin space[10]; smaller aisles to move around; reclining seats[11] that encroach on ever-decreasing space between seats and take-off problems[12], turbulence and fatigue, anxiety (including fear of flying)[13] to pre-boarding issues such as Long queues, The security and screening process[14], Crowded conditions and Lack of personal space, etc,. On numerous occasions, annoying individuals such as loud or boisterous passengers[15], seat

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[10] A fight broke up between two passengers vying for that coveted area above their seats on a Pittsburgh to New York flight. Ron Scherer, *Lesson from JetBlue attendant meltdown: overhead bins are sacred*, CHRISTIAN SCIENCE MONITOR (Aug. 10, 2010), https://www.csmonitor.com/USA/2010/0810/Lesson-from-JetBlue-attendant-meltdown-overhead-bins-are-sacred.

[11] On a Miami-to-Paris American Airlines flight landed in Boston late Wednesday after air marshals on the plane broke their cover to restrain a man who had fought with a passenger trying to recline in front of him turned violent on an Indigo flight from Mumbai to Delhi and attacked a crew-member. See *supra* note 10.

[12] Chinese travelers, upset by seating arrangements on a Thai Air-Asia flight, threw hot water and noodles at a flight attendant and threatened to bomb the plane. Chris Kitching, *AirAsia flight attendant scalded with hot water and noodles by Chinese passenge*, DAILY MAIL ONLINE (Dec. 15, 2014), https://www.dailymail.co.uk/travel/travel_news/article-2874902/AirAsia-flight-attendant-scalded-hot-water-noodles-unruly-passenger-wanted-sit-husband.html.

[13] On a British Airways flight to Saudi Arabia, a man who got a panic attack tried to open the flight door in mid-air. Sean Ingle, *Man restrained after trying to open door of BA aircraft in midair*, THE GUARDIAN (Dec. 3, 2019), http://www.theguardian.com/business/2019/dec/03/man-restrained-after-trying-to-open-door-of-ba-aircraft-in-midair.

[14] The Thanh Hoa Police have arrested a male passenger for assaulting two aviation employees at Tho Xuan Airport. He was about to board a flight in Thanh Hoa in north-central Vietnam to HCMC on June 1, reportedly failed to comply with instructions given by airport staff in charge of security screening and baggage checks and after airport security repeated their instructions, he became agitated and got violent, grabbing a security guard by the neck and knocking him down to the ground. Nguyen Quy, *Passenger arrested for attacking airport employees*, VNEXPRESS INTERNATIONAL (June 6, 2019), https://e.vnexpress.net/news/news/passenger-arrested-for-attacking-airport-employees-3934578.html.

[15] In December 2014, Cho Hyun-ah, Vice-president of Korean Air and the daughter of the chairman's daughter, had an outburst over macadamia nuts. The flight had just left New York and was bound for Seoul. Cho got enraged when a flight attendant served her nuts in a bag, rather than on a plate. She demanded the flight to return to New York, and the flight attendant removed. This incident delayed the flight and caused an uproar in the media. In 2015, she sentenced to a year in jail. Ju-min Park, *Korean Air chief's daughter seeks leniency in "nut rage" appeal*, REUTERS (Apr. 1, 2015), https://www.reuters.com/article/us-southkorea-nuts-idUSKBN0MS3QT20150401.

kickers, crying babies,[16] etc., in one's vicinity are the reason for unruly behavior. The latest among all this is the issue of compulsion to wearing the mask due to the ongoing pandemic (COVID-19) which has not gone well with many passengers in the last few months. It has added many cases[17] in the list of unruly passengers in just the last couple of months. A new report from the Netherlands' Aviation Incidents Analysis Bureau (ABL) has identified a "sharp increase in the number of nuisance incidents" on commercial aircraft over the last few months, with around 60% of those incidents involving passengers who refuse to comply with the COVID-19 safety protocol.[18]

Apart from the physical factors mentioned above, there are certain underlying economic and psychological factors that bring out the worst in the travellers. Inequality has been identified as a compelling driver of outbursts in the cabin, where violent conduct in economy class cabins has been observed to be more prolific in aircraft with configurations that include the first-class cabin. This phenomenon has led to a modern-day aircraft being called a "*social microcosm of class-based society*."[19] A study done in

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[16] Four women from mainland China brawled over a noisy baby on a Hong Kong-bound flight and almost forced the plane to return to Chongqing. Lai Ying-kit, *Crying baby sparks brawl among women passengers on Hong Kong flight*, SOUTH CHINA MORNING POST (Dec. 18, 2014), https://www.scmp.com/news/hong-kong/article/664647/women-brawl-over-noisy-baby-hong-kong-bound-flight.

[17] A fight broke out on Friday on-board a KLM flight to Ibiza after two passengers under the influence of alcohol refused to wear a mask. *Fight onboard KLM flight after two passengers refuse to wear masks*, THE BRUSSELS TIMES (Dec. 3, 2021), https://www.brusselstimes.com/news/world-all-news/124609/fight-onboard-klm-flight-after-two-passengers-refuse-to-wear-masks/.

[18] Michael Bartiromo, *Dutch officials say 60% of airline "nuisance incidents" now involve passengers refusing to wear masks*, FOX NEWS (Aug. 10, 2020), https://www.foxnews.com/travel/netherlands-officials-airline-nuisances-passengers-refusing-masks .

[19] *supra* note 1 at 100.

Australia shows that most of the unruly incidents have occurred during a leisure trip[20] rather than on a business trip.[21]

Another dominant cause that leads to unruly behaviour is intoxication. Most of the cases reported over the years as air rage incidents are caused by intoxicated passengers. "IATA identifies intoxication (e.g. through alcohol, narcotics, or medications) and recognizes that "in many cases the ingestion and consequent influence of alcohol, narcotics and/or medication starts before the passenger boarded the aircraft is the one of the major reasons behind a disruptive behaviour of a passenger. Globally, alcohol intoxication is identified as a factor in around 27% of unruly and disruptive passenger incidents.[22] Intoxication, often resulting from alcohol already consumed before boarding, ranks high among factors linked to these incidents.[23] On most occasions, intoxicated passengers have a disproportionate impact, threatening safety, disrupting other passengers and crews, and causing delays and diversions. It also involves physical aggression with crew members and co-passengers or damage to the aircraft. There are multiple such reported incidents from 1995 to 2020. For example- On the January 15 flight from Los Angeles to Chicago, an intoxicated

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[20] A plane en route to Slovakia had to divert because a few men were celebrating a bachelor party. The plane made an emergency landing in Berlin when they tried to strip. Jennifer Newton, *Stag party reveller punched his friend on a Ryanair flight causing flight diversion*, DAILY MAIL ONLINE (Feb. 29, 2016), https://www.dailymail.co.uk/news/article-3469053/Brawl-35-000ft-Shocking-moment-stag-party-reveller-punched-friend-forcing-Ryanair-flight-make-emergency-landing.html.

[21] Wendy Patrick, *Fight or Flight: What Causes Air Rage? The Surprising Answer*, PSYCHOLOGY TODAY (May 11, 2017), https://www.psychologytoday.com/blog/why-bad-looks-good/201705/fight-or-flight-what-causes-air-rage-the-surprising-answer.

[22] *Fly Safely, Drink Responsibly Campaign Takes Off in Norway*, https://www.iata.org/en/pressroom/pr/2019-12-03-01/.

[23] IATA Members Set Out Steps Needed to Tackle Problem of Unruly Passengers, https://www.iata.org/en/pressroom/pr/2014-06-02-5/.

passenger was forcibly removed from the plane as he caused the flight to divert to the Albuquerque International Sunport after he began kicking seats, assaulting a flight attendant, and taking off his clothes.[24] The man also began spitting gum at the passenger who was filming him and threatening to kill everybody. At the Sunport airport, the police arrested him on charges of assault, disorderly conduct, threatening passengers and crew, and intoxication. [25] In 2019 on February 1, on a flight from Taipei to Singapore, Taiwanese actor Tuo Chung-Hua became drunk and behaved indecently. He allegedly molested a flight stewardess. He was taken into custody at the Changi Airport.[26] On January 28, 2019, on an EasyJet flight from Manchester to Iceland, Matthew Flaherty, a 44-year-old man, began drinking from a gin bottle and verbally abusing a female passenger who was ignoring his attempts to talk to her. He also started shouting and swearing at the concerned crew before issuing threats to kill them during his mid-air outburst. When he was warned to behave, he pulled out his mobile and began dismantling and eating his mobile phone. The pilot has to divert the plane to Edinburgh Airport, where he was arrested.[27] In another case of 2018, which got a lot of media attention, an International Lawyer, Simone O'Broin from Ireland,

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[24] Helen Coffey, *'Wasted' passenger dragged off flight after 'hitting flight attendant' and removing trousers*, THE INDEPENDENT (Jan. 20, 2020), https://www.independent.co.uk/travel/news-and-advice/drunk-flight-passenger-american-airlines-video-trousers-police-a9292596.html.

[25] *Id.*

[26] Timothy Goh, *Taiwanese actor Tuo Chung-hua arrested for allegedly molesting stewardess on flight to Singapore*, THE STRAITS TIMES (Feb. 4, 2019), https://www.straitstimes.com/singapore/courts-crime/lust-caution-actor-arrested-by-singapore-police-for-allegedly-molesting.

[27] Alex Lawrie and Hilary Mitchell, *Drunk thug caused mid-air havoc after EATING his mobile phone on easyJet flight*, EDINBURGHLIVE (Feb. 10, 2020), https://www.edinburghlive.co.uk/news/edinburgh-news/drunk-thug-ate-mobile-phone-17723971.

on an Air India flight from Mumbai to London on November 11, 2018, spat at a flight attendant. Later, she grabbed the arm of a flight attendant verbally and racially abused her for refusing to serve alcohol on a nine-hour business class flight. She was awarded imprisonment for six months for being drunk on an aircraft and two months for assault. She was also held liable to pay £300 as compensation to the assaulted crew member.[28] A 34-year-old male Korean passenger on December 20, 2017, on a flight from Hanoi to Seoul, got drunk after 2 ½ glasses of whiskey with his meal. He then began arguing loudly with his seatmate and became violent. When flight attendants tried to calm him, he became physically abusive with them as well. The passenger was handed over to the police when the flight landed at Incheon Airport.[29]

Laws governing unruly passengers

There are many such incidents, and the airlines, Governments, and the passengers have growing concerns about such episodes. The issue of unruly passengers was first addressed in the Tokyo Convention,1963, under the auspices of the International Civil Aviation Organisation (ICAO). The main objective of the Tokyo Convention was to ensure that persons who commit crimes aboard an aircraft do not go unpunished. Another main agenda was to protect the aircraft, persons, and property and to maintain good order and discipline on board by giving special authority and powers to the aircraft commander, members of the crew, and even

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[28] *Lawyer jailed for spitting at flight attendant during racist tirade*, THE GUARDIAN (Apr. 04, 2019), http://www.theguardian.com/uk-news/2019/apr/04/lawyer-jailed-for-spitting-at-flight-attendant-during-racist-tirade.

[29] The Korea Herald, *Korean Air on hot seat over air rage incident* (Dec. 22, 2016), http://www.koreaherald.com/view.php?ud=20161221000799.

passengers. The Tokyo Convention also attempted to fill the jurisdictional gap. Article 3 of the Tokyo Convention of 1963 grants jurisdiction to the State of Registration for crimes committed on board. However, the Tokyo Convention was deficient in approaching the problem from a holistic angle; thus, several cases involving unruly passengers did not fall within the recognized categories of 'jurisdiction' in the Tokyo Convention. To bridge this gap, the ICAO council had organized a Diplomatic Conference in 2014 in Montreal to amend the Tokyo Convention, giving the Convention the moniker 'Montreal Protocol'. This article will track the origin of both the Conventions, their contributions and their shortfall in tackling disruptive passengers.

According to Kane, the Tokyo Convention originated in a bottle of rum. [30] In the famous *United States v. Cordova* case, [31] Mr. Cordova consumed too much rum before boarding an American aircraft from Havana to Miami in 1947. However, during the flight, Mr. Cordova assaulted the pilot, a stewardess, and another passenger with a rum bottle while the flight was over the Atlantic Ocean. On arrival to the US, he was arrested and tried for wounding and beating, and simple assault; though the Judge found him guilty of committing the offences, he was acquitted by the Court as the assault took place over the High seas, and the US had no territorial jurisdiction to punish. This case received widespread attention and brought the focus on the legal status of aircraft and how to deal with jurisdiction issues for offences committed on board such aircraft.[32]

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30 *Russell Kane, Time to Put Teeth into Tokyo?* 43 ZLW 187 (1994).

31 *United States v. Cordova*, 89 F. Supp. 298 (E.D.NVY. 1950).

32 Jordan Campbell, *"GET OFF MY PLANE": THE NEED FOR EXTREME DEFERENCE TO CAPTAINS AND CREWS ON INTERNATIONAL FLIGHTS*

A series of unlawful acts against civil aviation were committed in the 1960s and 1970s, that created an urgent need by the international aviation community to establish uniform international legal norms to deal with these types of incidents and solve the jurisdictional issues. Under the auspices of ICAO, three international Conventions were adopted to combat these serious offences. The first was the Tokyo Convention, 1963, dealing with offences and certain other prohibited acts committed on board aircraft; the second was the Hague Convention, 1970, [33] criminalized the act of any person who, while onboard an aircraft in flight, unlawfully by force or threat by any other form of intimidation, seizes or takes control of such aircraft, or any attempt to do so. The third was the Convention for the Suppression of Unlawful Acts Against the Safety of Civil Aviation, 1970, which further expands on offences as contained in The Hague Convention. The Tokyo Convention, 1963, is one of the most widely ratified international instruments ever developed under the auspices of the International Civil Aviation Organization Total 185 States have ratified the Tokyo Convention.

The Tokyo Convention, 1963, governs offences and other acts that occur on board aircraft in flight. Since domestic laws of States differ with regard to the extra-territorial application of jurisdiction over crimes committed on board, the drafters of the said Convention intended to establish a form of uniformity internationally with respect to the rules applicable to the

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UNDER THE TOKYO CONVENTION OF 1963, 77 Journal of Air Law and Commerce 367 (2012).

[33] CONVENTION FOR THE SUPPRESSION OF UNLAWFUL SEIZURE OF AIRCRAFT, (Hague, Dec. 16, 1970).

prosecution of offences committed on board. In this respect, the *raison d'etre* of the Tokyo Convention was to:

(i) grant the State of Registry jurisdiction over acts occurring aboard the aircraft;

(ii) allow the aircraft commander certain prerogatives to handle passengers in those situations where they have already committed or are about to commit an offence or an act that may jeopardize the safety of the aircraft;

(iii) set forth the responsibilities of the State of landing where the alleged offender may be disembarked or delivered; and,

(iv) Address the crime of hijacking - although the Convention was originally not conceived as an instrument to deal with acts of unlawful interference with aircraft.[34]

Jurisdiction

The issue of jurisdiction is discussed under Articles 3 and 4 of the Tokyo Convention. Under article 3, the primary jurisdiction is granted to the State of registration. However, the Tokyo Convention "does not exclude any criminal jurisdiction exercised as per the national laws." In this respect, The Tokyo Convention does not establish exclusive jurisdiction but instead opts for a system of concurrent jurisdiction. As the State of registry, a State Party bears the "best efforts" obligation to assert its jurisdiction over criminal offences committed on board aircraft registered by

[34] ICAO, 'SPECIAL SUB-COMMITTEE OF THE LEGAL COMMITTEE FOR THE MODERNIZATION OF THE TOKYO CONVENTION INCLUDING THE ISSUE OF UNRULY PASSENGERS' (*Working Paper*, 2012), available at https://www.icao.int/Meetings/LC-SC-MOT/Working%20Papers/WP-1%20Rapporteur's%20Report.En.pdf.

it.[35] Apart from the State of Registration, no other State shares a similar obligation for acts that may jeopardize the safety or the good order and discipline on board the aircraft.[36] Another state can exercise jurisdiction if either of the conditions laid down under article 4 is satisfied;

(a) the offence has effect on the territory of such State;

(b) the offence has been committed by or against a national or permanent resident of such State;

(c) the offence is against the security of such State;

(d) the offence consists of a breach of any rules or regulations relating to the flight or manoeuvre of aircraft in force in such State;

(e) the exercise of jurisdiction is necessary to ensure the observance of any obligation of such State under a multilateral international agreement.

For the first time, status, rights and duties of the aircraft commander, flight attendant and passengers were also discussed under Articles 5 to 10 of the Tokyo Convention. [37] The aircraft

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[35] In the Canadian case of *Atmospheric Diving Systems Inc. v. International Hard Suits Inc*., the Court concluded that the term best efforts impose a higher onerous obligation on the party to discharge its performance than other endeavour clauses such as the reasonable efforts or all reasonable efforts clause in a commercial contract. The Court interpreted the standard of obligations under the "best efforts" clause as equivalent to the standard of "leaving no stone unturned". Prabhakar Yadav, *Law of Best Efforts and Reasonable Efforts Obligations in Commercial Contracts*, INDIACORPLAW (Jan. 04, 2019), https://indiacorplaw.in/2019/01/law-best-efforts-reasonable-efforts-obligations-commercial-contracts.html.

[36] *supra* note 35.

[37] Article 5 states that –
"*1. The provisions of this Chapter shall not apply to offences and acts committed or about to be committed by a person on board an aircraft in flight in the airspace of the State of registration or over the high seas or any other area outside the territory of any State unless the last point of take- off or the next point of intended landing is*

situated in a State other than that of registration, or the aircraft subsequently flies in the airspace of a State other than that of registration with such person still on board.
2. Notwithstanding the provisions of Article 1, paragraph 3, an aircraft shall for the purposes of this Chapter, be considered to be in flight at any time from the moment when all its external doors are closed following embarkation until the moment when any such door is opened for disembarkation. In the case of a forced landing, the provisions of this Chapter shall continue to apply with respect to offences and acts committed on board until competent authorities of a State take over the responsibility for the aircraft and for the persons and property on board."

As per Article 6 –

"*1. The aircraft commander may, when he has reasonable grounds to believe that a person has committed, or is about to commit, on board the aircraft, an offence or act contemplated in Article 1, paragraph 1, impose upon such person reasonable measures including restraint which are necessary:*
(a) to protect the safety of the aircraft, or of persons or property therein; or
(b) to maintain good order and discipline on board; or
(c) to enable him to deliver such person to competent authorities or to disembark him in accordance with the provisions of this Chapter.
2. The aircraft commander may require or authorize the assistance of other crew members and may request or authorize, but not require, the assistance of passengers to restrain any person whom he is entitled to restrain. Any crew member or passenger may also take reasonable preventive measures without such authorization when he has reasonable grounds to believe that such action is immediately necessary to protect the safety of the aircraft, or of persons or property therein."

As per Article 7 –

"*1. Measures of restraint imposed upon a person in accordance with Article 6 shall not be continued beyond any point at which the aircraft lands unless:*
(a) such point is in the territory of a non-Contracting State and its authorities refuse to permit disembarkation of that person or those measures have been imposed in accordance with Article 6, paragraph 1(c) in order to enable his delivery to competent authorities;
(*b) the aircraft makes a forced landing and the aircraft commander is unable to deliver that person to competent authorities; or*
(c) that person agrees to onward carriage under restraint.
2. The aircraft commander shall as soon as practicable, and if possible before landing in the territory of a State with a person on board who has been placed under restraint in accordance with the provisions of Article 6, notify the authorities of such State of the fact that a person on board is under restraint and of the reasons for such restraint.

According to Article 8 –

"*1. The aircraft commander may, in so far as it is necessary for the purpose of subparagraph (a) or (b) or paragraph 1 of Article 6, disembark in the territory of any State in which the aircraft lands any person who he has reasonable grounds to believe has committed, or is about to commit, on board the aircraft an act contemplated in Article 1, paragraph 1(b).*
2. The aircraft commander shall report to the authorities of the State in which he disembarks any person pursuant to this Article, the fact of, and the reasons for, such disembarkation."

Article 9 explains that –

commander has the authority to take "reasonable measure" when he/she has reason to believe that a person has committed or is about to commit a criminal offence or an act that may jeopardize the safety of the aircraft or crew members or the passengers. However, the air commander's decision should not only be based on subjectivity but should also pass the test of objectivity, which depends upon the fact and circumstances of each case.

Shortcomings of The Tokyo Conventions

The Tokyo Convention had a positive effect on aviation safety for a long time. However, many events had led to review it, and the Convention was found defective in certain areas. Over 50 years since the inception of the Tokyo Convention, ICAO, IATA, academicians, scholars, and legal professionals pointed out many shortcomings in the Tokyo Convention. These shortcomings include; The lack of Definition of "Offence," "In-Flight," "Good Order" and "Discipline," issues related to Jurisdiction, extradition,

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"*1. The aircraft commander may deliver to the competent authorities of any Contracting State in the territory of which the aircraft lands any person who he has reasonable grounds to believe has committed on board the aircraft an act which, in his opinion, is a serious offence according to the penal law of the State of registration of the aircraft.*
2. The aircraft commander shall as soon as practicable and if possible before landing in the territory of a Contracting State with a person on board whom the aircraft commander intends to deliver in accordance with the preceding paragraph, notify the authorities of such State of his intention to deliver such person and the reasons therefor.
3. The aircraft commander shall furnish the authorities to whom any suspected offender is delivered in accordance with the provisions of this Article with evidence and information which, under the law of the State of registration of the aircraft, are lawfully in his possession."
As per Article 10 –
"*For actions taken in accordance with this Convention, neither the aircraft commander, any other member of the crew, any passenger, the owner or operator of the aircraft, nor the person on whose behalf the flight was performed shall be held responsible in any proceeding on account of the treatment undergone by the person against whom the actions were taken".*

insufficient powers and duties of the aircraft commander, and lack of right to recourse against disruptive/unruly passengers to name a few.

The issues of Definitions

The Tokyo Convention does not define what constitutes an "offence/Serious offence", nor does it define the words like "Good Order", "Discipline", and "in-flight". Hence, interpretation is left to the discretion of each state party, which creates a severe lacuna. For example, "Article 1(a) of the Tokyo Convention, 1963, mentions that the Convention shall apply regarding "offences against penal law." However, in Article 9(1), provision is made that the aircraft commander may, on reasonable grounds, deliver to the competent authorities of a Contracting State any disruptive/unruly passenger whom the aircraft commander believes has committed a "serious offence" on board the aircraft. Which immediately begs the question of whether the aircraft commander then is excluded from such action in the cases of other offences or acts committed by disruptive/unruly passengers where these acts do not constitute "serious offences'?"[38].

In the same manner, lack of definition of "Good order and Discipline" on board, leads to conflicting judicial interpretations. In *US v. Flores,* [39] a heated conversation between a passenger and a flight attendant escalated to physical aggression. The court held that the assault and interference elements are separate, and not every assault interferes with a flight attendant's duties. It also held

[38] Leon Gernandt, *Disruptive or unruly air passengers: could the Tokyo Convention of 1963 be saved?*, 2015, https://repository.up.ac.za/handle/2263/50908 (last visited Sep 8, 2020).

[39] *U.S. v. Flores*, 968 F. 2d 1366 (1992).

that this incident does not jeopardize good order and discipline on board. In another case, [40] a German court held that despite the existing smoking ban if a passenger smokes in an aircraft and merely activates the smoke detector, it does not fulfil the criminal offence of dangerous interference with air traffic; as there is a difference between a real fire and merely a smoke alarm activation. Another critical point to consider is that passengers from various cultures and socio-economic backgrounds are usually on a flight. So, what may constitute a breach of good order and discipline in one culture may not be viewed the same in another

In the same way, the lack of an "In-flight" definition has been a problem. Like, while the aircraft is taxiing or being pushed back before take-off by an auxiliary power unit (APU) does not fall within the definition of "in-flight." Hence, any crime committed during this time frame falls outside the scope of the Tokyo Convention. On the other hand, as per article 5 of the Convention, aircraft shall be considered to be "In-flight" at any time from the moment when all its external doors are closed following embarkation until the moment when any such door is opened for disembarkation.

Jurisdictional Issues: The main reason behind the adoption of the Tokyo Convention was to solve the jurisdictional issue; however, it did not solve the issue altogether. The lack of mandatory jurisdiction has been identified as one of the Convention's weak points. Under Article 3(1) and (2) of the Tokyo convention, the power to exercise the criminal jurisdiction over offences and acts committed on board is given to the State of the registry. That does

[40] Informationen zum Verfahren OLG Düsseldorf - 2b Ss OWi 95/00 (2000).

not put a mandatory obligation upon the State of the Registry to exercise its jurisdiction. The State of the registry is only obliged to "take measures as may be necessary to establish its jurisdiction as the State of registration over offences committed on board aircraft registered in such State." It raises question as to whether the State of the registry can only exercise jurisdiction in case of offences only but not for the acts that may jeopardize the aircraft's safety or the good order and discipline on board.

Further, under the Tokyo Convention, the State of landing cannot assert jurisdiction when the offence is committed on board an aircraft registered in another State unless the offence in some manner affects its territory or it involves national security issues. As a result, many unruly passengers go unpunished. Here is a hypothetical example to explain this issue sufficiently-

"Thai Airways flight takes off from Bangkok International Airport (Thailand) bound for Osaka Kansai (KIX) (Japan). During the flight, a Mongolian passenger twice smokes a Cuban cigar in the business class lavatory. When a flight attendant demands that the passenger stops smoking, the passenger verbally and physically assaults her. As a result of the incident, the flight attendant suffers severe physical injuries. Upon arrival at KIX, the passenger is delivered to the police and aircraft's Captain demands that the KIX police detain the passenger. After an assessment of the factual elements of the case, KIX police concludes that there is no jurisdiction to prosecute offences which were committed: (i) on board an aircraft registered in a State other than Japan (Thailand); (ii) outside Japanese territory (i.e., somewhere over the high seas); (iii) by an offender who was not Japanese (Mongolian). Reasoning that there were insufficient connecting elements that link the case

to Japan, and on the basis that the Japanese legal system does not extend Japan's jurisdiction to cover these types of acts, KIX police free the Mongolian passenger without trial or penalty. Despite having seriously jeopardized the safety of the flight, the Mongolian passenger walked away with absolute impunity."

In the light of this, it has been argued that, in a world where incidents of unruly passengers are growing day by day, jurisdiction powers should also be extended to the State of the operation, State of landing, etc., which will be a practical and effective solution to the problem.

Extradition Issues:

It is interesting to note that the Tokyo Convention does not provide a mandatory extradition provision. It creates no legal obligation upon the contracting States to extradite an alleged offender. Articles 13(2), 15(1), 15(2), 16(1), and 16(2) deal with the issue of extradition. However, Article 16(2) states that *"nothing in this Convention shall be deemed to create an obligation to grant extradition"*.

In 2009, the increase in unruly passenger incidents led IATA to make a formal request to the International Civil Aviation Organization (ICAO) to review and enhance the scope and application of the Convention to allow law enforcement authorities adequate means to pursue offenders.[41] As a result, The International Civil Aviation Organisation (ICAO) has considered amendments to the Tokyo Convention 1963. Under the auspices of ICAO, the International Air Law Conference held in Montreal

[41] Joint Position Calling for States to Ratify the Montreal Protocol 2014 to Deter Unruly Passenger Incidenets and Promote a Safer Air Travel Experienece for All, available at https://aaco.org/Library/Assets/Tokyo%20Revision%20Position%20Paper.pdf.

from 26 March to 4 April 2014. There the Protocol to Amend the Convention on Offences and Certain Other Acts Committed on Board Aircraft was signed, commonly known as Montréal Protocol of 2014.The Conference also adopted a Resolution Relating to Updating Circular 288 – Guidance Material on the Legal Aspects of Unruly/Disruptive Passengers (Diplomatic Conference Resolution). The Task Force on Legal Aspects of Unruly Passengers (Task Force) was established to update ICAO Circular 2881.[42] On 26 November 2019, Nigeria ratified it, and she was the 22nd state to do so. India has signed it in 2014 but has not ratified it yet. Starting from 1 January 2020, Montreal Protocol 2014 is in force between the states that have ratified it or acceded to it.

The main objective of the Montreal Protocol is to provide necessary powers, to the state of landing and state of operation, to exercise jurisdiction in case of disruptive passengers and to fill the gap existed under the Tokyo Convention. As per IATA About 60% of offences go unpunished because of jurisdictional issues.[43] The new Protocol will give States the tools they require to deal with unruly passengers, whilst preserving prosecutional discretion. Specifically:

a) The Protocol gives mandatory jurisdiction to the intended State of landing (the scheduled destination). However, two safeguards were included to reflect the concerns of some states on legal certainty and proportionality. Firstly, the offence must be sufficiently serious i.e. where the safety of

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[42] Internatiaonl Civil Aviation Organisation, 'ACTS OR OFFENCES OF CONCERN TO THE INTERNATIONAL AVIATION COMMUNITY AND NOT COVERED BY EXISTING AIR LAW INSTRUMENTS' (*Working Paper*, 2018).

[43] 'Boost for Efforts to Tackle Unruly Passengers as MP14 Set to Come into Force' (*IATA*, Nov. 28, 2019), https://www.iata.org/en/pressroom/pr/2019-11-28-01/.

the aircraft or of persons or property therein, or good order and discipline on board is jeopardized. Secondly, the State of landing must consider if the offence is an offence in the State of operator.

b) If the aircraft diverts to a third State, the Protocol gives that State the competence to exercise jurisdiction at its discretion.

c) The Protocol establishes mandatory jurisdiction for the State of operator. This takes account of the increasing trend toward dry leasing aircraft where the State of aircraft registration is not necessarily the State of operator.[44]

The Montreal Protocol clarifies certain behaviours which should be considered, at a minimum, as an offence and encourages States to take appropriate criminal or other legal proceedings. These include physical assault or a threat to commit such assault against a crew member and refusal to follow a lawful instruction given by or on behalf of the aircraft Commander (for safety purposes). The elaboration of the types of conduct prohibited will improve certainty for passengers, law enforcement authorities and airlines.[45]

Through, The Montreal Protocol, International Civil Aviation Organization has tried address the shortcomings of the Tokyo Convention.; however, there is a significant difference between the drafted Montreal Protocol of 2014 and the one came into force in January 2020. The draft Protocol submitted to the 38th ICAO Assembly in September/October 2013 offered two options in terms of the role of in-flight Security Officers (IFSO) to deal with the

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[44] *supra* note 44.
[45] *Id.*

situation of an unruly passenger on board. In the first option the IFSO was given powers equal to those of the aircraft commander in responding to an offence on board an aircraft; and the other retaining the primacy of authority of the aircraft commander with powers to require or authorize the assistance of other crew members in instances of offences on board aircraft or offences about to be committed, the Conference opted to choose the latter, rejecting the equality of supremacy of control of the aircraft commander and the IFSO in the event of an offence being committed on board or the possible commission of an offence on board, as proposed in the first option.[46] Another significant difference between the draft and adopted Montreal Protocol was that Article II of the draft Protocol had definitions of an IFSO and State of the Operator and the State of Registration. These do not appear in the adopted Protocol. Article II of the adopted Protocol replaces Article 1,[47] paragraph 3[48] of the Tokyo Convention, which

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[46] Ruwantissa Abeyratne, *Protocol to the Tokyo Convention of 1963: A Legal Triumph or Damp Squib*, 39 AIR SPACE LAW 245 (2014).

[47] "*1. This Convention shall apply in respect of:*
(a) offences against penal law;
(b) acts which, whether or not they are offences, may or do jeopardize the safety of the aircraft or of persons or property therein or which jeopardize good order and discipline on board.
2. Except as provided in Chapter III, this Convention shall apply in respect of offences committed or acts done by a person on board any aircraft registered in a Contracting State, while that aircraft is in flight or on the surface of the high seas or of any other area outside the territory of any State.
3. For the purposes of this Convention, an aircraft is considered to be in flight from the moment when power is applied for the purpose of takeoff until the moment when the landing run ends.
4. This Convention shall not apply to aircraft used in military, customs or police services."

[48] *"1. The State of registration of the aircraft is competent to exercise jurisdiction over offences and acts committed on board.*
2. Each Contracting State shall take such measures as may be necessary to establish its jurisdiction as the State of registration over offences committed on board aircraft registered in such State."

provided that: "*for the purposes of the Convention, an aircraft is considered to be in-flight from the moment when power is applied for the purpose of take-off until the moment when the landing run ends*".[49] This provision now reads in Article II of the Protocol as *"an aircraft is considered to be in flight at any time from the moment when its external doors are closed following embarkation until the moment when any such door is opened for disembarkation; in the case of a forced landing, the flight shall be deemed to continue until the competent authorities take over the responsibility for the aircraft and for persons and property on board".*

One also fails to understand why the distinction between "on board" and in-flight is made and begs the question, wouldn't an unruly person be on board while he/she is in-flight? Although the provision of the Protocol is seemingly an improvement on the Tokyo Convention but still poses a legal gap. According to the President of the ICAO Council, the achievement of the Conference lay in the fact that the adopted Protocol *"serves to enhance global aviation security provisions by expressly extending legal recognition and protections to IFSOs from this point forward...and significantly improves the ability of ICAO Member States to expand jurisdiction over related offences to the State of the Operator and the State of Landing".*[50]

The Protocol also replaces Article 3 of the Tokyo Convention, which stated that "*the State of registration of the aircraft is*

3. This Convention does not exclude any criminal jurisdiction exercised in accordance with national law.

[49] Ruwantissa Abeyratne, *Protocol to the Tokyo Convention of 1963: A Legal Triumph or Damp Squib*, 39 AIR SPACE LAW 245 (2014).

[50] *Id*.

competent to exercise jurisdiction over offences and acts committed on board." Article 3 of the Tokyo Convention and the Montreal protocol is the same in providing jurisdiction to the State of Registration. Both the text provides that Each contracting State requires to take such measures as may be necessary to establish its jurisdiction as the State of registration over offences committed on board aircraft registered in such State and asserts that it does not exclude any criminal jurisdiction exercised in accordance with national law. The new protocol part its way from the Tokyo convention in terms of extending jurisdiction to the State of landing and the State of the operator.[51] Article 3 of the Protocol provides that:

> *"A State is also competent to exercise jurisdiction over offences and acts committed on board: a) as the State of landing, when the aircraft on board which the offence or act is committed lands in its territory with the alleged offender still on board; and*
>
> *b) as the State of the operator, when the offence or act is committed on board an aircraft leased without a crew to a lessee whose principal place of business or if the lessee has no such place of business, whose permanent residence, is in that State."*

The new Protocol also provides an addition to Article 3, which states that- "*If a Contracting State, exercising its jurisdiction under Article 3, has been notified or has otherwise learned that one or more other Contracting States are conducting an investigation, prosecution or judicial proceeding in respect of the same offences*

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[51] *supra* note 50.

or acts, that Contracting State shall, as appropriate, consult those other Contracting States with a view to coordinating their actions. The obligations in this Article are without prejudice to the obligations of a Contracting State under Article 13".

At the end of this analysis, one can conclude that the Tokyo Convention, 1963, has no doubt made a considerable contribution to aviation safety; however, it was not proven as a fool proof mechanism to deal with the disruptive passengers. Over the years, it has been criticized for its loopholes by the Scholars, legal practitioners, and academicians alike. Increasing incidents of disruptive passengers have made ICAO revisit the Tokyo Convention which led to the drafting of the Montreal Protocol. The Montreal Protocol was negotiated to overcome the lacunas of the Tokyo Convention. However, the accepted version of the Protocol could not resolve the challenges in terms of the jurisdiction. However, the Protocol provides jurisdiction to the state of landing and the state of the operation but doesn't provide a system of priority of jurisdiction. There is no clarification in terms of which state has better/priority jurisdiction over the other. In general, it is an accepted practice that the state where the aircraft or the passenger is present can exercise the jurisdiction. Since it is not mentioned in the Protocol, it leaves room for debates and confusion. Another unsolved issue is that the Protocol does not bind the State of Landing to enacted relevant domestic laws to deal with unruly passengers. Under article 15 of the Protocol – "Each Contracting State is encouraged to take such measures as may be necessary to initiate appropriate criminal, administrative or any other forms of legal proceedings against any person who commits on board an aircraft an offence." Hence, The Protocol does not

create a compulsory obligation upon the state to prosecute a disruptive passenger, and it remains upon the state's sweet will. As discussed above, there is no clarity in terms of the IFSO and aircraft commander's power and duties. ICAO should provide detailed guidelines in this regard. Having said that, the Protocol has come into force very recently. So far, it is signed by only 24 states. [52] All of Europe and most of North America has abstained from signing it. Even very few developing countries have signed it. So, it is very early to comment on whether the protocol will be successful in solving the issues of unruly passengers effectively in the future. One can only hope that all the state parties will ratify the Montreal Protocol soon and improve the aviation security in the future.

[52] Angola, Brazil, Burkina Faso, Burundi, Cabo Verde, China, Congo, Cote d'Ivoire, Dominican Republic, Fiji, India, Jordan, Kuwait, Lesotho, Madagascar, Mali, Mexico, Nepal, Niger, Paraguay, Senegal, Sierra Leone, Sudan, and Togo.

USE OF AREA NAVIGATION PROCEDURES IN INDIA

Group Captain E Krishna Prasad (Retd)[*]

Abstract

As air traffic increases, ATC finds it difficult to manage increased traffic. The R/T channels get clogged. The reason being aircrafts must be given specific vectors to fly in order to align them with the runway for landing. This leads to reduced capacity and increased separation. To address this issue, a new method must be implemented to accommodate more aircrafts in the confined terminal airspace simultaneously.

Introduction

In 2016, the Directorate General of Civil Aviation (hereinafter "DGCA") published several R Nav routes (Q routes) connecting major airports of India. R Nav stands for Area Navigation. With the advent of satellite-based navigation, aircrafts in the airline service have the capability to fly from one point in space to another point as against the beacon-to-beacon navigation followed by the aircrafts earlier. These routes were established to meet the increasing demand from airlines to fly shorter routes with reduced separation thereby saving on time and fuel. However, the departure, the arrival, and the approach procedures are still flown using conventional navigation aids and procedures.

R Nav Approaches have the same minima as CAT I ILS. Pre-described R Nav departure and arrival routes could further enhance ease of controlling for Air Traffic Controllers (hereinafter "ATC")

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while reducing cockpit workload for the crew in the aircraft. Furthermore, it helps in reducing the congestion in voice communication channels during peak hour traffic in crowded airports. However, it is pertinent for airlines to conduct training for its crew to boost proficiency in flying R Nav procedures.

Traffic Conditions In Nine Major Airports In India

There are a total of 449 airports and airstrips throughout India. The government owned Airports Authority of India (hereinafter "AAI") operates 126 airports and civil enclaves. 100 airports/aerodromes receive regular commercial flights. The cities of Bengaluru, Delhi, Hyderabad, Kochi and Mumbai are served by private (or joint-venture) operators. Airports in India handled over 341 million passengers in 2018. India is the third largest domestic civil aviation market in the world behind the USA and China.

Out of the 100 airports, majority of the traffic in India is limited to nine airports presently. The number of passengers conveyed in 2019 is tabulated below[1]:

Airport	Passengers (in thousands) total YTD
Delhi	68492
Mumbai	47056
Bengaluru	33654
Chennai	22819
Kolkata	22503
Hyderabad	22329
Ahmedabad	11713
Kochi	10281

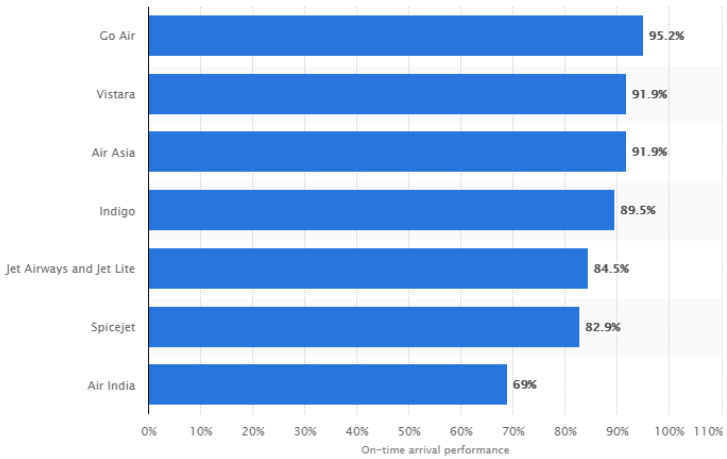
The other 89 operational airports convey limited number of passengers. Traffic density in these airports is very less. Some of them have less than 10 flights in a day. There are several unused

[1] TIMIR MOZUMDER (May. 30, 2020), http://Knowindia.net/aviation3.html.

airports/airstrips, that the government plans to operationalize under the UDAN scheme. Both the Centre and states have shown keen interest in operationalizing these airports. The primary reason being, this improves connectivity, creates jobs, and is an overall contributor to the welfare of the country's economy.

Peak Hour Traffic and Average Delays

During peak hours, in the morning for three hours between 0800h and 1100h and in the evening from 1730h to 2130h, the airports handle majority of the departing and arriving flights. Metro airports have an average delay of more than 15 minutes. An on-time arrival study of airlines in India is shown in table below for the year 2018:[2]



An aircraft is considered 'on time' if it departs and arrives at the destination within 15 minutes of the scheduled timings. With this rather stretched requirement, the average flights that arrived on

[2] Shanglio Sun, Punctuality of domestic airlines in India 2021, STRÖER MEDIA (May. 30, 2020), https://www.statista.com/statistics/588960/punctuality-of-domestic-airlines-in-india

time in 2018 is 89.5%. A congestion in the Metro airports has a cascading effect on the airports in the Tier II cities. The implementation of the UDAN scheme, will further exacerbate this delay. . Automated and smooth air traffic management procedures is the need of the hour.

Use of R Nav Procedures for UDAN Scheme Airports

Area Navigation procedures have been in vogue for some time now. With the advent of the GPS, the accuracy and reliability has further improved. The successful launch of the GAGAN mission gives India its own GPS with improved accuracy and reliability. India is now able to set up its own GPS signals that can be used effectively for Air Navigation.

Airports intended to be operationalized are typically in Tier II and Tier III cities. Footfalls into such airports can become a reality when it is affordable for everyone to fly. One of the major impediments is the airport infrastructure and allied procedures for safe travel of flights. In bad weather, ground beacons like VORs and ILS should be required to give adequate confidence to pilots to fly in and out of such remote regions. Congested airports also use terminal radars to guide and sequence aircraft into the ILS of the runway in use. This often results in longer flight paths. Furthermore, Mixed traffic and wake turbulence category limitations add to the delay.

By virtue of GPS and R Nav techniques, legacy aids would no longer be required. Various versions of the ILS like GLS, FLS with LNAV and LPV minimas are available. These are self-contained in the aircraft and do not require any ground equipment.

Modern airline aircrafts have these capabilities and they can be used effectively to UDAN airports..

Use of R Nav Procedures and Their Benefits

Area navigation enables aircrafts to fly the shortest path. It enables them to feed into an approach by navigating between points in space. These points are defined by coordinates adding on to the smooth navigation. This cannot be ensured when ground beacons are used for guidance.

This method lends itself to several benefits, some of which are listed below:

- Shortest flight path results in less fuel burn, thus reducing costs.
- Curved approaches are possible.
- Reduced carbon footprint.
- Lesser R/T congestion resulting in clear instructions and improved communication.
- Lateral separation is possible using R Nav in the beginning of approach.
- Increased situational awareness to all pilots especially in congested terminal areas.
- Capability to operate even in bad weather with CAT I ILS minima.
- No expenditure on installation and maintenance of infrastructure.
- While ILS is runway specific, R Nav approaches can be designed for all runways.
- Lesser airport charges and airport user fees leading to lesser price of tickets.

- Safety is not compromised while operational efficiency is maintained.

Designing R Nav Procedures

R Nav procedures are easier to design as overhauls can be devised where required and paths can be constructed accordingly. Even in hostile and mountainous terrain, exact paths can be defined by devising fixes and the aircraft would then follow the desired path. The FMS in modern aircraft can fly these curved paths and therefore, curved approached by flying through the valleys are possible. This further ensures greater degrees of certainty and assurance levels.

An accurate survey of the topography and correct extraction of coordinates using the WGS84 datum would be required. The modern-day advancements in GIS, a field in which India is a leader, can be exploited for this. The DGCA is in a good position to exploit Indian talent in the field of Aviation, for designing procedures. The use of GAGAN for position fixing and the insitu talent in GIS will further make the task easier. The private players bidding for airports would do well to use this expertise since it will provide them with the opportunity to drive down their costs of operations. This major change would result in ease of operations and be a win-win for the stakeholders.

Flying R Nav Procedures

The R Nav Procedures can be flown in the same way as traditional ILS approaches are flown. The indications in the cockpit are akin to ILS indications for localizer and glide path. Simulator training is not required for certain types of R Nav approaches. This further drives down training costs for pilots. The look and feel in the

cockpit have been intentionally kept similar to that of the ILS so that the pilots are comfortable with the operations. Moreover, the selection of switches and buttons are the same. The manufactures of aircraft have kept pace with the times and have incorporated this design in all modern cockpits.

Cost Benefit Analysis Vis A Vis Conventional Procedures

Radars, VOR and ILS equipment are prone to huge maintenance costs. The standby power supply requirements for a CAT II ILS far exceeds the initial installation cost. Furthermore, ILS requires calibration frequently. For instance, the CAT II ILS must be calibrated every six months. If not calibrated the ILS can be used for CAT I operations only. Since ILS is runway specific both ends of the runway should have separate ILS equipment. In case of parallel runways, all runway ends should have a separate ILS equipment.

A recent study by MIT identified around 117 enroute VORs in USA that can be decommissioned. The VOR maintenance takes a long time and having two VORs for 24x7 operations have been resorted to in some cases. Enroute VORs under maintenance, results in airways being redesigned for the duration of maintenance.

Usage of R Nav Procedures in Other Countries

All advanced nations like the USA and Western Europe exploit R Nav Procedures to the maximum. Almost all airports in China have R Nav Procedures published. Recently, Kathmandu airport, which has an approach to the runway flying through valleys with mountain peaks above the height of the aircraft, chose to design their approach procedure using R Nav so that there is a smoother

descent and approach to landing while not compromising on safety. R Nav Procedures are easier to fly and design. The cost benefit has attracted many airports to adopt this method. Almost all private airports in USA and Australia have R Nav approaches and arrival procedures.

Suggested Steps and Timeline that must be Taken by Dgca for Implementation

In view of the above the following are suggested:

- DGCA should design R Nav SID, STAR and Approach Procedures in all airports in India especially the UDAN airports located in Tier II and Tier III cities.
- Airlines should undertake R Nav approaches training and familiarization for the aircrew for smooth implementation of this project.
- ATC controllers should familiarize with the arrival R Nav procedures and do away with the radar vectors and feeding into ILS.
- Private airport operators should pave the way for this new approach design.
- DGCA should include this in the bid for new airports for PPP model.

Pass on benefits of R Nav to passengers should make it cost effective and should operate out of UDAN airports.

LEGAL IMPLICATIONS OF SPACE TOURISM

Jayanta Baruah[*] & Pallabi Nath[♦]

Abstract

Necessity is the mother of invention, they say. Since ancient times, mankind kept on thriving for its unique quest for knowledge. With each progress, they introduced new dimensions for amusements and recreational purposes,which the millennial quotes as an adrenaline rush. One such path-breaking invention is the concept of space tourism as an adventure for the rich. Space tourism, in simplest terms, refers to traveling into space for adventure. History was made by one Dannis A. Tito, who traveled to space in 2001, known as the first man who made his first space voyage as a space tourist. Once the ambit of space tourism emerged, the need for a legal framework to regulate such transits was also felt. Thereby, Space law developed as a new discipline to govern the growing aspects of space tourism. This paper aims to discuss the notion of Space tourism and the concurrent space laws for regulating such space tourism. This paper also focuses on the impact of space tourism in modern civilized nations and the responsibilities of the States in regulating space tourism. While discussing the relationship between tourists, operators, and third parties, this paper also discusses their liabilities toward

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each other in case of probable dangers. This paper also discusses the current status of Space tourism and space law within the legal framework of various International Treaties.

Key words - Space Tourism, liability, Space Law

Introduction

The quest of human civilization keeps on revealing new dimensions for exploration, and one of such dimensions includes space. It is well known that no person could precisely determine what exactly Outer Space constitutes, but mankind has started striving its excellence to explore it for different vocations. Once the utility of a particular dimension is perceived, rules for governing such utilizations become crucial. Thus, Space law emerged as a new discipline. Apart from the multitude of Space utilization, space tourism is a relatively new approach toward such utilization. Ergo, regulating tourism in space and implementing effective legal measures are the need of the hour.

Meaning of Space

Outer space has never been defined formally in a legal sense. Natural scientists widely accept space as an intrinsic relationship between celestial bodies and outer space, beyond Earth's atmosphere. However, in the legal domain, the question of jurisdiction of sovereign nations over space often arises for which demarcation between airspace and outer space is a fundamental need. Air space is generally defined in terms of one or more physical factors, including velocity, gravitation, altitude,

centrifugal force, etc.[1] JC Cooper defined airspace in relation to man-made instruments, whether controlled or not, in operation at any given time, and that is the Usable space.[2]

In pursuance of dictating the jurisdiction over airspace and isolating it from outer space, several theories like – Gravitational theory, Atmosphere Theory, Interest Theory, etc., and two approaches- Functional Approach and Spatial Approach were drawn out. Furthermore, there are five prominent International Treaties that govern outer space activities.[3] Through analysis of all these theories, approaches, and treaties, inference can be drawn that both airspace and outer space are independent of each other in the legal realm where airspace is more of the zone attached to Earth's atmosphere upon which sovereign states can exercise their jurisdiction while Outer space is the zone beyond the limit of Earth's atmosphere and over which no sovereign has any control, thereby making it a common property of the humankind and hence accessible for all kind of explorations for the common welfare of humanity without discrimination.

Meaning of Space Law

Space law is a distinctive branch of law that governs all activities analogous to space encompassing international and domestic principles, agreements, and rules.[4] Space law in its broader ambit includes various facets like the exploration of space, liability for damage caused during such exploration, conducting scientific

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1 Siri Sakhamuru, Definition of Space Law, (10 August ,11:45 PM) <www.legalserviceindia.com/article/2350/Definition-of-Space-law.html>

2 JC Cooper, High Altitude Flight & National Sovereignty, 4, International Law Quarterly Review, 411-418. (1951).

3 Supra note 1.

4 What is Space Law, Legal Career Path (Jan. 22, 2019, 12:13 AM) <https://legalcarepath.com/space-law/>

activities in space, utilization of weapons as well as rescue operations, environmental preservations, sharing of technologies including information technologies, and all other matters expressly or implicitly related to space.[5] Consequently, Space Tourism will also be a step into the realm of Space law.

Meaning of Space Tourism

Space tourism, in general, refers to the human space travel for recreational purposes. So far, orbital, suborbital, and lunar space tourism are the most prominent space tourism. The Russian Space Agency is the only agency that has been able to execute orbital space tourism.[6] Thus, space tourism is the commercial activity aspiring to deliver life experiences in space to the customers by its traders.[7] Space tourism, in simplest terms, is the detour to space-seeking adventure through commercial means.

Space travel is an expensive affair, with each trip costing 20 to 25 million USD, howbeit people in the surge of adrenaline get attracted toward it. Since 2001 some thrill-seekers have alreadysuccessfully completed their space tour, while a few others have done suborbital space travel. The first kind of space travel is the *premium travel*, where the trip starts with a departure from Baikonur cosmodrome in Soyuz Rocket. There will be a stay for a few weeks in the International Space Station (ISS) orbiting the Earth from an altitude of about 400 km, and this is known as

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5 Space Law, United Nation Office for Outer Space Affairs (Jan. 21, 2019, 12:17 AM) <www.uncosa.org/cosa/en/ourwork/spacelaw/index.html>

6 Frans G. von der Dunk, Space Tourism, Space, Cyber and Telecommunications Law Program Faculty Publications, (2011),

7 Stephan Hobe, Legal Aspects of Space Tourism, 86(2), Nebraska Law Review (2007).

orbital space travel.[8] The second category includes travel by a rocket or aircraft that will take off from an airport or spaceport and fly to an altitude of 100 – 200 km from the Earth's surface, allowing the passengers to escape gravity for a few minutes.[9] These tours are mainly provided by Virgin Galactic, a leading British spaceflight company. A concurrent marketing agenda is designing hotels based on ISS modules with magnificent outlooks.[10] It is established that space tourism is now thriving and emerging as a multimillion-dollar industry in forthcoming times.

Impact of Space Tourism on Space

As the ambit of space law is widening, concerns about applying laware also emerging. The biggest concern about space law is to adjudicate the nature and scope of law that will be pertinent to it. The applicability of law on space tourism shall be based on two prime criteria viz; *Ratione Loci* where the place of providing transport, either airspace or outer space, is taken into consideration, and another one is *Ratione Materia* where means of transport will be taken into consideration. In Ratione Loci, no agreement for demarcating airspace and outer space has been endorsed. Nevertheless, the Chicago Convention 1944 in Article 1 grants exclusive jurisdiction over airspace to the sovereign states.[11] While space law denies jurisdiction over outer space by any sovereign

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[8] Profile: Tito the Spaceman, BBC News (Jan. 22, 2019, 01:11 AM) <news.bbc.co.uk/2/hi/science/nature/1297924.stm>

[9] Carolyn, British tycoon wants to fly you to space/ Virgin Galactic plans to sell $200,000 rides, SFGATE (Jan. 22, 2019, 01:12 AM) <https://www.sfgate.com/news/articles/British-tycoon-wants-to-fly-you-to-space-Virgin-Galactic-2691181.php#tem-85307-tbla-2>.

[10] Louis de Gouyon Mtignon, Space Tourism Legal Aspects, Space Legal Issues (Jan. 22, 2019, 01:23 AM) <https://www.spacelegalissues.com/space-law-space-tourism-legal-aspects/>

[11] *Convention on Civil Aviation ("Chicago Convention")*, 7 December 1944, (1994) 15 U.N.T.S. 295.

states. United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) only limits itself in consulting with States to regulate their national activities in space. States had diversified opinions on deciding the altitude and limit of airspace. For instance, Australia passed a law in 1988 that defined the limit of airspace to an altitude of 100 km.[12] In the meantime, Prof. Dr. Stephan Hobe provided a parameter to determine the means of transport that space law shall govern. As stated by him, rockets that use their engine for vertical thrust shall be considered Space Object whilst aircrafts capable of supportingthemselves in the atmosphere shall fall under the domain of airspace law.[13] With this parameter, the Astrium Space Transportation, a suborbital device of EADS whose jet-sized aircraft with traditional aircraft engines will work while a rocket will be used for space climbing, might get approved under airspace law since more than 90% of the travel will be conducted by the aircraft only and not by the rocket. In European Union, such devices are to be certified by European Union Aviation Safety Agency which is expected to bring new categories in the future for certifying suborbital flights.[14] ,Virgin Galactic's device is categorically unsettled as under which law it will be governed since its aircraft carry a rocket that takes a vertical assent following the dispatch and goes up to an altitude of 100km before returning to its host aircraft. Para 19 of the U.S Commercial Space Launch Amendment Act 2004 asserts that Suborbital devices are the rockets intending for a flight on a

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12 Civil Aviation Act, 1988 (Cth) (Austl,).

13 Stephen Hobe, Spacecraft, Satelites and Space Objects, Oxford Public International Law (Jan 22, 2019, 02:11 AM) <https://opil.ouplaw.com/view/10.1093/law.epil/9780199231690/law-9780199231690-e-1222>

14 Europe joins space tourism race, The Times, (Jan. 22, 2019, 02:12 AM) <https://www.thetimes.co.uk>.

suborbital trajectory and whose thrust is greater than its lift for the majority of the rocket-powered portion of its ascent.[15] Therefore, the precondition of a space object is that the vehicle must be a rocket more in structure, intending for a suborbital flight with a vertical ascent. So that, space law will be applicable to space tourism based on the manufacture and nature of the devices used for the transit rather than fixed demarcation between Airspace and Outer space.[16]

Another area of concern is the status of Space Tourists, which depends upon the legal definition provided under various national legislations with a varying degree of impact from the International treaties, especially the COPUOS. Para 17 of the U.S Commercial Space Launce Act 2004 states that a customer of the travel agencies arethe space flight participants who are not crew and are carried either in a launch vehicle or a re-entry vehicle.[17] However, this definition raises a question about whether a customer can be regarded as an astronaut? Furthermore, suborbital flights are distinctive of the long stays in space. In suborbital flights, passengers get to stay in space for a few minutes. Therefore, considering the altitude is 100km, those customers or astronauts will be governed by space law only for a fraction of time. Meaning their rights will be guaranteed under space law only for a few minutes. While, in the case of long stays, space passengers might be regarded as envoys of mankind, which is again not without the effect of third parties. After all, many facets of space law still

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[15] Commercial Space Launch Amendments Act, Pub. L. No. 108-492, 118 Stat. 3974 (2004) (codified as sections of 49 U.S.C.).

[16] Supra note 10.

[17] Commercial Space Launch Amendments Act, Pub. L. No. 108-492, 118 Stat. 3974 (2004) (codified as sections of 49 U.S.C.), at para 17.

require the attention of appropriate laws such as compulsory safety equipment for the passengers and the pilots, the frequencies to be used, the interactions with the Air Traffic Control or the Space Traffic Management, etc. considering the International Space treaties, no sovereign nation may claim space under their jurisdiction. However, parties to such States must be liable if any damage caused by them during their voyage.[18] Interesting that, whether such states parties will be responsible for any harm caused to any passenger who himself/herself gives consent to such a flight?

The contractual relationship between the passengers and the transport companies another area of concern in space law. Space law involves great risk; hence it is necessary to educate the passengers of the various safety threats involved in the journey beforehand and simultaneously, vital to examine for professional misconduct on the part of transport operatorsThe U.S. has made a significant advancement by propounding two crucial texts that adjudicate operators and passengers' relationship. One Commercial Space Launch (Amendment) Act 2004 and others are the Regulations adopted by the Federal Aviation Administration (FAA) in December 2006. The FAA regulates the supplying equipment as per the 2004 Act and lays down rules regarding informed consent of the passengers and ensuring that they are well informed about the probable risks in advance as well as Rules for fixing financial responsibility and liabilities.

Meanwhile, experimental permits are subjected to separate Rule-making. These rules ensure noteworthy prominence on the notion

[18] Supra note 10.

of informed consent. It requires the operators to inform about the risks involved in such flights alongside measures to avert such accidents. The law explicitly states that passengers must be able to perceive all the information as they have to give written informed consent. Minors under 18 years of age are ineligible as they cannot provide informed consent.[19] Likewise, the State of New Mexico from where Virgin Galactic operates adopted a legal stand that, if a passenger gives free consent and admits that he has perceived all the necessary information to become a space tourist and subsequently suffers from any fatal injury during his journey, the operators will not be bound by liabilities for such accidents caused to the passengers. On the contrary, if such accidents occur due to the operators' negligence, there shall be no immunity to the operators despitethe prior informed consent of the passengers.[20]

Last but not least, space law commits to third parties due to the International Treaties. The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon or other Celestial Bodies (1967) as well as The Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space (1968) obligates the States to rescue Astronauts of all origins at Sea, On Earth and in Outer space. Article V of the 1967 Treaty directs the signatory States to treat the astronauts as envoys of humankind and provide them all assistance during emergencies, danger, and distress. States must make necessary arrangements for their safe return to the launching State or to the State register itself and must inform either the signatory States or the Secretary-General of

[19] US draws up Space Tourism Rules, BBC News (Jan. 22, 2019, 02:23 AM) <news.bbc.co.uk/2/hi/science/nature/4589072.stm.>

[20] Ibid.

United Nations about any activities that may cause harm to the astronauts. Article 2 of the 1968 Agreement directs the Contracting parties to take reasonable care to rescue astronauts in danger and inform Launching authorities or the .N.U.N. Secretary General. However, these rules speak about assisting the space tourists who go for a long stay in space but are silent regarding the safety of suborbital tours. Article VI of the 1967 Treaty confers responsibility upon the States for any national activities conducted in space, whether carried out by government or private entities. Meaning, in case of accidents during a suborbital tour, the host States shall be responsible for the damage caused. That is why in U.S., the FAA considers insuring up to 500 million dollars for the companies themselves and also for the states.[21]

Positive and Negative Impact of Space Tourism

Space tourism as a discipline is now emerging and bringing new agendas for policy-making across the world in the field of education, particularly in developing nations. Institutions like Rochester Institute of Technology in New York[22] and Keio University[23] in Japan have already started to teach Space Tourism. Likewise, space law might enhance the dimensions of Business law as it has great economic potentials and thereby establish new avenues for commercial transactions.[24]

However, many intellects criticize Space Tourism as against the Principle of Social Justice merely because space tourism is a lavish

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21 Supra note 10.

22 Travis Carter, Vacation: The Final Frontier, NYU Livewire, (Jan. 22, 2019, 02:23 AM), <http://journalism.nyu.edu/publishing/archives/livewire/archived/vacation_final_frontier/index.html>.

23 A Goeclich Robert, Space Tourism Lecture.

24 Economic Impact of Commercial Space Transportation on the US Economy 2009, FAA (2010).

affair for the wealthiest people, against social convictions.[25] Furthermore, researchers have proved that increased suborbital launches have a huge potential of increasing global warming and climate-related responses and affect the ozone layer of the Earth, which might cause a threat for mitigating climate change.[26]

Conclusion

Especially in the developed countries, space tourism is now evolving as a new business venture which has the potential of causing an impact on the entire humankind. Thereby, it is vital to set up limits of its horizon, for which it is essential to settle fundamental laws related to space tourism. As per Space law is concerned, so far, it is still in the preliminary stage of development. There are many confusions regarding the limit of jurisdiction over outer space; hence it becomes troublesome to determine the liability and rights of individuals and States engaged in Space activities. However, it is explicit that no state has jurisdiction over outer space, yet all States possess a general responsibility to regulate national activities in space. It has been established that State parties shall be liable for the damage caused either by their government or private entities in the course of their space activities.

Regarding the passengers of space voyage, the principle of *volunti non fit injuria* will prevail, which states that the operators of space tourism shall not be liable for any damage caused to the passengers if they provide prior voluntary informed consent. Space Law will be applicable based on construction and nature of the transport

[25] EU officials balks at space tourism, the Peninsula

[26] Ross, M., Mills, M., and Toohey, D, Potential climate impact of black carbon emitted by rockets, *Geophys. Res. Lett.*, 37, L24810, (2010).

rather than the distance to be covered by the means of transportation. It reflects that space law will be highly dynamic with the advancement of technology as technological inventions are not rigid. Today what is done with a rocket might get possible to accomplish with a simple aircraft tomorrow. Therefore, it is desirable that the applicability of space law must be decided on a fixed parameter rather than the device to be used for exploration.

Last but not least, space tourism has several positive and negative impacts; thereby it is essential to consider all possible consequences before enacting any laws. As it has huge potential for environmental hazards, the Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC) has to remain vigilant toward this newly emerging aspect. In the meantime, space tourism is emerging as a billion-dollar industry that has the capability to bring huge economic profits, especially to developing countries like India in the forthcoming times, thereby rendering it essential to enact legislation to provide scope for responsible growth of space tourism as a new business avenue.

AN INSIGHT OF AVIATION SECTOR DURING COVID-19

Sahana R[*]

Abstract

The impact of natural disasters, terrorist attacks, oil crises, clashes between the armed forces, financial emergencies due to a drop in the revenue, and disease outbreaks is undreamed-of to the Aviation industry but common, just like any other sector. The way the sector deals with these situations is more of a serious concern and determines the survival of the sector. The outbreak of CoViD-19 has led to an unexpected turn in the history of Aviation. This paper gives an insight of activities carried out by the aviation industry during coronavirus outbreak, to remain in the picture and help in recovering from the CoViD-19 pandemic. It is a record of measures taken by the government in co-ordination with the other stakeholders to mitigate the impact of CoViD-19. The role of Aviation during this period determines the future of the sector and provides a platform to learn and be prepared for any future predicament.

Keywords: Aviation, CoViD-19, Vande Bharat Mission, Sustainability, Mitigation

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Introduction

The World Health Organisation (WHO) of China identified several cases of severe respiratory illness in Wuhan city on Dec. 30 2019, which was later diagnosed as CoViD-19 caused by a novel coronavirus. The virus spread to different countries mainly through air travel, and WHO declared CoViD-19 a pandemic on March 11 2020. No one could have foreseen a pandemic like this. Also there has been no similar event with such a huge impact on the economy, society, and health, specifically since the great 1945 war, and the aviation sector has not been excluded. The affected nations imposed a complete lockdown, and the planes were grounded, leading to the shutdown of Air services. The industry is facing challenges due to the imposed restriction in the movement of masses and safety regulations issued in the view of a Pandemic. The aviation sector is trying its best to contribute to the country in all possible ways. Various activities have laid these sectors on the path of recovery from impact due to CoViD-19 (Corona Virus Disease). Some of them are presented in the next section.

International Air Transport Association (IATA) updates by Brian Pearce presents the prediction model of the assessment and recovery plans with the help of two scenarios.[1] An initial assessment with a series of interviews conducted by P. Suan-Sanchez et al. shows that the recovery must be short to maintain a good relationship with the clients for a business traveler and the industry expert expecting a deeply negative impact on aviation. Lau et al. investigated the association between Air traffic volume

[1] The first scenario deals with Limited spread assumption where only markets with more than 100 cases are studied and second scenario presents the study of all markets with 10 or more cases.

and the spread of the coronavirus and came up with a relation. These forecast studies play an important in determining the relief measures to ensure smooth and fast recovery from the crisis.

Aviation sector during CoViD-19: Roles and Measures

The Aviation sector is like a labyrinth, with a never-ending list of divisions. At this moment, the industry and the connected shards must work in an organized way to decide on relief measures to address the present challenges and develop recovery plans for the entire aviation domain. To understand the role of the aviation sector in such a situation, some noteworthy measures taken are specified below.

Repatriation of Stranded Citizens

One of the facets of Aviation is Social responsibility. The Aviation sector's contribution towards the protection of people during the pandemic is remarkable. International Health Regulations (2005)[2] or "IHR (2005)" formulated by World Health Organisation (WHO) aims to protect people, provide proper facilities during a disease outbreak, and also account for international trade and transport, which has been in effect from 2007. The outbreak of Coronavirus in Hubei province, Wuhan (China), led to a situation where International traffic was drastically affected, and nations closed borders. The citizens living away from home lived in fear of the virus. Academic Institutions shut down and evacuated students. On the other hand, tourists and other foreign populaces urged to return home. As a result, many of them had no place to go and were stranded in a foreign country.

[2] See International Health Regulations (2005) https://www.who.int/ihr/publications/9789241580496/en/

To resume Air operations for repatriation with a pandemic situation across the world, is a mammoth task. Stringent measures must be taken in order to contain the virus and transport the stranded citizens to their native safely. A noteworthy step taken by the Government of India in this issue is 'Vande Bharat Mission.' This mission required detailed planning of flight missions, stakeholders involved, demand and supply ensuring the Non-transmission of CoViD-19 at any point of travel. 'Vande Bharat Mission' is being executed in phases to ensure the safety of passengers and smooth running of operations. All major airlines[3] have opened their services to the government for repatriation flights.

Vande Bharat Mission: A safe journey home

In May, the Government of India planned to rescue stranded Indians in foreign countries. As explained by Dr. Mahipal Rathore, the situation worsened for abandoned migrant workers and students stranded in different countries where the Non-Government Organisations helped them with basic amenities. It could not be extended for a long time. The Government announced the Largest Evacuation mission in 3 decades which was the Airlift from Kuwait involving 488 flights. A total of 111,711 Indians were rescued from the Gulf after Iraq invaded Kuwait. The mission put its first step on May 06 2020. It involved 64 flights rescuing nearly 50,000 passengers in Phase-1. On the other hand, the preparations for Phase-2 were on the way. The Phase-2 operation started by May 16 and will be extended up to Jun. 08. 30,000 passengers were rescued by 149 flights using Boeing 737-800 operating in 40

[3] Air India is the major operator along with GoAir, SpiceJet, IndiGo and Vistara.

countries. 300 flights to Europe, Australia, Canada, United States of America, United Kingdom, Africa, and other countries operated from Jun. 10 to Jul. 01 in Phase-3. After successfully completing three phases, Phase-4 was designed to rescue more than 1 lakh citizens operating from Jul. 03 and extending up to August 2020. Nearly 945 International flights and 252 feeders make it to 1197 flights scheduled as reported by the Ministry of External Affairs. These flights were commissioned to operate across 29 countries landing in 34 airports in India. The minister of Civil Aviation, Mr Hardeep Singh Puri, said that more than 8 lakh Indians were Repatriated from all over the world. Around 900 flights or more will take part in Phase-5, extending to Canada, the UK, France and Germany, and so on[4]. Once the situation is stabilised, the lockdown can be recalled, and the air operations are expected to resume. (Note: The numerical data is approximate as reported by the media). The military and civil aviation are jointly working[5] to make this mission a grand success. Along with the private airlines, certain military aircraft like C-17 Globemaster and C-130J Super Hercules have been commissioned to return bulk masses in a short window.

The Massive Evacuation process makes sure that the infection protocols are strictly followed, and citizens return to their natives. The mission involves a two-way traffic where stranded citizens possessing Visa, Green card or Citizenship willing to return to their country from India were transported via these flights. This way, the burden of taxpayers is reduced. The passengers have to submit an undertaking of mandatory quarantine for 14 days in a

[4] The numerical data is taken from media reports on 'Vande Bharat mission'.
[5] Along with airlines the naval sector has extended services of repatriation.

Government facility. This rule faced serious opposition as the financial status of most of the travelers was weak as they had spent it on the expensive tickets, and to pay for the quarantine facility made it more challenging to manage, which kept them demanding for home quarantine to reduce expenses. But it is to be noted that the containment of the virus is a vital measure to stabilise the situation.

Financial facets of Aviation during CoViD-19

The CoViD-19 outbreak made a deep mark on the financial sector of every industry. Aviation is the most affected as the Air transport operations had to be halted for a long time. Alexandre de Juniac, Director General of IATA, quoted that most airlines are cutting capacity and taking emergency measures to reduce losses. Financial markets have been warning about the decline. The situation is worsening on a day-to-day basis. Airline share prices have fallen nearly 25% [2] since the outbreak of this deadly virus. Around 21% [2] points greater than the decay that befell at a similar point during the SARS crisis of 2003. A similar model was studied during SARS. A positive impact of reduced oil prices could cut costs up to $113 billion [2], as reported by IATA in a press release on Mar. 05 2020 [2]

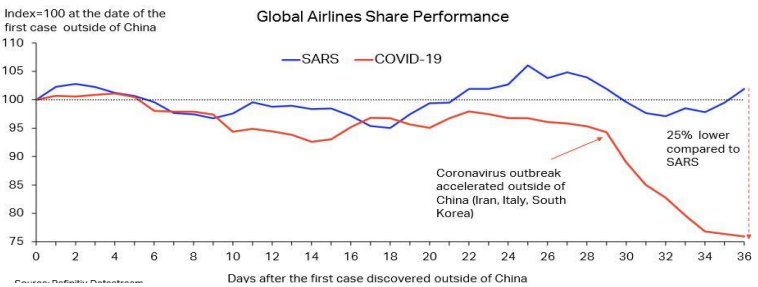

Fig 1. Anticipated fall of Airline profits globally during SARS and CoViD-19 outbreak [2]

Talking about savings to the sector due to reduced operations might provide a cushion but cannot completely ward off the impact of CoViD-19 (Fig 2) outbreak, but the decline seems to have taken a sharp V with 25% [2] lower profit. (Fig 1)

The economic councils have taken measures to mitigate the issue. The European Union (EU) Commission proposed to amend the EU Slot Regulation (EEC 95/93) where the airlines were required to operate 80% of their allocated slots or face losing their rights in the future when the operations return to normal. Hence if the amendment is through then there was no need for the 'ghost flights' to operate which would reduce emissions and expenses occurring by flying empty flights. Along with these, the import of aircraft has not been halted. India had signed an agreement with France to procure 36 Rafael fighter jets at the cost of $7.86 billion in September 2016. At this crucial time, certain aircraft are crashing onto the ground. The damage of an aircraft that brings in a huge loss to the back-end team, the airline itself and the country as a whole is unimaginable. Hence the Government must plan to account for the overall expenses of the sector and advise legally and help in recovery wherever possible.

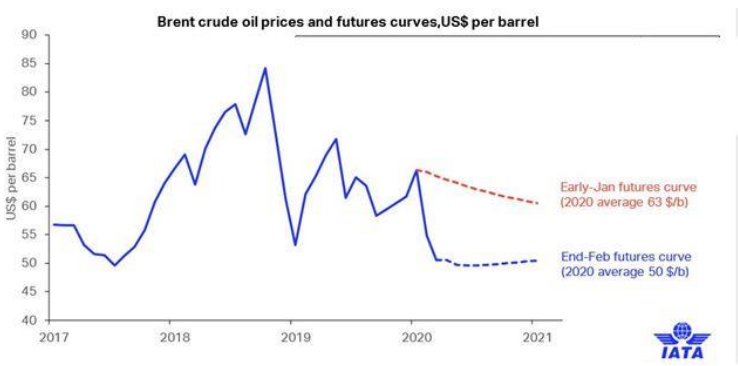

Fig 2. Drop in Crude oil price due to a pause of Airline operations

Airport and Airlines status quo

Airlines are doing their best to stay in the market as they are the bridge to world financial prudence. The Air transport industry restart is directly related to the recalling of lockdown and travel restrictions imposed by the countries and their states. The path of recovery will progress by letting the Non-Essential domestic flights and slowly leading to the coordinated planning of International flights to ensure safe two-way traffic. But to make this conceivable, it is crucial to restore customers' confidence in terms of health and safety. It can be noted from Fig 3 that the overall demand for the first few months post-outbreak is on the path of declination. With the falling economy, ticket pricing plays an important role in determining the need for air travel.

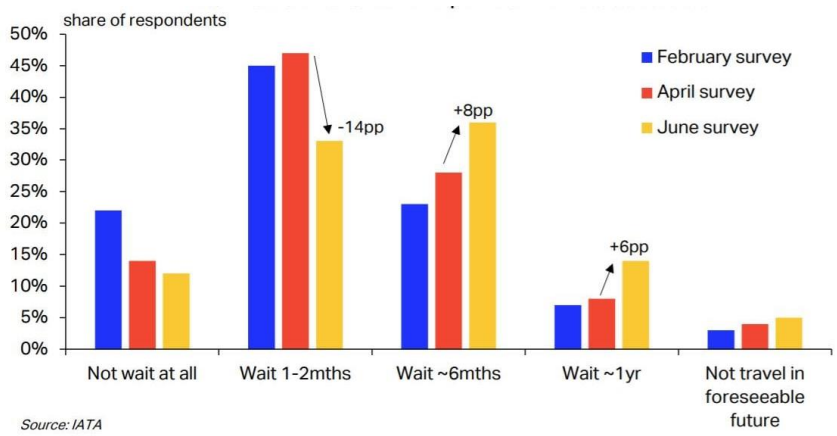

Fig 3. IATA survey on willingness to travel Source: IATA Economics' chart of the week[6]

With regards to travel bookings, there is a risk of airline and tour operator bankruptcies, booking obstinacy and rigid flight cancellation rules, which may extend the restraint of people to plan

6 See IATA Economics' Chart of the week 26 June 2020

non-essential travel. Adopting to a new normal is essential from the customer's perspective. Social distancing norms shall become mandatory until a vaccine is developed. Airports need to review the existing terminal capacity so as to accommodate extra space or organise new terminals. In some airports, there is already an Airport Operations Centre (APOC) set up to drive greater airport association and productivities to cope with surging air demands and airport congestion. Health screening using thermal scanners is most likely to become the must-pass stage, also not to forget this was the first measure taken to screen international travellers as the outbreak began. Along with this, electronic health declaration, testing kits, emergency rooms and regular sanitisation are likely to become a segment of future Airports.

As a part of new mitigation measures being introduced in airports and on-board aircraft with respect to cleanliness, sanitization and social distancing, as well as health screen procedures on departure and arrival. This process is likely to continue and, for this to be most operative, a global approach should be taken. Airports Council International (ACI) is working with the authorities[7] and other global members to plan for strategies that will run for a smoother recovery. The structural changes to which the airline can be subjected might pose a potential risk to the long term growth of the industry. One of the measures to reduce cost can be Airline re-organising and efficient Flight planning. The airlines lookout for a more cost-effective mission ; larger airlines in the market take it as an advantage to remain in the play and drop secondary destinations. This way, the market shares, and slots are maintained

[7] The commission involved the participation of World Health Organization (WHO), International Civil Aviation Organization (ICAO), the International Air Transport Association (IATA)

along with the overall sustainability, leading to the first step towards recovery with some economic benefits. Another plan involves Airline flight mission re-organising which leads to the suspension of larger aircraft like Boeing B787 and Airbus A380 thereby reducing the requirement for airports to provide slots, infrastructure and serve the maintenance of the aircraft. The airports must account for greater demand for engine ground runs, towing activities, daily checks, staff health, and smooth terminal operation once the situation stabilises. The Airlines can recover faster compared to the Airport segment as they fall due to loss. If the airlines are made part of National Infrastructure, comparatively additional aids are attained. Some airlines are involved in spraying medicines, pesticides and aiding emergencies during natural calamities. It can be inferred that the role of authorities like ICAO, IATA, WHO and the Government is significant in determining the survival of an Airport or Airline industry as a whole during the pandemic.

Sustainable path of Aviation industry during CoViD-19

Every predicament offers a window to employ creativity and innovation in the future developments of a sector. It is the positive impact of the crisis that must be considered. As can be seen, the CoViD-19 outbreak has become one of the never foreseen crises and an opportunity to improve and work for a better future. Once the crisis ends, it must be made sure that the sector is on a Sustainable path. The industry must employ a low carbon future. Though aviation's contribution to air pollution is lesser than Internal Combustion engine emission, which leads to both health issues and climatic changes, it cannot be ignored in terms of long-term effects. The fact that sustainable growth provides prolonged

safety must be the main motto. Post the coronavirus crisis, operations may reach the peak leading to a deteriorated environment. CoViD-19 has opened the doors for innovation, and it is the best time to implement advanced technology to be prepared for future pandemics and stimulate the economy for a better world. To simplify, two approaches are explained. one approach is to focus on the economy as well as the environment links. For Economic progress, the Government strategically plans, allocates funding, and waits for the GDP to grow gradually. For example, Air France won a $7.7 billion bailout from the European Union to which the Dutch states pledged billion dollars. The carrier acquired a state guarantee and a subordinated shareholder loan, a financial lifeline needed for its survival in the face of a collapse in revenue due to the coronavirus pandemic that has thrashed the global industry. The government has laid down conditions with respect to the bailout of the carrier, and it is supposed to be "World's most Eco-friendly Airline" to satisfy the bailout terms.

The industry can focus on sustainable development so as to remain in the market. The second approach is Design optimisation. Design field is progressing without stimuli in various fields to set the industry on a greener path. It involves changing the design, system, tools, product life cycle, production methods,, and maintenance to improve the sector. Another contributing factor is the use of Solar powered and Electrical aircraft. The aviation industry accounts for a higher share of greenhouse gas emissions by 2050, even if it stands at 0.1% at present. To account for this increased environmental demand to reduce carbon footprint Sustainable

Aviation Fuel (SAF) must be used. SAF is known to reduce the Carbon footprint by 80%.

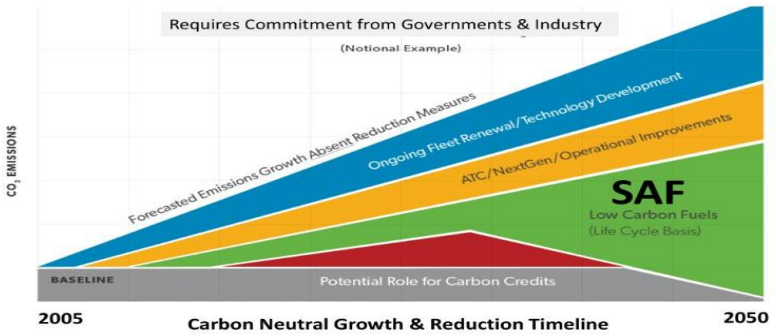

Fig 4. Forecast of reduction of CO_2 emission with the use of SAF

The development of airships will lead to cheap, sustainable, and climate-friendly innovation, which will have a huge impact on the countries with less connected infrastructure.

The Clean Skies for Tomorrow Coalition estimates the yearly CO_2 emissions share of the aviation chain stakeholders. These studies provide a background for developing a better design for all the connected members. Also, any law or policy accounting for the sustainable growth of the aviation sector must be passed at the earliest. Hence by employing these measures, the aviation industry will prosper along with an immense contribution to make the planet healthy.

Conclusion

The key to success is to plan for long-lasting growth. Forecast studies have contributed to the recovery by aiding in planning the suitable relief measure. The steps taken by the government to repatriate the citizens is appreciable and set an example. Offering financial aids and ensuring sustainability is one of the bold steps

taken such that the industry remains in the market and protects the Earth. The safety measures taken by the airline and airport industry depicts the etiquette and boosts the confidence of the customer for future travel. The financial sector's recovery can be slow-paced, but the role of the stakeholders is vital. The research and development sector is expected to be driven more than ever during the crisis to contribute to new designs, safety equipment, and financial and medical emergencies. It can be seen that every measure taken to drop the industry on a growing path requires the Government and Air Travel industry to co-operate and co-ordinate the research so that the world is well equipped and far beyond the imagination prior to the outbreak.

SPACE AS THE NEXT STEP TO LIFE

Bijayini Namrata Patel

Abstract

Discovery of evidence of life to open up an opportunity for youth minds would become more interested in finding biological signatures which would lead to development of space industry in India because its having a very wide scope. The paper includes the fact and motive that science analysts are trying their level best to take life into space so they actively participating in Aeronautics and developed a team called National Advisory Committee for Aeronautics (NACA). ISS which is a laboratory in space developed the environment for the astronauts to live and work there. The struggle has started since the day when Yuri Gagarin stepped to space not only in the United States but also all over the world. India has been in the force since the 12th century where we have legends like Bhasakaracharya. It has continued today and recently India successfully completed the Mars Mission. India currently progressing towards Remote Sensing Technology which is an important component in space science and technology that aims to maximize utilization of country's natural resources by the programme of National Natural Resource Management System (NNRMS).

For the peaceful usage of outer-space, the international space law has been developed. These codified space

laws specifically the Public International Law gives opportunity and ensured free and non- discriminatory access to space. The provisions of the act provide the legal support to the private entity which is going to be settle on moon, mars and any asteroids. Still a powerful space system is completely essential. Its nonappearance can ruin India's development in future. We should take proactive measures to guarantee its detailing and execution.

Key Words: Biological Signature, Russian Soyuz Spacecraft, NNRMS, Public International Law.

Introduction

Humankind's enthusiasm for the heavens has been general and persevering. People are headed to investigate the obscure, find new universes, push the limits of our logical and specialized cut-off points. The immaterial want to investigate and challenge the limits of what we know and where we have been has proven to be beneficial to the general public.

Human space investigation assists with tending to major inquiries regarding our place in the Universe and the historical backdrop of the various other planetary groups. Through tending to the provokes identified with human space investigation which grows innovation to make new enterprises, and help to encourage a quiet association with different countries.

The Space Race was a twentieth century rivalry between two Cold War matches, the Soviet Union (USSR) and the United States (US), to accomplish feats in spaceflight ability. It had its starting point in the ballistic rocket based atomic weapons contest between

the two countries that occurred post World War II.[1] The Space Race prompted spearheading endeavours to dispatch artificial satellites, unmanned space probes to the Moon, Venus, and Mars, and human spaceflight in low Earth circle and to the Moon.[2] The Soviet Union accomplished the principal effective dispatch with the October 4,1957, circling of Sputnik 1, and sent the primary human to space with the orbital trip of Yuri Gagarin on April 12, 1961. The USSR additionally sent the lady, Valentina Tereshkova, to space in 1963, with various firsts occurring throughout the following not many years concerning flight length, spacewalks and related exercises. As indicated by Russian sources, these accomplishments prompted the end that the USSR had a preferred position in space innovation in the mid-1960s.

This paper is going to explore aerospace engineering while considering the contribution of Indian astrologers to develop aeronautical engineering. Advanced plane design, also known as aeronautical engineering, alludes to the designing engaged with making, building and creating airplane and shuttle.

Space Exploration: India Where it All Begins

The battle has started since Seventh century in the Brahmagupta era. He built a 'Cosmic Model' utilizing which Bhaskara had the opportunity to characterize 'Astronomical Quantities'. He precisely determined the time that Earth took to revolve around the Sun as 365.2588 days that is a distinction of 3.5Minutes of present

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1 History.com Editors, *The Space Race*, HISTORY (Feb. 21, 2020), https://www.history.com/topics/cold-war/space-race.

2 Martand Jha, *Genesis Of The Space Program: How A 'Non-Aligned' India Negotiated The Space Race*, OUTLOOK (Oct. 3, 2017), https://www.outlookindia.com/website/story/genesis-of-the-space-program-how-a-non-aligned-india-negotiatied-the-space-race/302555.

day acknowledgment of 365.2563 days. Bhaskarachyra in his book 'Surya Siddhant' he composed on the gravitational power, that makes a difference to keep the planets, the Sun and the moon in their particular orbits much before the world could even arouse and acknowledge to these discoveries. 'Kuttaka' the Quadratic Indeterminate conditions was given by him in twelfth Century a long time before the European mathematicians got it in the seventeenth Century.[3]

Our India was a place where there is theory and religion as well as a profound ground for science and innovation numerous incredible sages composed immense writing on science and innovation since ancient time. Of which sage Bharadvaja's Vaimanikasastra is one of the most famous and pertinent writings, in any event, during in this manner mechanical pinnacle of twenty first century.

There is a use of the airplane in the Ramayana and Mahabharata. As referenced in Ramayana, Ravana has utilized Puspakavimana which had been caught from Kuvera. However, slam assumed responsibility for the airplane. Gayopakhyanam in Mahabharata likewise discusses utilizing airplane.[4] Western researcher estimate about the relic of the aeronautical science to be around 5000 years. Indian researchers and pundits have an alternate supposition passing judgment on the quantity of years. They state that the broad utilization of airplanes in Ramayana and Mahabharata showing that air transportation was a much before this period.

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[3] Jayasankar G, *Concept of aeronautics in ancient India*, VEDIC SCIENCE (Mar. 4, 2018), https://www.sanskritimagazine.com/vedic_science/concept-aeronautics-ancient-india/.

[4] Velcheti Subrahmanyam, *Of the Mythical World*, THE HINDU (Jun. 21, 2012), https://www.thehindu.com/features/friday-review/theatre/of-the-mythical-world/article3550483.ece.

Air transportation or Vaimanikasastra is a piece of Yantrasarvavsa of Bharadvja. It deals with flight related, including the structure of airplane, the manner in which they can be utilized for transportation and different applications. Sage Bharadvja clarified the development of airplane and approach to fly it in air ashore, water and submarine also. He likewise portrayed the development of war planes or contender airplanes. Jatyadhikarana which orders airplanes says, 'Jatitridyam Yugabhedath Vimananam' quoted in Hindu mythological books that reflects aviation technology was absolute first apparent in Quite a while in India.[5]

India's relationship with space goes back to its first rocket dispatch in 1963 under the direction of the visionary, Dr. Vikram Sarabhai. Thus, it was the dispatch of Aryabhatta, the primary Indian satellite. From that point forward India's endeavours have been solidified into a few missions with applications in the regions of correspondence, broadcasting, meteorology and oceanography, review of characteristic assets, observing condition, and anticipating fiascos, credit to the Indian Remote Sensing Satellite (IRS) and Geosynchronous Satellite (GSAT). Along these lines, with the presentation of the Polar Satellite Launch Vehicle (PSLV) and the Geosynchronous Satellite Launch Vehicle (GSLV), India engaged itself to turn out to be just the seventh country on the planet with indigenous satellite launch capacities, in this manner shedding its reliance on others. At that point came the momentous launch of Chandrayaan (the moon crucial) Mangalyaan (Mars Obiter Mission) in 2008 and 2014 respectively, which encapsulated the nation's mechanical capability.

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[5] Vinaya Deshpande, *Rishi has given guidelines to make planes*, THE HINDU (Jan. 4, 2015), https://www.thehindu.com/news/cities/mumbai/first-man-to-build-and-fly-an-aircraft-wasindian/article6753840.ece.

Aviation design was once referred to similarly as ‘aeronautical’ yet was later supplanted with ‘aviation’ so as to mirror the progressions and headways of empowerment.

The occupation of a plane architect is to structure airplane, satellites, rockets and shuttle. They are entrusted with testing models just as planning segments and significant parts for these specialties. With regards to planning air and rocket, weight is significant. This is on the grounds that lighter machines can travel quicker on less fuel. Indeed, even the smallest improvement to the wire structures utilized inside the boat’s controls could have an immense effect. Since airplanes are an inconceivably and significant innovation, making enhancements may likewise require the utilization of custom springs to make lighter and more grounded vessels.

A human excursion to Mars, from the outset, offers an endless measure of complexities. To carry a strategy to the Red Planet from fiction to truth, NASA's Human Research Program (HRM) has composed perils space travellers will experience on a persistent premise into five arrangements.

Challenges to Be Overcome by NASA’S HRM

Different research stages give NASA important knowledge into how the human body and brain may react during expanded invasions into space. The subsequent information, innovation and techniques created fill in as significant information to extrapolate to the interplanetary missions.

1.Radiation

The primary danger of a manned mission to Mars is significant in light of the fact that space radiation is imperceptible to the human

eye. Radiation isn't just stealthy, yet thought to be one of the most threatening of the five dangers.

The space station sits inside Earth's defensive prone field, so while our space travellers are presented to ten-times higher radiation than on Earth, it's as yet a littler portion than what profound space has coming up.

2. Isolation and Confinement

Social issues among gatherings of individuals packed in a little space over a significant stretch of time, regardless of how all around prepared are inescapable. Groups will be picked with great care and upheld to work adequately as a group for quite a long time or years in space.

To address this peril, strategies for observing conduct wellbeing and refining different devices and advancements for use in the spaceflight condition are being created to distinguish and treat early hazard factors. Research is likewise being directed in outstanding task at hand and execution, light treatment for circadian arrangement, stage moving and readiness.

3. Distance from Earth

The third and maybe most obvious danger is the distance of 140 million miles from Earth. As opposed to three-day lunar probe, space explorers would leave Earth for approximately three years. While International Space Station campaigns fill in as a harsh establishment for the normal effect on arranging coordination for such outing. In the event that a clinical occasion or crisis occurs on the station, the group can get back inside hours. Furthermore, load vehicles resupply the groups with new nourishment, clinical gear, and different assets continuously.

4. Gravity

The fluctuation of gravity that space travellers will experience is the fourth peril of mankind in space. On Mars, space travellers would need to live and work in three-eighths of Earth's gravitational draw for as long as two years. Also, on the half year trek between the planets, wayfarers will encounter absolute weightlessness.

Research is being directed to guarantee that space explorers remain sound previously, during and after their central goal. NASA is recognizing how present and future, FDA-endorsed osteoporosis medicines to avoid bone loss during space exploration. Versatile preparation and improvising the capacity to identify important tactile information are being explored to relieve balance control issues.

5. Hostile environments

NASA comprehends that the biological system inside a vehicle assumes a major role in regular space explorer life. Liveability factors incorporate temperature, pressure, lighting and commotion. It's basic that space explorers are getting the essential nourishment, rest and exercise expected to remain sound and glad.

NASA's Human Research Program stays focused on protecting the wellbeing and essential of the group that will soon land on Mars. While these five dangers present critical difficulties, they likewise offer an opportunity for development and advancement in innovation, medication and our comprehension of the human body.

NASA'S Successful Attempts

Human Research Programme

NASA's Human Research Programme (HRP) is committed to finding the best techniques and advances to help sheltered, gainful human space travel. HRP empowers space investigation to aeronautical engineers for looking into the base level off the offices of the International Space Station to find the best possible situations. This prompts the improvement and conveyance of an investigation biomedical program concentrated on educating human wellbeing, execution, and liveable models; the advancement of countermeasures and hazard moderation arrangements; and propelled tenability and clinical help advances.

Innovations By Isro

The capability of the innovation for cultural applications keep on enticing ISRO and endeavours are on to use the advantages of innovation for the advancement of humanity. Significant activities sought after by ISRO towards cultural advancement incorporate Tele-training, Tele-medication, Village Resource Centre (VRC) and Disaster Management System (DMS) Programs.

Training Development and Communication Channel

Training Development and Communication Channel (TDCC), has been functioning since 1995. It gives one-way video and two-way sound arrangement which found across the Direct Receiving Systems (DRS) and have offices to associate with teachers utilizing phone lines. A few state governments and colleges are utilizing the TDCC framework broadly for Distance Education, Rural Development, Women and Child Development, Panchayati Raj, Health, Agriculture, Forestry, and so on.

Physical and organic researchers have thought about the difficulties of information necessities for 10 years or more and have distinguished the utility of satellite remote sensors as significant wellsprings of reliable, persistent information for climatic, sea, and land learns at an assortment of spatial and worldly scales. A broad collection of writing on various scientific disciplines records the improvement of, or potential for, satellite sensor information investigation strategies to distinguish ecological properties and screen physical and natural procedures applicable to worldwide change look into.

Satellite sensor information has proven to be helpful to the barometrical and sea sciences networks. While social researchers may have little inclusion in the logical investigation of the organic, physical, and substance forms being tended to inside these networks, human measurements premiums are related with the reasons for the irritations to air and sea frameworks being examined and in the resultant wellbeing and financial impacts on people.

During the space journey America tried its ability for advancement and change along with the improvement of the jet engine reduced the requirement for broad research on powers related with customary airplane. Lewis Laboratory Director, Abe Silverstein drew new authoritative outlines, the first to transparently recognize that the NASA and the Lewis Laboratory were prepared to seek after research in rocketry.

Achievements of NASA

NASA can be glad for continuous job in empowering aeronautical development and inventiveness, an examination legacy that goes

back a 100 years to the arrangement in 1915 of the National Advisory Committee for Aeronautics (NACA). March 3, 2015 imprints the centennial of this event. NACA's objective is to manage and coordinate the logical investigation of the issues of trip with a view to their viable arrangement, and to decide the issues which ought to be tentatively examine their answer and their application to handy inquiries. Through the span of NACA's 43 years, it made crucial flight related leaps forward in the manner the present airplane and rocket are fabricated, tried, and planned. NACA's noteworthy research started a significant number of the key advances that quickened the improvement of protected, successful, and efficient air travel.

Opportunity in Aviation Industry

Aviation Industry offers its clients the satisfactory approach to travel, so the work power can be more effective. It has been seen that the workforce in the aviation industry have endured a few issues because of financial variances, however it is the nearness of solid worker's organization structure in the carrier portion that has kept the representatives from being misused in the hands of the aircraft organizations and their administration.

Throughout the years, Indian Earth Observation satellites have been assuming a noteworthy job in empowering stock and the board of common assets, foundation arranging and debacle the executives. These satellites give best chances to outline earth's assets at various spatial and transient goals and age of assortment of items and administrations to help host of topical applications in the regions of land and water, sea and climate, biology and condition and so forth including execution of formative plans and dynamic procedures. NNRMS brings out intermittent notices on

various subjects including articles on water assets, horticulture, biodiversity, urban arranging, remote detecting and GIS applications and data about satellites propelled by ISRO and furthermore writes about significant occasions and exercises of NNRMS.

Discovery of Bio Signature Creates Interest in Youths for Aerospace

The quest for outsider 'bio signatures'[6] regularly focuses on the sorts of gases created by Earth life forms, since Earth life is the one model that researchers need to work with. Accordingly, Seager[7] called oxygen our most loved bio signature gas. Scientists have contemplated the climates of in excess of three dozen universes past the nearby planetary group. The number is so little on the grounds that the vast majority of the exoplanets that have been found to date lie hundreds or thousands of light-years away for the most part, too far off to even consider probing in any detail with current instruments. Discovery of evidence of life to open up the opportunity to the youth minds which make them more interested in aviation engineering. It would create a new path for them as well as the development of economic growth of a developing country like India.

Vyomitra[8] was developed by the Indian Space Research Organization (ISRO) to be sent into space, as a major aspect of India's ambitious Gaganyaan mission. The venture eventually

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6 A bio signature is any substance e.g. component, isotope, particle or wonder which gives logical proof of past or present life.

7 Mike Wall, *Alien Atmospheres: The Search for Signs of Life*, SPACE MOTIVE (Jan. 5, 2016), https://www.space.com/31519-alien-life-hunt-biosignatures-exoplanet-atmospheres.html.

8 It is a female looking spacefaring humanoid robot being created by ISRO to work for Gaganyaan which is an orbital space craft.

plans to send three space explorers to space in 2022, which, on the off chance that it occurs, will be a record-breaking first for India[9].

ISRO has demonstrated itself to be resolved and versatile as they moving forward by the help of Indian Prime Minister Narendra Modi, to finance up and coming space voyages. In September 2019, ISRO were cheerful that India would be only the fourth nation to delicate land a shuttle on the moon with its Chandrayaan-2 crucial, in a disillusioning unforeseen development, the rocket crash-arrived because of a slowing down blunder.

In any case with chief Kailasavadivoo Sivan affirming toward the start of January that a third lunar strategic, had been endorsed and could dispatch as ahead of schedule as this year. The bigger Gaganyaan venture will send two unmanned specialties into space in December 2020 and June 2021, preceding sending three shortlisted space explorers and potentially Vyomitra, in 2022.

Regardless of confronting analysis for underwriting financing for space travel while India fights with monetary issues as a creating country, Chief K Sivan demands that space advancement energizes the young people of India to prepare to stun the world. He has recently expressed that beginning a space program in India in 1960 was a major insane thought yet originator Dr. Vikram Sarabhai anticipated the capability of room innovation in changing the nation.

Presently the ISRO's most recent advancement, Vyomitra may even support progressively youngsters, especially ladies, to fantasy

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[9] The Project staff, *Meet Vyomitra, India's First Humanoid To Be Sent To Outer Space*, DAILY (Jan. 24, 2020), https://10daily.com.au/shows/theproject/news/a200124precq/meet-vyomitra-indias-first-humanoid-to-be-sent-to-outer-space-20200124.

about turning into a space traveller. After all, Vyomitra has capability she will be distant from everyone else in the initial two space missions of venture Gaganyaan, speaking to her nation as they capably speed ahead in the domain of room innovation. Remote sensing is the way toward recognizing and checking the physical qualities of a region by estimating its reflected and produced radiation good ways off ordinarily from satellite or airplane[10]. Exceptional cameras gather remotely detected pictures, which help specialists 'sense' things about the Earth.

Remote Sensors and Remote Sensing Technology

Remote sensors gather information by recognizing the vitality that is reflected from Earth. These sensors can be on satellites. Remote sensors can be either inactive or dynamic even aloof sensors react to outer boosts. They record regular vitality that is reflected or transmitted from the Earth's surface. The most well-known wellspring of radiation identified by latent sensors is reflected daylight.

Interestingly, dynamic sensors utilize interior boosts to gather information about Earth. For instance, a laser-pillar remote detecting framework extends a laser onto the outside of Earth and measures the time that it takes for the laser to reflect back to its sensor.

Instances of aloof remote sensors incorporate film photography, infrared, charge-coupled gadgets, and radiometers. Dynamic assortment, then again, discharges vitality so as to filter items and regions whereupon a sensor at that point identifies and quantifies

[10] PHILLIP OLLA, SPACE TECHNOLOGIES FOR THE BENEFIT OF HUMAN SOCIETY AND EARTH 99-120, (Springer, 1st Ed. 2009).

the radiation that is reflected or backscattered from the objective. Remote detecting is the way toward recognizing and checking the physical qualities of a territory by estimating its reflected and discharged radiation good ways off (commonly from satellite or airplane). Unique cameras gather remotely detected pictures, which help analysts 'sense' things about the Earth.

As India's second strategic the moon, Chandrayaan-2, is ready to make a delicate arriving on the southern surface of the moon in the early long periods of the computerized reasoning or the artificial intelligence fuelled wanderer of the Indian Space Research Organization (ISRO), will assume a noteworthy job in this present crucial.[11]

Artificial Intelligence

Initiated 'Pragyan' (intelligence in Sanskrit), the home-grown sun oriented controlled mechanical vehicle that will move the lunar surface on six wheels, contains a Laser Induced Breakdown Spectroscope (LIBS) from the Laboratory for Electro Optic Systems (LEOS) in Bengaluru. Its objective is to distinguish components present close to the arrival site, and an Alpha Particle Induced X-beam Spectroscope (APIXS) from the Physical Research Laboratory (PRL) in Ahmedabad that will assess the structure of the components close to the arrival site.

Thus, alongside the JPL Artificial Intelligence bunch at the California Institute of Technology (Caltech), the Institute of Astronomy-University of Hawaii has built up a product framework

[11] Raj Chengappa, *ISRO Chief K Sivan on Chandrayaan-2 landing: in rocket science, there are always unknown unknowns*, INDIA TODAY (Sept. 13,2019), https://www.indiatoday.in/magazine/cover-story/story/20190923-interview-in-rocket-science-there-are-always-unknown-unknowns-1598448-2019-09-13.

called Sky Image Cataloguing and Analysis Tool (SKICAT) that fuses the most recent in the AI innovation including AI and machine-helped revelation in an offer to consequently inventory and measure sources identified in the sky overview pictures - to characterize them as stars or worlds and help a space expert in performing logical examinations of the subsequent article inventories[12].

Polar Satellite Launch Vehicle

The Indian Space Research Organization's (ISRO) Polar Satellite Launch Vehicle (PSLV), which costs almost ₹200 Crore, is a third-age rocket. It is the principal Indian dispatch vehicle to be furnished with fluid stages. PSLV has three variations: PSLV-Core alone (PSLV-CA) without the strong lash on engines; a PSLV with six strong tie on sponsors; and PSLV-XL, the top model, with six expanded strong tie on promoters. The greatest favourable position of PSLV is that it is equipped for setting different payloads into space with multi-payload connectors utilized in the payload fairing. Different motor restarts to accomplish numerous circles in a similar strategic on the mission necessities, have likewise been exhibited effectively for the PSLV.

PSLV has likewise been utilized to dispatch different satellites into geosynchronous and geostationary circles, for example, satellites from the IRNSS star grouping. PSLV utilizes six strong rocket lash on engines to increase the push gave by the first stage in quite a while PSLV-G and PSLV-XL variations.

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[12] *supra* n. 10.

NASA'S Russian Soyuz Technique

The Soyuz is a Russian rocket that conveys individuals and supplies to and from the space station. The Soyuz can likewise take individuals back to Earth. Russian team individuals are called cosmonauts. And the NASA group individuals from the United States are called space explorers whereas group individuals from Europe, Canada and Japan are likewise called space explorers.

The Soyuz takes cosmonauts and space travellers to and from the space station. A Soyuz has space for three individuals to ride in it. The rocket likewise carries nutriments and water to the space station for the travellers.

The Soyuz has two sections. One section is the Soyuz case. The subsequent part is the Soyuz rocket.

Soyuz Capsule

The Soyuz case sits on the Soyuz rocket having three sections. The parts are likewise called modules.

The initial segment of the container is the Orbital Module. The group individuals live in the Orbital Module while they are in circle. This module is about the size of an enormous van. The Orbital Module can interface with the space station.

The second piece of the container is the Descent Module that signifies to go down. The team sits in this part when the Soyuz is propelling to the space station. They additionally utilize the Descent Module for arriving on Earth.

The third module is home to the existence emotionally supportive networks. It holds things like batteries, sun oriented boards and directing motors.

Soyuz Rocket

The Soyuz container dispatches on a Soyuz rocket. A rocket is the thing that dispatches individuals and items into space. After the dispatch, the case and the rocket discrete and some portion of the Soyuz comes back to Earth. The Soyuz container continues onward, and takes just nine minutes to arrive at space.

Indian Aerospace Industries

Hindustan Aeronautics Limited

The Indian Aerospace Industry is seeing a remarkable development. Hindustan Aeronautics Limited (HAL), which is completely possessed by the Government of India, is the head aviation organization in the nation. HAL has assumed a significant job in the Defence flight of India through plan, production and update of warriors, coaches, helicopters, transport airplane, motors, flying and framework gear. HAL is currently positioned 34th in the rundown of world's best 100 barrier organizations.

Indian Space Research Organisation

Administration of India set up the Department of Space in 1972 to advance turn of events and utilization of room for science and innovation in the nation to get financial advantages. Indian Space Research organisation (ISRO) is the essential organization under the Department of Space for executing space programs. During the mid-seventies, India embraced showing of room applications for correspondence, TV broadcasting and remote detecting building test satellites in particular, Bhaskara – and trial satellite dispatch vehicles, SLV-3 and ASLV.

Indian National Satellite System

Today, India has an amazing cluster of accomplishments with the biggest residential correspondence satellites called Indian National Satellite System (INSAT) in the Asia pacific area with around 210 transponders in circle.

Defence Research and Development Organisation

DRDO is a system of 52 Defence Laboratories in India which are profoundly occupied with creating basic barrier innovations covering different orders like aeronautics, deadly implements, hardware, battle vehicles, designing framework, instrumentation, rockets, propelled registering and re-enactment, uncommon materials, maritime frameworks, life sciences, data frameworks and agribusiness.

Bharat Electronics Limited

BEL was set up in 1954 to meet the particular electronic needs of the nation's protection administrations, is a multi-item, multi-innovation, multi-unit organization. It serves the requirements of local and outside clients with the administrations made in its nine best in class ISO 9001/2 and ISO 14000 confirmed assembling plants in India.

Mars Orbiter Mission

Mars Orbiter Mission (MOM), the woman interplanetary crucial ISRO, propelled on November 5, 2013 by PSLV-C25 got embedded into Martian circle on September 24, 2014 in its first endeavour. MOM finishes 1000 Earth days in its circle, on June 19, 2017. 1000 Earth days compares to 973.24 Mars Sols (Martian Solar day) and MOM finished 388 circles.

Making history, ISRO's Mars Orbiter Mission (MOM) effectively entered the circle of the red planet. With this, India has become the principal country on the planet to have entered the Mars circle in the main endeavour. ISRO's MOM is additionally the least expensive such crucial at this point. after nerve-wracking final moments at the command centre of Indian Space Research Organisation, India's Mangal Mission was a successful one and brings triumph before the world.

The Laws That Govern Space Arena: New Territory of Human Kind

For the peaceful usage of outer-space, the international space law has been developed. It consists of five sets of principles which would lead to consensus being achieved and help the codification of legal regime. The Ministry of common Aviation (MoCA) is the service answerable for detailing of arrangement, rules and guideline of common aviation in India. It manages the arranging and usage of plans for the development and extensions of common air transport.

The Directorate General Civil Aviation (DGCA) implements the common avionics guidelines and transport administrations.

The Airports Authority of India (AAI) likewise assume a significant job in extension of common flight just as the ground and air space in India.

The Bureau of Common Avionics Security (BCAS) worried about the aeronautics area, the appropriateness of administrative of those demonstrations likewise guarantees the flying segment guidelines and universal required arrangements on air wellbeing which prompts the magnificent improvement in flight innovation.

The Air Craft Rules, 1937 sec 134 gives the arrangement that no individual will works any timetable air transport administration from or across the India with the exception of the consent from the central government conceded in understanding to plan XI of that rules.

In India, only government elements have a hold over the space segment likewise ISRO. The redistributing includes a specific level of gracefully and assembling of parts by some business ventures. As of late, a lovely astonishment poured in when ISRO, in advancing the 'Make in India' crusade, re-appropriated satellite assembling to a private part undertaking. A year ago, ISRO marked an agreement with an Indian beginning up to dispatch a shuttle, which will endeavour to arrive on the Moon. These are characteristic strides towards the making of a private space industry biological system that will prompt more prominent transitional, reciprocal and multilateral action. Redistributing would at last assistance decrease ISRO's time spent on satellite and dispatch vehicle building and let it centre around cutting edge research to upgrade India's forays in space.

India's advancement, yet an all-encompassing Space Act is essential all things considered. Today, there are 22 countries that have residential space laws, of which Australia, Japan and South Korea are the main Asia-Pacific districts that have executed global shows through national laws. India should likewise make progress towards it. This will be an impetus to additionally support India's space exercises and manage them to be in a state of harmony with elements of worldwide space exercises. In this way, a powerful space system is completely essential. Its nonappearance can ruin

India's development in future. We should take proactive measures to guarantee its detailing and execution.

These codified space laws specifically the Public International Law gives opportunity and ensured free and non- discriminatory access to space. The provisions of the act provide the legal support to the private entity which is going to be settle on moon, mars and any asteroids. In India there is an enormous prerequisite of legal counsellor and predominant laws to deal with lawful complications in the rising aeronautics industry. Although India shows its active participation in outer space and signed the moon agreement which creates the way for opportunities to science analyst which is a great sign for the aerospace engineering.

Conclusion

Space programs that have advanced into an infinite of utilizations. The advantages of these applications are legitimately to the first speculations made by the space organizations and the private sector. Space investigation alone has given a lot of information that is significant for the training of individuals about at last comprehension of our planet and the universe. A portion of the more straightforward advantages of room investigation remember an expansion for the information that is out there about space and the revelation of inaccessible planets and cosmic systems, it additionally gives us knowledge into the beginnings of our universe.

The development and investigation of the space age has filled in as a motivation to mankind. Specifically, the logical and innovative progressions remain as a motivation to established researchers of educators, and science analyst around the world. Additionally,

space investigation has likewise propelled imaginative preparing programs focused on pre-schoolers, for example, the Future Astronauts Program. It is apparent that by attracting the marvel of room along with the information and aptitudes formed through space investigation into study halls, kids can be firmly propelled and engaged since the beginning to develop interest in the space arena.

IMPACT OF COVID-19 ON AVIATION SECTOR

Nehal Kankanawadi[*]

ABSTRACT

The novel Coronavirus Disease - 2019 (COVID-19) is a highly infectious disease which was first reported in Wuhan, Hubei province, China on 31 December 2019. Due to its high community spread, total of 213 countries have been affected by it as of July 14 2020. COVID-19 is declared as a pandemic. To contain the virus, many countries had stopped the movement of people in and out of the country. Due to this the aviation sector is hit hard. With no passengers travelling many aircrafts are grounded, leaving the aircraft owners in loss. Aviation sector is prone to every situation where moment of masses is restricted. This paper deals with the impacts of COVID-19 on aviation sector in terms of decrease in customers, increase in losses, steps taken by airliners to cope up with the loss and the future of aviation after the pandemic is over. The aviation sector may now be at loss with no customers but it will eventually recover once the pandemic is over and people get back to usual routine. The travel for business, vacation or education will be resumed and the aircrafts will touch the sky again.

Keywords: COVID-19, Aviation, Airlines, Pandemic

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Introduction

The first case of COVID-19 was recorded on 31 December 2019. It is a highly contagious virus capable of spreading through community via direct methods (physical contact) and indirect methods (through sneeze in air, water, surface touch, etc.). Due to its high contagious nature it started to spread exponentially and the virus was declared to be pandemic on 11 March 2020[1] recording total case of 16,189,203 on July 25 2020.[2] Due to the wide spread of COVID-19 and its rate of spread many countries started to reduce the activities and limited them only to essentials. Many countries started imposing lock-down where all other services expect essential services like healthcare, grocery, law and order, posts and banking were put to halt. People were asked to stay at home and move out only to seek essential services.

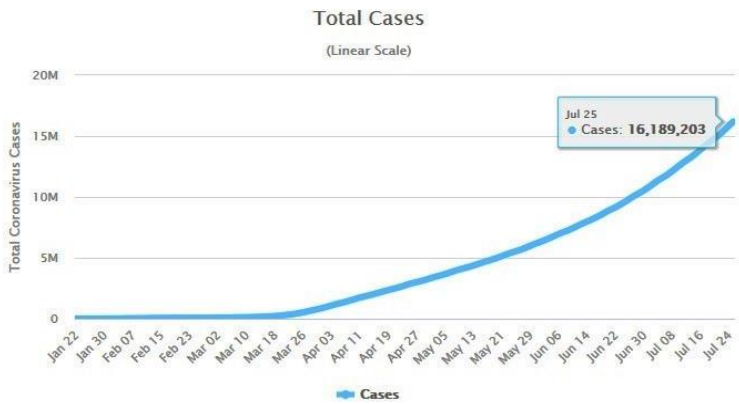

Fig 1: *Growth of COVID-19*

In a time like pandemic where people think twice stepping out of their house, the airlines that take passengers over a long distance

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1 World Health Organisation, *WHO Timeline - COVID-19*, https://www.who.int/news-room/detail/27-04-2020-who-timeline---covid-19.

2 Worldometers.info, (July 26, 2020), https://www.worldometers.info/coronavirus/worldwide-graphs/#total-cases.

were of less need. Due to the pandemic and the restriction on international travel, airlines lost their customers rapidly and in great amount. Soon, aviation became the worst hit sector due to the ongoing COVID-19 pandemic. This led to grounding of many aircrafts, cutting of employees, halting of non-essential projects and focusing for short term. The only way out of this misery for airliners was to get revenue from cargo transport and through evacuation of people presently living outside of their country.

World Passenger Traffic Evolution

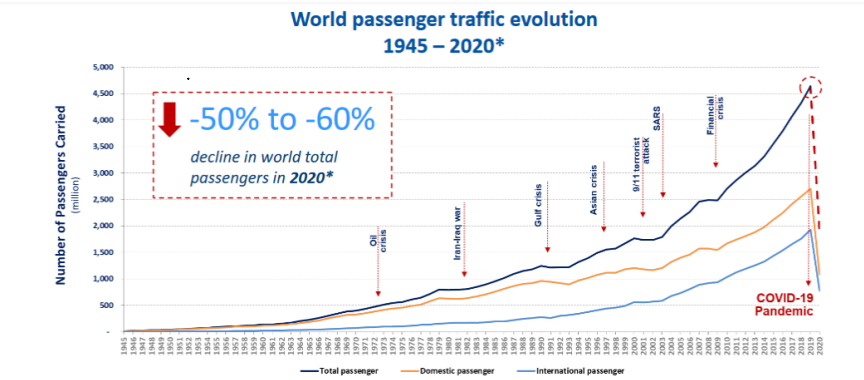

Fig 2: *World Passenger traffic during crises.*

As seen from the figure above, the aviation sector had no much decline in the percentage of passenger traffic during various crises. Oil crises of 1972 had negligible effect on growth of passenger traffic, Iran-Iraq war of 1981, Gulf crises of 1990, Asian crises of 1996, 9/11 terror attack in 2001 and Financial crises during 2008 restricted the passenger travel and the traffic remained constant but did not decline much. During the COVID-19 pandemic, passenger traffic declined by 50% to 60%. This is worst crises compared to various other crises the past. This was because during pandemic there was restriction on moment of passengers which was not the

case in any of the crises of the past. All other crises involved the finance and restrictions at minor level but this pandemic caused the greatest losses of all times.

COVID-19 Cases vs Net Bookings

As seen from the graph below, with increase in the COVID-19 cases the year on year (YoY) change in the net booking fell drastically. At the start of January people frightened by the COVID-19 did not travel to places via air and hence there was a decline YoY change in net booking. Between January and February there was a slight increase because at this time the people staying out of their country started to return back to their countries. It was later followed by strict lockdown where no passenger moment was allowed; in this phase the YoY change in net booking fell drastically up to ~90% in mid-March. It was also the time when India stopped both domestic and international flights, cancelling more than 700 flights. Since then there has been gradual increment but it still is around -80% at the end of June.

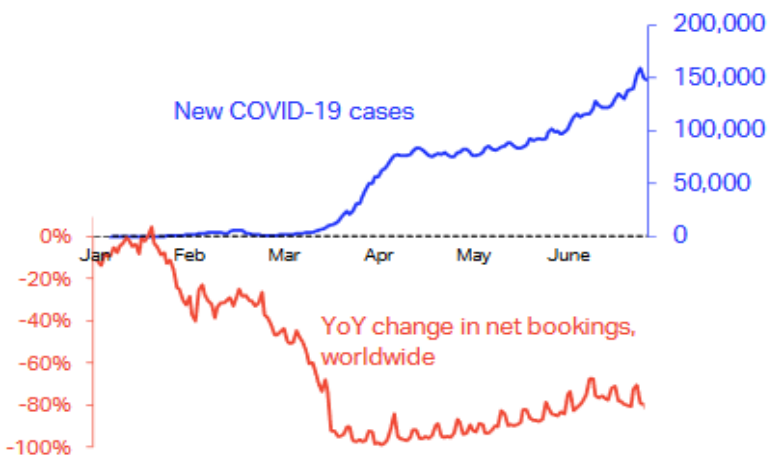

Fig 3: *%YoY change in net booking with respect new COVID-19 cases.*

Loss to Airliners

Table 1: *Effect of COVID-19 on passenger airliners*

Region	Revenue Passenger Kilometer (RPK) growth % compared to 2019	Available Seats Kilometer (ASK) growth % compared to 2019	Net profit for full year 2020 (in USD billion) compared to 2019
Africa	-58.5%	-50.4%	-2.0
Asia-Pacific	-53.8%	-39.2%	-29.0
Middle East	-56.1%	-46.1%	-4.8
Latin America	-57.4%	-43.3%	-4.0
North America	-52.6%	-35.2%	-23.1
Europe	-56.4%	-42.9%	-21.5
TOTAL	**-54.7%**	**-40.4%**	**-84.3**

From the data above, we can see drastic decline in the Revenue Passenger Kilometer (RPK), Available Seats Kilometer (ASK) and Net profit for full year 2020 as compared to the year 2019. The RPK saw a negative growth of 54.7% due to restriction of movement of passengers. The ASK saw a negative growth 40.4% because of aircrafts being grounded which resulted in no seats available. It is estimated that the airlines would lose **84.3 billion USD** net profits in the year 2020. With no passengers to travel the only alternative left with the airliners was to transport cargo to make up to the losses. Due to this, the cargo fares went up high and were tripled by late march to transport across Pacific Ocean.

Grounded Planes

It is estimated that more than **16,000** planes are grounded due to no passenger travel. Grounded airplanes do not make money; instead they add extra losses in terms of maintenance. It is a great problem for airliners to ground the aircrafts and to add to the misery the

airliners are required to maintain the aircraft in the airworthiness standard so that they are flight ready when the travel restrictions are withdrawn and flights resume. The aircrafts are to be maintained in terms of protecting them from external environment, foreign object injection in engines, adequate tyre pressure is to be maintained that bears the weight of the aircraft, and maintain the fuel in proper condition that is to be stored in aircraft to prevent them from rocking during high winds.

Effect on Air Cargo

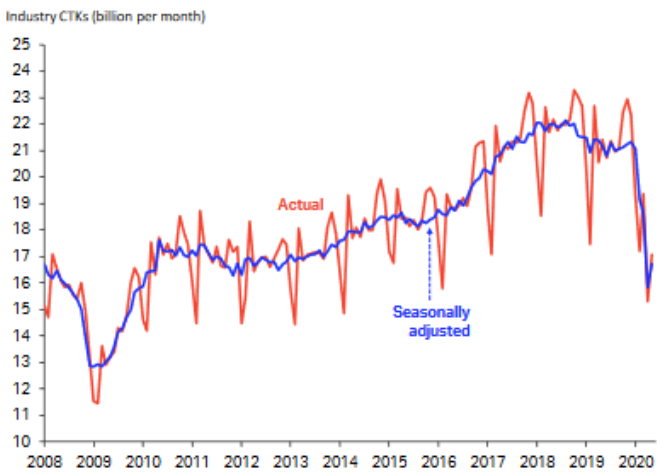

Fig 4: CTKs levels over years

The amount of air cargo has been increasing over years, but during the pandemic there has been a significant loss in the cargo ton per kilometers (CTKs) with decline of 25.6% during April 2020. During the ongoing crises with no passenger travel, cargo was the only way out for the airliners. After the low reach in April, there was an increase in CTKs from -25.6% in April to 20.3% in May. This was mainly due to worldwide shipment of masks, Personal Protective Equipment (PPE) and other necessities to fight the

COVID-19 in mid-April. This indeed was a ray of hope that aviation industry was badly in need of.

Revenue Share

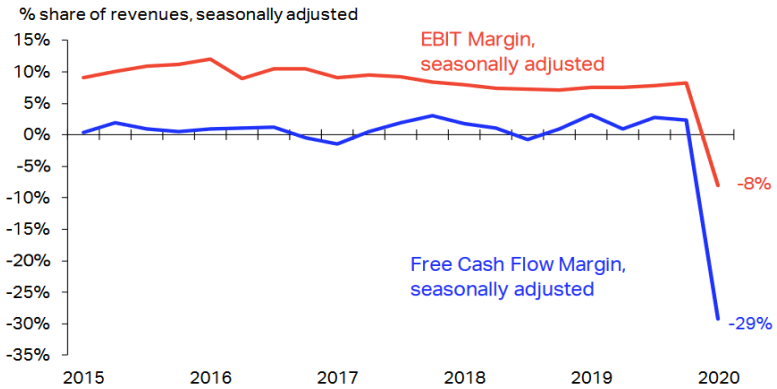

Fig 5: % revenue shares over years

The report by International Air Transport Association (IATA) shows that there has been significant decline in the percentage share of revenues since the end of 2019. Due to pandemic airliners are in great loss and they have no option but to cash liquidity. The airliners prior to the pandemic had the cash liquidity to handle revenue losses of 2 to 3 months. Fortunately, most of the domestic flights were resuming after a period of 2 months and airliners started making some revenue although not as compared to that of non-crises situation. All the efforts were made by airlines to preserve cash such as reducing the expenses to meet short term and immediate goals, reducing the number of workforce, requesting help from government and various other methods, yet the free cash flow margin was a steeper decline of 29% then to that of Earnings before interest and taxes (EBIT) which had a decline rate of 8%.

Job Losses

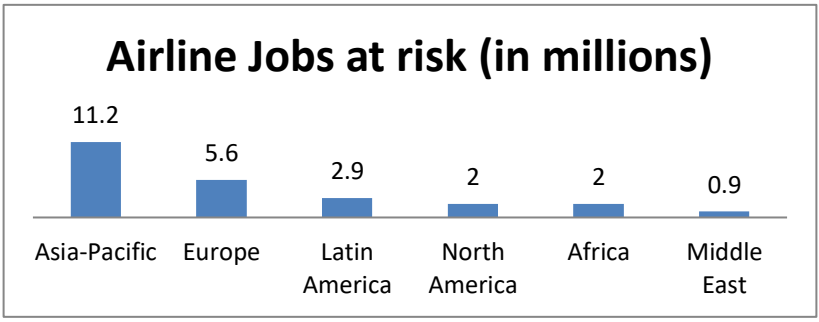

Fig 6: Airline jobs at risk

Due to shutdown of airspace for passenger travel not only the airlines but also the jobs of individuals in the field of airlines, travel and tourism are at risk. These include engineers, cabin crew, pilots, ground staff, airport employees, etc. A study by IATA shows that around 25 million jobs are at risk in airline industry alone. Combined with travel and tourism total jobs at risk are up to 65.5 million globally Some of the prime product based companies in the aviation industry had cut the jobs as follows: Boeing 12,000-15,000 jobs, Rolls Royce 9,000 and General Electric 13,000. These job holders if terminated would face harsh situation as every airliner is in loss and getting a job is very difficult. Companies firing the employees now impacts negatively to the company in terms of trust in the company and job security of employees.

Confidence of People in Air Travel

The study conducted by IATA to know the confidence of people in air travel shows that most passengers at the start of the pandemic during February thought of waiting for a month or two to travel by air, but in June the situation is worse and it might take a while for

things to be normal passengers would like to wait for at least 6 months to travel by air.

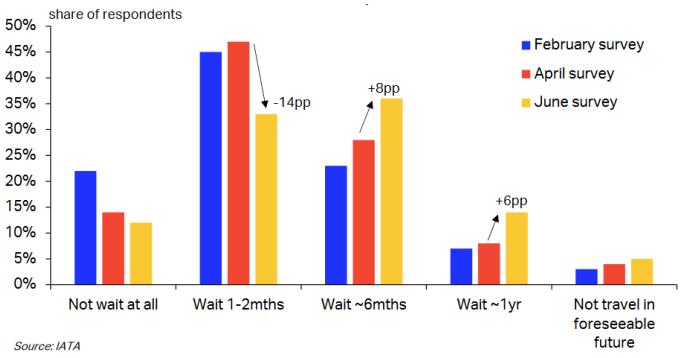

Fig 7: Confidence of people in air travel

This gives a slight hint that the people are waiting for the pandemic to end and guess it'll be so in 6 months to 1 year. This might be good news for airlines because they might see a good amount of air traffic post pandemic, which would help them from the current situation. Though the recovery will be slow paced we might expect

Future of airliners Post Crises

The situation right now is worse. There is no airline or aviation company that has not incurred loss due to the crises. People are not confident to travel right now because they don't want to take a chance of catching the COVID-19. It will take some years to gain confidence of the passenger for air travel. The main thing that can speed up this process is the vaccine to the virus. When the vaccine is found people could be treated and the number of cases will reduce exponentially and the virus will just be like that of cold or flu.

The study by IATA shows that it will take minimum 4 years to reach the level of global RPKs that was in 2019 before the

pandemic. Till 2024 focus must be on recovery from the pandemic. The airlines would then take several more years to reach the pre-COVID19 baseline. The recovery might be high in 2021 because of end of pandemic and people being free to move but then the curve is going to lose its slope and won't be steep anymore. After mid 2021 there will be gradual increase in the RPK as people who wanted to travel and tour might have already been done.

The aviation sector must focus on innovation and new methodologies to grow out of this crisis. Innovation in terms of passenger comfort, flight management, supply chain, manufacturing and digital transformation is needed to stand out from fellow competitors and to grow big in coming time.

The main sector that is going to help the aviation sector in future is the 'travel and tourism'. Post crises people who right now are locked in home will feel like a "free bird", and a free bird would always like to fly. As soon as the pandemic is over people would like to travel places both domestically and internationally. So we can say that 'travel and tourism' would help airliners recover from this loss.

Conclusion

In the current situation where the vaccine for COVID-19 is yet to be made, the risk of infection is high. It would take quite a time for situation to get normal and people would move freely. Until then the aviation sector has to be ready to face the adverse conditions that will be created due to non-availability of customers in terms of passengers, cargo, aircraft buyers and Maintenance Repair and Overhaul (MRO). Right now it is a challenging situation and the focus is to survive, but as soon as the crises end people are going

to travel a lot as they have been restricted for a long time and hence this would help the airliners to recover from the losses.

Customers, suppliers and the third-party agencies must help airliners in this situation of global crises to sustain and regrow. Government must help airliners by providing loans and allowing private airliners to carry out government tasks such as evacuation which will help the private airliners. Along with this airliners should also make sure that their employees must not face situation like job loss. The employees may be asked to perform with reduced perks and longer duration. The ongoing non-essential projects could be paused and the workforce can be redirected to achieve short term goals. Post crises, there will be lot of opportunities to grow which then requires the workforce. Hence the termination of jobs of employees at this time may result in decreased trust in the company which may later affect it to hire skilled employees.

At this time the airliners must make up to the losses occurred. It will take few years to completely recover from the loss due to pandemic but this sector will recover and the planes grounded today will be the planes that would make profit tomorrow. The process is going to be gradual and would take quite some years to recover, but eventually the aviation sector will sustain. Aviation is here to stay.

CORSIA IN COUNTERING AVIATION EMISSIONS: DILUTING EFFECTIVE CLIMATE CHANGE MITIGATION MEASURES IN INDIA

Ms. Prathiksha C. Ullal & Ms. Harita Ramachandran[*]

Abstract

The aviation sector in India has shown steady growth over the past years but growth brings with it a bundle of environmental concerns. The indispensability of the Aviation sector has necessitated a relook on the sectoral contribution to the Greenhouse Gas (GHG) emission levels. The steady growth of the aviation sector posits a further increase in greenhouse emissions that exacerbate climate change. The International initiatives to regulate emission levels largely emanate from the International Civil Aviation Organisation (ICAO), a body under the auspices of the United Nations which purports to achieve carbon-neutral emission growth under the CORSIA scheme. The CORSIA scheme largely seeks a transition from traditional aviation fuels to sustainable aviation fuels or biofuels. The viability of these biofuels as a sustainable carbon offsetting mechanism is under question as they bear a direct and inevitable effect on food security which is intrinsically linked to climate change. The paper seeks to analyse the economics behind the impact of biofuels on food security and climate change in a country like India. This could be

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done using economic concepts such as cost-benefit analysis, which could disclose the method's viability . The offsets of the airline industry have been the focal point for the intense debates surrounding climate change. GHG emission reduction pertains to an interconnected web of several domain areas, including food security, human rights, and an intricate network of several other issues, and ignorance of these would prove detrimental in framing an effective policy for reducing carbon footprint.

The paper seeks to analyse the commitment of CORSIA towards Environmental concerns if it is going be to be anything beyond a greenwashing exercise. The paper seeks to assess the sustainability criteria of CORSIA and see if it is in line with the Swedish approach towards reconciling the growth of the aviation industry and climate change concerns. The paper also seeks to evaluate the prevailing aviation policy of India to analyse whether the policy approach laid out therein would effectively contribute towards the 2-degree Celsius target. However, this target could be reached with the full cooperation of the global aviation sector. This paper also seeks to analyse several innovations made by other countries such as Singapore to effectively manage the aviation industry and apply similar innovations at a global platform and the economic viability of such an initiative. The paper also seeks to analyse the impact of campaigns such as the Flight Shaming movement in Europe and Flygskam in

Sweden on flight and passenger frequency. Finally, the paper seeks to propose a comprehensive national aviation policy in India with due considerations and policy innovations to combat climate change.

Keywords: Climate Change, CORSIA, Greenhouse Gas emission, Sustainable aviation fuels

Introduction

The global aviation industry has contributed significantly in bringing borders closer and building a transportation network facilitating international trade and economic growth. With an ever-increasing need for connectivity, global aviation emission levels pose a significant threat to environmental protection considerations. The UNFCCC report clearly outlines that anthropogenic greenhouse concentrations have considerably increased since the mid-20th century leading to warmer global average temperatures.[1] It is thus, imperative to engineer globally coordinated policy interventions to limit anthropogenic emissions in the aviation industry, which is among the largest contributors to global warming in the 21st century. The global aviation industry sought to achieve carbon neutrality growth by 2020 by reducing carbon emissions by 50% and seeking to further reduce it by 2050.[2] The four-pillar approach set out by the IATA (International

[1] Richard B. Alley et al., Summary for Policymakers. In: *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (Mar.1, 2020, 4: 00 PM), http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf.

[2] International Air Transport Association (IATA), *A Global Approach to Reducing Aviation Emissions, First Stop Carbon Neutral Growth by 2020*, YUMPU (Mar.1, 2020, 5: 00 PM), https://www.yumpu.com/en/document/read/24408947/a-global-approach-to-reducing-aviation-emissions-from-air-france.

Air Transport Association), which includes 1) technology, 2) operations, 3) Infrastructure 4) economic measures, seeks to provide a global framework to engineer nation-specific policies.

Technological interventions are far more effective contributors in reducing emissions as far as the aviation industry is concerned. The peak oil theory essentially foresees a global oil crisis in the backdrop of ever-growing global energy consumption during 2010 and 2020. However, this prediction did not manifest itself since the theory failed to take into account the emerging non-renewable energy technological innovations that possibly delayed the risk to later years.[3]

The focus of this paper is the analysis of the sustainability criteria of CORSIA by examining the basket measures in light of its efficacy in contributing towards emission reductions. The next section of the paper focuses on the cost-benefit analysis of the efficacy of biofuels in reducing Co2 emissions that mainly relies on the pillar of efficient technology. Additionally, the paper also seeks to analyse the impacts of using biofuels on India's food security. The economic viability of using biofuels in India is in the midst of intense debate in the Indian context. The paper then explores and analyses the Green Aviation Policy in terms of its viability and effectiveness to combat climate change accelerated by the Indian aviation sector. The next section of the paper deals with the environmental sustainability of the aviation industry beyond CORSIA and emission reduction by analyzing steps innovations made by Singapore in its domestic aviation sphere. The paper further deals with the impact of Campaigns such as the Flyskgam

[3] Ambarish Datta & Bijan Kumar Mandal, *Use of Jatropha Biodiesel as a Future Sustainable Fuel*, 1 ETAP 8, 9 (2014).

movement to nudge passengers to make sustainable choices and concludes with certain recommendations.

Commitment Of CORSIA Towards Environmental Concerns-Assessment Of Sustainability Criteria

CORSIA as a measure, is aimed at providing an effective alternative solution for the aviation sector to facilitate emission reduction in an environmentally sustainable manner. The sustainability criteria of CORSIA is important to determine how it can make an effective contribution to the cause of environmental protection through the course of its implementation. CORSIA can be credited to having brought about internationally accepted standards and a set of recommended practices for the Member States to follow to fulfill its common objective of emission reduction. By the adoption of International Standards and Recommended Practices (SARP's) by the ICAO, has paved the mechanism for verification, monitoring, and reporting of emission levels by the Member States referenced as Annex 16, Volume IV.[4] However, annex 16, Volume IV is only one means to ensure the implementation of CORSIA by the Member States, but it is majorly accompanied by Emission Unit Criteria(EUC) and CORSIA Eligible Fuels to make this a comprehensive mechanism.[5] It is key to understand how these three mechanisms work in tandem as SARP's monitor the implementation of

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4 ICAO Document, *CORSIA Sustainability Criteria for CORSIA Eligible fuels*, ICAO (Mar. 31, 2020, 10:04 AM),https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO%20document%2005%20-%20Sustainability%20Criteria.pdf.

5 IATA, *An Airline Handbook on CORSIA*, IATA (Mar.31, 2020, 10:10PM), https://www.iata.org/contentassets/fb745460050c48089597a3ef1b9fe7a8/corsia-handbook.pdf.

CORSIA, whereas EUC and CORSIA Eligible Fuels set certain criteria to be fulfilled for emission reduction.

CORSIA Emission Unit Criteria primarily focuses on setting clear criteria, which would be later verified by the Technical Advisory Board (TAB) to see if emission unit programs would be eligible under CORSIA. In addition to this, it also sets certain criteria with regard to procedures and programs that have to be in place for design elements.[6] The setting up of the Technical Advisory Board aims to ensure that there are standard terms of reference for selecting credible emission units for offsetting under the CORSIA regime. [7] The setting up of the Technical Advisory Board ensures that an International standard is maintained while selecting eligible emission units as per the criteria laid down by CORSIA and reduction of aviation emission in an environmentally sustainable manner. Although this can prove to be an effective mechanism theoretically, the lack of transparency surrounding the ICAO and the membership of the TAB, its recommendations cast a significant shadow of doubt on the efficacy of such a Board.[8] Although there is a mechanism of inviting emission programs and review by the TAB and subsequent publication for comments by the public on determining the eligibility of the emission units for offsetting, there seems to be a need for

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6 Green Air Online, *ICAO Council approves criteria for CORSIA emissions units and structure for new body overseeing eligibility*, GREEN AIR ONLINE(Mar.31,2020,07:45PM), https://www.greenaironline.com/news.php?viewStory=2573.

7 Green Air Online, *Agreement on sustainability criteria and advisory body for CORSIA carbon credits welcomed, although with reservations from NGOs*, ICAO (Mar. 31, 2020, 10:04 AM)https://www.greenaironline.com/news.php?viewStory=2577.

8 Green Air Online, ICAO Council *supra note 6*

more transparency on the part of ICAO, which will add credibility and help gain public confidence in the effectiveness of CORSIA.

It is pertinent to analyze whether the existing GHG offset programs such as Clean Development Mechanisms (CDM's) can fulfill these standards set under the Emission Unit Criteria. To practically understand whether the existing GHG offset programs can fulfill the requirements, a study conducted by Carbon Market Watch provides a brief understanding of the same. [9] Out of the dual criteria adopted by CORSIA, this study attempts to analyse 8 GHG programs with specific reference to Programme design elements criteria including Clean Development Mechanism (CDM), Verified Carbon Standard (VCS), Gold Standard (GS), Japan's Joint Crediting Mechanism (JCM), Forest Carbon Partnership Facility (FCPF), Climate Action Reserve (CAR), American Carbon Registry (ACR) and Plan Vivo. The study's findings are positive that CORSIA can make an effective contribution if the existing programmesprograms are strictlyscrutinized by both criteria. For the programs to be completely compliant with the eligibility criteria, the existing programs have to be revamped, and upgraded methodologies and protocols must be used. There was a lack of clarity for programs as there were no accepted means to avoid double counting of emission reductions.

With CORSIA being viewed as a crucial element of the global aviation sector for making effective and significant contributions towards climate change mitigation, the risk of double-counting of emission reductions emerged as a major concern. The concept of

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[9] Carbon Market Watch, *First Class or Economy? An Assessment of Credit Providers for the Aviation Offsetting Scheme*, CARBON MARKET WATCH (Mar. 31, 2020, 10:04 AM) https://carbonmarketwatch.org/wp-content/uploads/2019/03/FIRST-CLASS-OR-ECONOMY-_-POLICY-BRIEF.pdf.

"double counting" is when an emission reduction has been counted both by a country of origin as well as a receiving country by reporting it in its emission inventory respectively, while in effect, the emission reduction has happened only once.[10] While trading of emission reductions has taken the centre stage with regard to the carbon markets contribution to mitigating climate change, the risk of double-counting could dilute the essence of international climate change agreements such as the Paris Agreement.[11] It is estimated that the total value of emissions at risk of double counting exceeds the entire ambition of current NDC's relative to the 2030 policy estimate. [12]

COP25 of the UNFCCC was a missed opportunity to consider the issue of double-counting. The whole purpose of CORSIA will be lost if double counting as a practice is not put to an end by means of an International Agreement, then none of the programs will meet the criteria laid out by CORSIA. In the absence of an international agreement, a possible way forward to curb double-counting would be to not grant full eligibility rather grant provisional eligibility to programs and can be invalidated if found indulged in double counting.[13] This again poses a significant

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[10] Gabriela Leslie,et. al, *Global Emissions Within and Outside the Scope of Nationally Determined Contributions* ,ENVIRONMENTAL DEFENSE FUND (Mar. 31, 2020, 10:04 AM) https://www.edf.org/sites/default/files/documents/EDF_NDC%20Emissions%20Coverage%20Analysis_0.pdf.

[11] Environment Defense Fund, *How to avoid double counting of emissions reductions*, ENVIRONMENT DEFENSE FUND (Mar. 31, 2020, 10:04 AM), https://www.edf.org/sites/default/files/documents/Steps_needed_legal_basis_avoiding_double_counting_2pg_June2018.pdf.

[12] Gabriela, *supra* at 2.

[13] Gilles Dufrasne, *COP25 outcome puts pressure on ICAO to ensure robust rules for aviation carbon market*, CARBON MARKET WATCH (Mar. 31, 2020, 10:04 AM), https://carbonmarketwatch.org/2020/01/17/cop-25-outcome-puts-pressure-on-icao-to-ensure-robust-rules-for-aviation-carbon-market/.

problem as there is no mechanism under the CORSIA for invalidation of programs.

In the ICAO Council Meeting, 2020, six programs have been identified which are eligible under the pilot phase from 2021-2023.[14] The carbon markets were largely under the purview of the Kyoto Protocol-the Clean Development Mechanism, before the advent of the Paris Agreement. With Paris Agreement, Article 6.2 and 6.4 jointly creates a "Sustainable Development Mechanism. This point of distinction between these two mechanisms is that Sustainable Development Mechanism can go far beyond the offsetting regime. However, it envisions a result-based climate finance model that furthers the goal of sustainable development.[15] There is a sufficient need to reconcile CORSIA with the Sustainable Development Mechanism under Paris Agreement Article 6 as there are many existing CDM's, and the reconciliation is key in the transition towards Sustainable Development Mechanisms under Article 6 of the Paris Agreement.

The second key aspect with regard to the sustainability criteria under CORSIA is the analysis of CORSIA eligible fuels. In line with its commitment reflected under Resolution A 39-2 to reduce emission in the aviation sector to make an effective contribution towards combating climate change, the concept of Sustainable

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[14] IISD, *ICAO Identifies Six Eligible Carbon-Offsetting Programs for Aviation Industry*, IISD (Mar. 31, 2020, 10:04 AM), https://sdg.iisd.org/news/icao-identifies-six-eligible-carbon-offsetting-programs-for-aviation-industry/.

[15] Carbon Market Watch, *Reconciling CORSIA and the Sustainable Development Mechanism*, CARBON MARKET WATCH (Mar. 31, 2020, 10:04 AM), https://carbonmarketwatch.org/wp/wp-content/uploads/2018/08/CMW-PB-RECONCILING-CORSIA-AND-THE-SUSTAINABLE-DEVELOPMENT-MECHANISM-FINAL-SINGLE-PAGE-WEB.pdf.

Aviation Fuels under CORSIA needs to be mentioned. [16] The CORSIA framework outlines the criteria to be classified as a Sustainable Aviation fuel under the Sustainability Certification Schemes, which the ICAO has approved.[17] The difference between a sustainable aviation fuel compared to the conventional one (CAF) is that a SAF helps in net CO2 reductions of at least 10 percent compared to CAF.[18] The shift in the attention towards SAF's has been tremendously owing, but it has a set of challenges to combat. Successful implementation of SAF's would require governmental measures, public policy initiatives, and cost-reduction strategizing. The SAF's face operational hurdles as even with blending with CAF's, there is an economic burden on the airline companies as it costs about 1.5 to 3 times the CAF price.[19] Owing to its benefits, the customers can share the economic burden as a means to compensate for their contribution to the carbon footprint.

Countries with a huge reliance on agriculture would benefit from effective contributorsto the production of SAF's. CORSIA, in order to truly achieve its potential of replacing conventional

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[16] International Civil Aviation Organisation, *Resolutions Adopted By The Assembly*, ICAO (Mar. 31, 2020, 10:04 AM)https://www.icao.int/Meetings/a39/Documents/Resolutions/a39_res_prov_en.pdf .

[17] Gernot Klepp, Norbert Schmitz, *CORSIA SAF Certification with ISCC – The International Sustainability And Carbon Certification Scheme, Sept. 2019*, p.188 , ISCC (Mar. 31, 2020, 10:04 AM),https://www.iscc-system.org/wp-content/uploads/2019/09/ICAO-Environmental-Report-CORSIA-SAF-Certification-with-ISCC.pdf.

[18] CAO-UNDP-GEF assistance project, *Transforming The Global Aviation Sector: Emissions Reductions From International Aviation,2017*, p. 7, ICAO (Mar. 31, 2020, 10:04 AM), https://www.icao.int/environmental-protection/knowledge-sharing/Docs/Sustainable%20Aviation%20Fuels%20Guide_vf.pdf.

[19] *Id.* At 14.

aviation fuels, must tap into the feedstock potential of such countries to promote and increase the production of SAF's.

Economic Analysis Of The Indian Biofuel Policy, 2018

There is an unprecedented need to develop an economic model to ensure faster market development of SAF (Sustainable Aviation Fuels) production to meet the growing needs of the aviation industry.[20] Biofuels constituted less than 2% of the entire consumption by the commercial aviation industry in the year 2018.[21] This is certainly indicative of the fact that presently the production costs of SAF are slightly greater than that of jet fuels which do not appeal to the aviation industry as a sound economic model.[22] It is thus imperative that national policies of countries provide adequate support to the production of biofuels to proliferate the consumption of these fuels over conventional jet fuels. Countries such as the UK, US, European Union have established policy regimes to facilitate the proliferation of biofuels and have set necessary targets to achieve this feat.[23] The Indian National Policy on Biofuels[24] outlines a framework that relies excessively on encouraging production byproviding minimum support price to biodiesel crops rather than equally placing importance on bioethanol producing crops such as sweet sorghum

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[20] Pharoah Le Feuvre, *Are Aviation Biofuels ready for take-off?* IEA(Feb. 12, 2020, 1:00 PM) https://www.iea.org/commentaries/are-aviation-biofuels-ready-for-take-off.

[21] Niven Winchester et al., *Economic and emissions impact of renewable fuel goals for aviation in the US*, 58 (C) TRPPP 116,116 (2013).

[22] Feuvre, *supra* note 20.

[23] *Id.*

[24] Ministry of New and Renewable Energy, *Indian National Biofuel Policy 2018*,MINISTRY OF NEW AND RENEWABLE ENERGY (Feb. 14, 2020, 1:30 PM), https://mnre.gov.in/file-manager/UserFiles/biofuel_policy.pdf.

and sugar beet.[25] Sweet sorghum is an upcoming source of ethanol-based energy production that meets the requirements of the policymakers to not compromise with food security.[26] The policy also considerably lacks a sense of drive as there is already a policy framework in place, but the production in India has not taken off with respect to meeting the nation's energy demands.[27] The present policy framework needs reconsideration[28] in many aspects, mainly with regard to the implementation of the policy in itself. The present policy heavily relies on the process of ethanol production, which is ridden with price volatility as it is completely dependent on sugar production, which could be replaced with a better alternative such as sweet sorghum. The sugarcane centricity of the policy conflicts with the policy's goal of using less fertile land for the production of biofuel feedstock. The existing policy only focuses on the supply side factors and does not consider the demand side factors such as providing consumption support.

Furthermore, the Jatropa plant has been identified by the Central and State governments as one of the most suitable trees for the production of biodiesel which is rather misconceived as Jatropa is a resilient crop but would still be unproductive as it would be unable to profitably yield seeds. The Indian Policy on Biofuels has, in essence, furthered the gap between theoretical expectations and real-time seed production in actuality in actual field conditions.[29] In addition, the Jatropa plantations in Andhra Pradesh have led to

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25 G Basavaraj et al., *A Review of the National Biofuel Policy in India: A critique of the Need to Promote Alternative Feedstocks*, 3 JOB. 65, 74 (2012).

26 *Id*. at 12.

27 Basavaraj, *supra* note 25, at 12.

28 Basavaraj, *supra* note 25, at 19.

29 Bhajrang Singh et al., *The Field Performance of some Accessions of Jatropha Curcas L. (Biodiesel Plant) on Degraded Sodic Land in North India*,10, INT J GREEN ENERGY. 1026, 1026 (2013).

considerable environmental issues such as acidification, toxicity, water depletion, and eutrophication.[30] There are, however, many issues[31] with the economic viability of Jatropha as a biofuel crop, such as long gestation periods up to 3-5 years, high fluctuation of yield, it requires proper irrigation and nutrients, a good commercial and disease-resistant variety is still lacking. The field conditions in India make crop production less viable due to the large-scale plantations in dry and arid lands allocated without assessing its suitability to the crop in question.[32] It is important that the biofuel policy and the green aviation policy go hand in hand and set achievable goals rather than setting unreasonable targets. It is clear from the above discussion that the biofuel sector in India has a long way to go to be able to produce viable biofuels in commercial quantities to be used in the aviation sector economically. Encouraging the use of biofuels without adequate research into its economic viability is counter-intuitive to the already debt-ridden airline industry in India. This calls for an integrated approach between the two policies and to set achievable targets that are specific and action-oriented. Biofuels, if developed economically with adequate research and development, have the potential to considerably help in the reduction of the emissions of the global airline industry. Thus, the present policy requires reconsideration in terms of several aspects, such as the adverse effects of largescale production of the Jatropha crop on soil fertility and indirectly on

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30 Purushottam Thakur, *India's ambitious plan to boost biofuel likely to fail without roadmap*, DOWN TO EARTH (Feb. 17, 2020, 4:00 PM), https://www.downtoearth.org.in/news/energy/india-s-ambitious-plan-to-boost-biofuel-likely-to-fail-without-roadmap-61892.

31 M. Moniruzzaman et al., Jatropha Biofuel Industry: The Challenges, INTECHOPEN (Sep.20, 2020, 11:57 PM),https://www.intechopen.com/books/frontiers-in-bioenergy-and-biofuels/jatropha-biofuel-industry-the-challenges.

32 *Id*. at. 10.

the food security of the nation. Government investments in the field of research and development in biofuels are very important for their increased production and growth. Successful Research in the realm of alternative fuels is the key for a green and sustainable future in terms of restricting the global temperature up to 2 degrees set by the UN

Analysis of The Indian Green Aviation Policy

The global estimates of the Airline Industry growth in India within the next decade or so are expected to jump to the third position, thus revealing a massive growth potential in the coming years.[33] Additionally, the International Civil Aviation Organization released a report in 2016 titled 'On Board a Sustainable Future' that cautioned the effects of rising temperatures on the airline industry,including hindering the ability of planes to fly and the rising sea levels that may impact airports.[34]This posits a sustainable green aviation policy that would balance the exponential growth keeping in mind the ecological considerations.

The Indian National Aviation Policy, 2016 specifically highlights that the Ministry of Civil Aviation shall work in collaboration with the DGCA(Directorate General of Civil Aviation) and the Ministry of Environment, Forest and Climate Change along with the stakeholders from the Aviation Industry to develop a sense of

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[33] IATA, *India's Air Transport Sector: The Future is Bright but Not Without its Challenges, IATA (Mar. 28, 2020, 5:00 PM),* https://www.iata.org/contentassets/eec5052bac6a4fd68f98e751b0b97d21/india-aviation-summit-aug18.pdf.

[34] ICAO, *On Board: A Sustainable Future*, ICAO (Mar. 29, 2020, 6:00 PM) https://www.icao.int/environmental-protection/Documents/ICAO%20Environmental%20Report%202016.pdf.

sustainability in the aviation policies.[35] Subsequently, the government has released the National Green Aviation policy,2019 that is viewed as a rather progressive step with a specific mandate to develop a sustainable approach in the Indian aviation policies. The policy mainly aims to peg critical policy areas such as environmental management system, airport master planning, green infrastructure program, noise management, greenhouse gas emissions, and climate change, local air quality, energy and resource conservation, and solar and other renewable energy and to further formulate regulations regarding these areas.[36] The policy also urges the DGCA to cooperate with the government agencies to promote greater use of Biofuels in the aviation industry in commercially viable quantities.[37] Furthermore, the policy also vests the DGCA with more regulatory duties such as emission control and keeping a check on the air quality and compliance with the other regulations put in place by the policy.

The policy is considered a much-needed step to reduce the emission levels emanating from the civil aviation industry and at a point where an exponential growth rate is predicted for the industry. The policy also aims to procure speedy clearances for civil aviation projects that were tedious andtime-consuming. However, the policy requires significant capital investments on the airline industries, which is a cause for concern as the industry is

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[35] Ministry of Civil Aviation, Government of India, *National Civil Aviation Policy*, MINISTRY OF CIVIL AVIATION (Mar. 29, 2020, 7:00 PM), https://www.civilaviation.gov.in/sites/default/files/Final_NCAP_2016_15-06-2016-2_1.pdf.

[36] Ministry of Civil Aviation, Government of India, *White Paper on National Green Aviation Policy*, MINISTRY OF CIVIL AVIATION (Mar. 29, 2020, 7:30 PM), https://www.civilaviation.gov.in/sites/default/files/Whitepaper%20on%20National%20Green%20Aviation%20Policy.pdf.

[37] *Id*. at. 6.

facing several issues such as insolvency, rising fuel prices, intense competition.[38] This is further accelerated by the Coronavirus Outbreak that has put a considerable strain on the aviation sector in India.[39]Thus, it is important that the policy recognizes the sector's financial situation and devise a model that subsidizes the investments that the airlines would have to incur to effectively comply with the policy.

The policy in the garb of reducing the procedures has added many more technical procedures to comply with that in a sense makes the process more complicated and time-consuming.[40] Furthermore, it is to be noted that the DGCA is vested with many responsibilities by the policy, and the authority may be overburdened. Thus, it is suggested that the policy vests more powers with the Airport Authority of India so that these two authorities may work hand in hand.

However, the policy is a welcome step by the government to push for the sustainable growth of the Indian aviation sector.

The policy in India is a starting step, and certain policy recommendations could be spelled out to further strengthen the policy and make it more effective. End-user awareness schemes should be encouraged by the governments and the stakeholders

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[38] Krrishan Singhania et al., *National Green Aviation Policy: India's Step Towards Emission Cuts*, MONDAQ (Mar. 31,2020, 5:30 PM),https://www.mondaq.com/india/Transport/847444/National-Green-Aviation-Policy-India39s-Step-Towards-Emission-Cuts#_edn2.

[39] The Economic Times,*Aviation sector under lot of pressure, says SpiceJet chief amid coronavirus outbreak*, ET, Mar.12,2020,https://economictimes.indiatimes.com/industry/transportation/airlines-/-aviation/aviation-sector-under-lot-of-pressure-says-spicejet-chief-amid-coronavirus-outbreak/articleshow/74596137.cms?from=mdr.

[40] *Id.*

that include voluntary emission reduction schemes.[41] The government should provide tax incentives and subsidize the investment amount to comply with the green regulations to aid in the financial strengthening of the aviation sector, which is set to incur heaving losses due to the coronavirus Pandemic. The policy also needs to adopt an integrated approach and push towards global partnerships that provide knowledge accumulation and information diffusion in line with the formulation of partnerships such as the Asia and South Pacific Partnership to Reduce Emissions (ASPIRE).[42] This brings us to the notion that aviation as a sector is more global than it is national that requires global cooperation and commitment to reduce emissions and proceed towards a more sustainable future.

Cross Country Innovations in Aviation Sector-Going Beyond Emission Reduction

With global recognition of the aviation sector making conscious efforts to combat climate change, this section of the paper analyses the innovations made in the Singapore aviation industry. The approach taken in Singapore goes far beyond the conventional route in the aviation sector and taps into the ultimate objective of environment-friendly modifications in the aviation sector.

The recent power purchase agreement was entered between Singapore Airlines, the national carrier of Singapore, SIA Engineering, and SembCorp Solar for the purchase of 20,000 solar panels in a power initiative their operations using solar panels and

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41 Arushi et al., *Aviation and Environment : A Working Paper*, CENTRE FOR SCIENCE AND ENVIRONMENT (Apr.1 ,2020, 4:00 PM) https://cdn.cseindia.org/userfiles/aviation_paper.pdf.

42 *Id*. at 48.

channel surplus power to power Changi Airport.[43] Massive energy requirements have been met with environmentally sustainable solar panels fuelling its commitment towards green energy. With Changi Airport Group pledging to reduce its GHG Emission contribution by 20% by 2030 as opposed to the current levels, initiatives have been taken to replace conventional lighting with eco-friendly lights and use energy-efficient equipment in airports. Energy-efficient lighting, greenery within airports to ensure air quality are some steps in the right regard taken by Singapore. [44] Interestingly, Singapore International Airlines has extended its sustainability initiatives to in-flight meals in the form of sustainable sourcing, reducing the use of plastic in in-flight meals.

These measures indicate the kind of measures that can be taken apart from the emission reduction commitments by the aviation sector to run in an environmentally sustainable manner. These measures collectively impact the entire global aviation sector into an environmentally conscious and sensitive sector if cues from these measures are taken and applied to the best of each country's capabilities. CORSIA, as an internationally recognized basket of measures, plays a significant role in strengthening the aviation sector's contribution towards emission reduction through environmentally sustainable measures. The example of the Singapore aviation sector has been taken to demonstrate that collective environmental consciousness in terms of small yet

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[43] CAPA Centre for Aviation, *Aviation Sustainability and the Environment*, CAPA(May 11,2020 03:45 PM) https://centreforaviation.com/analysis/reports/aviation-sustainability-and-the-environment-capa-13-feb-2020-513458.

[44] Airport Technology, *The world's most environmentally friendly airports*, AIRPORT TECHNOLOGY (May 11, 2020 03:45 PM)https://www.airport-technology.com/features/worlds-environmentally-friendly-airports/.

significant measures towards sustainability can reduce carbon footprint and achieve sustainable growth in the aviation sector.

Impact of Campaigns on Altering Consumer Behaviour-Flygskam Movement

The entire aviation sector aims to achieve a reduction in emission levels to tackle climate change and reduce the carbon footprint. On this premise, the individual passengers who use these means of transportation contribute to the carbon footprint. Can individuals be nudged to make a choice by probably opting for, say, a train that has a lesser carbon footprint? The recent Flygskam movement, also referred to as the Flight Shaming Movement in Sweden, has been an unprecedented, one-of--a-kind campaign that aims to achieve the aforementioned objective. The movement tracing its origins to Sweden from 2017 has gained considerable global attention, which manifests itself by making people feel ashamed of traveling by aircraft owing to their carbon footprint and its impact on climate change.[45] This movement has a unique approach that ensures that consumers are vigilant with their choices and are conscious about their contribution to the carbon footprint, as well as to put pressure on the aviation sector and global organisations to come up with effective, sustainable measures to combat the effect of climate change.[46] As the movement gained momentum, Sweden saw a 4% dip in the number of flyers and a 9% dip in domestic

[45] BBC News, *What is flygskam? Greta speaks up about 'flight-shaming'*, BBC NEWS (May 11,2020 03:45 PM) , https://www.bbc.co.uk/newsround/49032117.

[46] The Local se, *How Greta Thunberg and 'flygskam' are forcing aviation industry to act on climate change*, THE LOCAL SE(May 11,2020 03:45 PM), https://www.thelocal.se/20190609/have-greta-thunberg-and-swedes-flygskam-forced-aviation-industry-to-act-on-climate-change.

travel in 2019.[47] This, accompanied with Sweden's airline passenger tax, has significantly reduced the number of routes that ply from Stockholm Arlanda Airport, raising concerns in the aviation sector. [48] This movement has provided sufficient impetus to raising environmental consciousness among many other countries beyond Europe, including China and US. JetBlue, a major player in the US Aviation sector, has announced measures to undertake a carbon offset measure of roughly about 8 million metric tons of emissions by investing in efforts towards environmentally sustainable measures in a bid to convince customers to travel by their environmentally conscious aircraft.

The movement has stirred people's consciousness towards activities we engage in every day, such as traveling by not thinking consequences of our actions. Although the movement has not significantly transformed into numbers but has caught the attention of the aviation sector and consumers to make environmentally sustainable choices and conscious efforts to reduce carbon footprint. This movement has given a reality check to question ourselves on the level of awareness we have with regard to global environmental issues by proactively taking measures by joining hands to tackle climate change.

Conclusion

CORSIA reflects the international community's commitments towards making significant contributions towards global emission

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47 BBC News, *Sweden sees rare fall in air passengers, as flight-shaming takes off*, BBC NEWS (May 11, 2020 03:45 PM),https://www.bbc.com/news/world-europe-51067440.

48 The Blue Swan Daily, *Sweden's new eco-friendly aviation tax is already beginning to affect air connectivity*, THE BLUE SWAN DAILY (May 11, 2020 03:45 PM)https://blueswandaily.com/swedens-new-eco-friendly-aviation-tax-is-already-beginning-to-effect-air-connectivity/.

reduction. The sustainability criteria introduced by CORSIA is unprecedented and shows immense promise owing to its systematic laying down of standards and review mechanisms. The constant criticism attributed to the ICAO is its lack of transparency in its functioning. Endeavors to promote transparency in its functioning will go a long way in building public confidence. As a subject matter, emission reduction cannot be independently dealt with under the CORSIA regime. Its close connection to climate change necessitates operation in tandem with the Paris Agreement. There is a need to reconcile the mechanisms under CORSIA as well as Paris for effectively countering the risk of double counting. Sustainable Development Mechanisms under the Paris Agreement can achieve a higher potential by harmonizing it with the CORSIA regime. The CORSIA regime also facilitates the transition from Conventional Aviation Fuel to Sustainable Aviation Fuel by setting standards to sustainability certification schemes. The growth potential of sustainable aviation fuels needs to be tapped by means of engaging with agriculture-intensive pockets of land.

With regard to measures taken in India, the Indian Biofuel policy does not truly discover the potential of capitalizing resources of our largely agro-based economy. There is still a lot left to be done as ood security needs to be critically examined. There is a heavy reliance upon ethanol production ridden with price volatility which creates high uncertainty without exploring alternatives. There is a need for harmonizing both the Indian Biofuel Policy as well as the Indian Green Aviation Policy. The green Aviation policy reduces the emission levels emanating from the civil aviation industry needs considerable revamp to effectively achieve its mission.

The innovations adopted in Singapore's aviation sector have reflected how the aviation industry can contribute beyond emission reductions to promote environmental sustainability. It reflects the growth in environmental consciousness as reflected in the Flight Shaming movement, which nudges passengers to make sustainable choices to reduce carbon footprint and make conscious choices in everyday life.

Aviation emission reduction bears multiple dimensions, and CORSIA is an internationally coordinated response to counter emission reduction. In the post-pandemic era, it is to be seen how effectively Member States will contribute towards fulfilling measures under CORSIA as well as meeting targets under the Paris Agreement. With countries looking to revive and boost economic consideration, the true challenge lies ahead in ensuring countries do not defer from their environmental commitments for economic considerations. India needs to strengthen its measures and focus on implementing its policies in its effort to tackle climate change. The indispensability of the global aviation sector calls for a balanced approach to sustainably running the aviation industry.

NUCLEAR POWER SOURCES (NPS) IN OUTER SPACE – REVIEWING LIABILITY ASPECT WITH SPECIAL REFERENCE TO KOSMOS 954/COSMOS 954 RECONNAISSANCE SATELLITE ACCIDENTS

Dr. Priyanka Manoj Jawale[*]

Abstract

The use of nuclear power sources in Outer Space is not a new concept. Since 1960s USA and Russia has used nuclear power sources (batteries/ smaller reactors, etc.) in its space explorations. Many NASA missions like Voyager, Ulysses, New Horizons, Cassini, and Curiosity had Radioisotope Power Systems. At present nuclear power is the only option available to have long distance space explorations. If man want to explore new destinations like Moon, Mars and beyond then solar power systems won't be sufficient. Nuclear power facilitates to build multi-purpose satellites beyond just generating electricity.

Keywords: Air Space, Aviation, International Law, Space Laws, Nuclear Laws, Liability

Prelude on Nuclear Power Sources in Outer Space

The outer-space mission's solar power supplies most of the energy requirement of the spacecraft. Considerably in recent times solar cells have shown good results in performancein near-Earth orbits

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and for satellite-borne equipment.[1] The far distance space explorations including manned mission require nuclear power as a source of power and cannot rely particularly on solar energy. The use of nuclear power sources in Outer Space is not a new concept. This typically either use small fission systems or the radioactive decay for electricity or heat generation. Since the 1960s USA and Russia have used nuclear sources for power and heat generation in its space explorations and manned lunar missions. A small fission reactor 'the TOPAZ Nuclear Reactor' was used for Earth observation satellite. It is said that Russia has sent about 40 reactors into space and its TOPAZ-II reactor can produce 10 kilowatts of power for the space mission.[2] **Many NASA missions like Voyager** 1 and 2**, Ulysses, New Horizons (launched in 2006),** Pioneer 10 – Pioneer 11, Viking 1 and 2, Mars Pathfinder rover (1996), twin Mars rovers Spirit and Opportunity (2003), and Mars **Curiosity rover had Radioisotope Power Systems (RPS), RTGs, RHUs (which can produce hear for decades).**

Elongated space missions can get electrical power supply by only two ways, either by the sun's rays or heat generated by the natural radioactive decay. **At present nuclear power is the only option available to have long-distance space exploration missions. If humanity wants to explore**new destinations like Moon, Mars, and beyond then solar power systems won't be sufficient. **Nuclear power facilitates can build multi-purpose satellites beyond just generating electricity.** Interplanetary research missions are possible with the help of nuclear sources. Radioisotope power

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1 Yury Zaitsev, *Nuclear power in space*, SPACE DAILY (Aug. 15, 2007), http://www.spacedaily.com/reports/Nuclear_Power_In_Space_999.html.

2 *Nuclear Power in Space*, WIKIPEDIA <https://en.wikipedia.org/wiki/Nuclear_power_in_space.

systems are compact and reliable systems. This RPS provide basic mission fuel and keep critical spacecraft components warm enough to function in the cold, dark reaches of deep space[3]. RPS systems directly convert heat generated by the decay of Plutonium-238into electric power. Plutonium-238 is considered to be a good space power source as it is stable at high temperatures can generate substantial heat in small amounts, and can emit easily shield-able relatively low levels of radiation. Also, it has a half-life of 88 years, meaning it takes that long for its heat output to be reduced by half. This type of plutonium is different than those used for nuclear weapons or nuclear power plant reactors[4]. These space batteries[5] have contributed successfully to many inspiring U.S. space programs.

Radioisotope Thermoelectric Generator (RTG) another option to power space mission was developed by the Atomic Energy Commission (U.S.). The U.S. Navy's 'Transit 4A' navigation satellite (1961) used RTG and became the first U.S. spacecraft which produced 2.7 watts of electrical power to be powered by nuclear energy. Transit 4A held the record for oldest broadcasting spacecraft for its first decade in orbit, in which it traveled nearly 2 billion miles and circled the Earth more than 55,000 times. NASA also launched the 'Nimbus III' (1969) the first U.S. weather satellite powered by RTG and built-in solar cells. **The 'Apollo' moon mission included ALSEP (**Apollo Lunar Surface

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3 Marissa Newhall, *The History of Nuclear Power in Space*, ENERGY GOV. SPACE WEEK 2015 (June, 2015), https://www.energy.gov/articles/history-nuclear-power-space.

4 *Id.*

5 RPS is known as space batteries in which the plutonium is processed into a ceramic form to prevent any harm in unlikely events or accidents. More than half a century's records have proven it as a safe option, worked as per its design.

Experiment Package) to be left on the moon for conducting experiments on the moon, its first package was solar-powered but relied on two 15-watt Radioisotope Heater Units (RHU) to keep its instruments warm in that environment.

The subsequent packages of the **Apollo mission** were each powered by 70-watt SNAP-27 RTGs. Planetarymissions like Galileo for orbiting Jupiterwas powered by 2 RTGs and included 120 RHUs. To explore Saturn and its moons 'Cassini' another international mission was powered by 3 RTGs and its spacecraft was kept warm by 117 small, strategically placed RHUs. Anothernuclear-powered space mission 'Curiosity' in 2011, which was famous for tweets from space, was relied on a single multi-mission radioisotope thermoelectric generator for its heat and power.[6]

Case Study- Cosmos 954/Kosmos 954 Reconnaissance Satellite Accident:

The 'Kosmos/Cosmos 954' Reconnaissance Satellite Accident has a special mention in the history of outer space exploration as it was the first crisis of having a nuclear source on board of the spacecraft. It is very much talked about Satellite accident which grabbed the attention of world media. People started taking space missions with nuclear sources in it more seriously. With Cosmos 954 theclaims settlement issues between Canada and the U.S.S.R. are of special importance while studyingthe liability aspect of nuclear power sources in outer space. In 1978 the 'Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space' was about to meet at the UN office in New York, and

6 Newhall, *supra* note 3.

the *'Cosmos 954'* incident occurred shortly before it, which lead the Subcommittee to give much attention to it[7].

Knowing Cosmos 954:

On 18th September 1977, the Union of Soviet Socialist Republics (U.S.S.R.) launched Cosmos 954 from its Cosmodrome near Tyura Tam to follow Cosmos 952[8] a sister satellite. The White House described Cosmos 954 as an 'ocean-surveillance satellite' with radar to locate warships of the U.S. Navy and noticed it as the one out of 16 ocean-surveillance satellites. On 25th December 1977, Cosmos 952 was fired out of its 150-mile orbit and raised to where it circled the earth at an altitude of more than 600 miles, making it no longer operational[9]. The same maneuver (exercise) was performed on earlier 14 surveillance satellites with their atomic reactors to take them far enough from Earth. It was commonly known that the Soviet's ocean-surveillance satellites obtain their power from nuclear reactors for its remote sensing and communication systems. Accounts of the Cosmos 954 accident indicate that the reactor on it holds 110 pounds of highly enriched uranium (which is the same kind of fuel used in atomic submarines, to make nuclear bombs and can also produce 100 kilowatts of electricity)[10].

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7 S. Neil Hosenball, *Nuclear Power Sources in Outer Space*, 6 JOURNAL OF SPACE LAW (1978).

8 *Id* 122-124. (It was launched on 16th Sept. 1977, two days before Cosmos 954. Both the satellites had been flying 150 miles above the Earth in a northeasterly direction following a path that took them roughly over two-thirds of the Earth every two weeks. The surveillance area covered by them was from the edge of the Antarctic in the southern hemisphere to the edge of the Arctic in the northern hemisphere).

9 Hosenball, *supra* note 7.

10 *Id* 122.

As per the 21st March, 1978 Note of the Embassy of the Union of Soviet Socialist Republics in Ottawa, the satellite carried on board a nuclear reactor working on uranium enriched with an isotope of uranium-235. The same orbit-raising maneuver was tried on five tons of Cosmos 954 after the Christmas same year but it failed to go into the higher orbit ratherit forced the spacecraft out of orbit resulting in it coming down in an unplanned regimen. The North American Air Defense Command in Colorado Springs at that time began to notice trouble in the Cosmos 954. The NORAD's radars noticed Cosmos 954 fall from 150 miles to 100 miles in 10 days and by that time warnings were flashed to countries that lay below the satellite's route[11].

On 24th January 1978, the satellite entered the earth's atmosphere intruding into Canadian air space at about 11:53 A.M. The satellite burned in the atmosphere and scattered to the Earth with the radioactive fission products of the uranium. The Soviet spacecraft started falling into the atmosphere at 6:50 a.m. (Eastern Standard Time) over Queen Charlotte Island off the west coast of Canada. It disintegrated three minutes later into countless fireballs over Great Slave Lake, near the mining towns of Yellow knife, Fort Radium, and Uranium City.

The Canadian Government immediately sent search teams to look for debris. The debris from the satellite was deposited on Canadian territory, including portions of the Northwest Territories, Alberta, and Saskatchewan. The Canadian Defense Minister, Barney Danson, said the debris from the satellite was identified near Baker Lake, a remote outpost in the frozen tundra of North-central

[11] *Id* at 123 to 124.

Canada less than 100 miles south of the Arctic Circle. The entire uranium core of the satellite contained at least 1,000,000 curies of alpha, beta, and gamma radiation. One million curies of radiation would be roughly equivalent to the radiation in a small atomic explosion, like smaller than that of the Hiroshima bombing in 1945.[12] The source of the radiation is not only the uranium but the radioactive fission products like strontium-90, cesium-137 that have built up as uranium fuel burned itself up along with a small amount of plutonium in the spent fuel[13].

The primary days of the accident didn't show immediate damage to person and the property but the risk of potential danger and public health hazards prompted the Canadian government to take certain precautionary measures and to do that the team involved a large number of scientists, technicians, and military personnel and about a dozen aircraft out of which many of them from the U.S. The well-equipped KC135 jet from McClellan Air Force Base and high-flying U-2 aircraft from Beale Air Force Base was sent by the U. S. Air Force to collect the air samples with filters to trap radioactive fallout (to analyze the presence of radioactive isotopes like *strontium-90, cesium-137,* and *iodine-131* which are fission products of any nuclear chain reaction) from the upper atmosphere over Western Canada.[14]

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[12] Hosenball, *supra* note 7.

[13] Department of External Affairs, Canada, Claim Against the U.S.S.R for Damage Caused by Soviet Cosmos, Note No. FLA-268 (Jan. 23, 1979), reprinted in 18 I.L.M. 899 (1979). And Canada-Union of Soviet Socialist Republics: Protocol on Settlement of Canada's Claim for Damages caused by 'Cosmos 954' (Apr. 2, 1981), reprinted in 20 I.L.M. 689 (1981).

[14] Paul G. Dembling, *Cosmos 954 and the Space Treaties*, 6 JOURNAL OF SPACE LAW 129, 129-136 (1978).

On 24th January 1978, an official of the Department of External Affairs (DEA) expressed to the Ambassador of the U.S.S.R. in Ottawa that the Government of the U.S.S.R. had failed to give notice to the Canada of the possible and subsequent re-entry of the satellite into the earth's atmosphere in the region of Canada. The Canadian official also put the questions to the Ambassador concerning the satellite and noting information on the presence of a nuclear reactor on board the satellite and requested an urgent response. These questions were reiterated on 27th January 1978 as well. On 24th January, 1978, the Ambassador of the U.S.S.R. advised an official of the DEA that the satellite had been expected to enter the dense layers of the atmosphere on the same day. The Ambassador of U.S.S.R. asserted that '*there should not be any sizeable hazard and that in places of impact there could only be insignificant local pollution requiring very limited measures of dis-activation*' also stated that construction of the nuclear reactor on board the satellite envisaged its destruction on re-entry of the satellite into the dense layers of the atmosphere. The Ambassador expressed that '*his Government is ready to render urgent assistance by sending to Canada a group of specialists to ameliorate the possible consequences and evacuate remnants of the satellite*' to which the Canadian officials replied that their urgent need was for immediate and complete answers to the questions posed on 24th January, 1978. Through Note of 21st March, 1978, the Embassy informed the Department of External Affairs that '*the active zone of the nuclear reactor onboard the satellite was a set of heat-emitting elements with a beryllium reflector*' and that '*The reactor's design provided for the destruction of the reflector at the entry into dense layers of the atmosphere to be followed by the destruction of the reactor's active*

zone'. The U.S.S.R. failed to provide timely and complete replies to the Canadian questions on 24th January, 1978, despite the reiteration of the request for information on several occasions. Ultimately the U.S.S.R. provided some information in the Notes of the Embassy on 21st March, 1978 and 31st May, 1978. The information of the Note of 31st May 1978 contributed to the Canadian evaluation of the required course of action; also, it included admissions that debris found in the Northwest Territories of Canada originated from the Cosmos 954 satellite.

Liability claims of Cosmos 954:

After the Cosmos 954 incident, many issues were raised from around the world. The prominent concerns raised were such as, difficulty in indicating liability, the question of payment of services taken by other States and experts or cost of third-party assistance, in case of nuclear radioactive contamination how to wait for understanding how much damage has happened due to the contamination, how to count the impact on the environment and its unusual damage. The Canadian Government mentioned earlier that they would seek reimbursement from the Soviet Union as the costs of the search operations exceeded several million dollars, excluding the expense of American scientists who had taken part in the cleanup of Canadian territory. The USSR acknowledged that Cosmos 954 satellite dropped out of the sky over Canada and they accepted the discovered fragments of the satellite, rather they indicated a willingness to pay for damages. The recovery of radioactive debris and complicated cleaning efforts raised the

logistical problems, the sub-Arctic cold created more hurdles in it and that also contributed to the increasing the cost of damages[15].

The Canadian officials undertook operations directed at locating, recovering, removing, and testing the debris and cleaning up the affected areas. The operations took place in two phases. The Phase I was from 24th January, 1978 - 20th April, 1978 and Phase II was from 21st April, 1978 – 15th October, 1978[16]. The total cost involved in Phase I was $ 12,048,239.11 of which $ 4,414,348.86 were included in Canada's claim. The total cost incurred during Phase II was $ 1,921,904.55 of which $ 1,626,825.84 were included in Canada's claim. In sum, Canada claims from the U.S.S.R. payment of $ 6,041,174.70. The Canadian authorities on recovered debris determined that all but two of the fragments recovered were radioactive, some fragments proved to be of lethal radioactivity. Their tests were carried out on the debris; the results of it confirmed that highly radioactive and dangerous debris from the satellite had been deposited on Canadian territory. The Government of Canada informed to the Secretary-General of the United Nations of the discovery of debris from the satellite[17].

After many detailed negotiations both the country's finally signed the protocol on 2nd April 1981, for settling damages caused by the disintegration over Canada by the Soviet SatelliteCosmos 954[18]. It was signed in Moscow by Canada's Ambassador to the U.S.S.R.

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15 Stephen Gorove, *Cosmos 954: Issues of Law and Policy*, 6 JOURNAL OF SPACE LAW 138, 137-146 (1978).

16 *supra* note 2.

17 United Nations Documents A/AC.105/214 and 214/Corr.1 of 8th February 1978; A/AC.105/217 of 6th March 1978 and A/AC.105/236 of 22nd December 1978.

18 *Settelement of Claim between Canada and the Union of Soviet Socialist Republics for Damage Caused by 'Cosmos 954'*, JAXA SPACE LAW, http://www.jaxa.jp/library/space_law/chapter_3/3-2-2-1_e.html.

Geoffrey Pearson and on behalf of the U.S.S.R. the Deputy Minister, Ministry of Foreign Affairs N.S. Ryzhov was there. Both the Governments decided that the Government of the U.S.S.R. shall pay to the Government of Canada the sum of three million Canadian dollars (C$ 3,000,000.00) in full and final settlement of all matters connected with the disintegration of the Soviet Satellite Cosmos 954 in January 1978 (Article I of the Protocol) and the Government of Canada shall accept the payment said under Article I of the Protocol.

The claims made by the Government of Canada were presented pursuant to the 1972 Convention on International Liability for Damage Caused by Space Objects to which both the States were a party and relied on the general principles of international law. The entry of the Cosmos 954 into Canada's air space and its deposit of hazardous radioactive debris on Canadian territory constitute a violation of Canada's sovereignty. It is in a way is the trespass of the satellite. The damage caused to Canada by the presence of hazardous radioactive debris and the interference with the sovereign right of Canada. It is a well-settled international precedent that recognises that a violation of sovereignty gives rise to an obligation to pay compensation.

For the space activities, the standard principle laid down under the Liability Convention is the absolute liability of the launching State of the Spacecraft. Also, activities involving the use of nuclear energy signify the absolute liability principle and it is pursued to have become a general principle of international law. Many international agreements refer principle of absolute liability to the high degree of risk fields/activities and it is also recognized by civilized nations. General principles of international law have

found its place under Article 38 of the Statute of the International Court of Justice. In this case, the Government of Canada calculated a fair amount of compensation relied on general principles of international law by applying reasonable claims for the cost of intrusion of the satellite and deposit of debris. Apart from this, the Government of Canada reserves its right to present additional claims for compensation to the Government of the U.S.S.R. in respect of damage not yet identified or determined or damage which may occur in the future as a result of the intrusion of the Cosmos 954 satellite into Canada's air space and the deposit. The Government of Canada reserves its right to claim from the Government of the U.S.S.R. all costs that Canada may be obliged to incur in the event of the establishment of a Claims Commission under the 1972 Liability Convention and also reserves its right to claim the payment of interest at an appropriate rate on the amount of compensation declared payable by a Claims Commission, such interest to accrue from the date of the decision or award of the Claims Commission[19].

An accident like this has allowed understanding that; such mishaps while carrying NPS on spacecraft would not only result in personal injury or damage to the property but can also challenge to collect the radioactive waste and its spread which is more traumatic. Finally, for three million Canadian dollars, Canada settled with the U.S.S.R.. This case demonstrated the effectiveness of international treaties and legal framework for dealing with space-based issues.

Legal Framework on Liability:

[19] Department of External Affairs, s*upra* note 13.

Much work has been done on the land-based accidents at the nuclear power plants and its liability aspect for claims settlement. Legal principles are much clear in the matter concerning land-based use of nuclear power sources (NPS). Also, at the national and international level, there is a much clear and transparent legal framework is available when it comes to the land-based civilian nuclear power plant and the liability aspects associated with it. But comparing this legal framework with space it seems to be inadequate. Apart from United Nations resolutions we have two soft law principles directly relating to NPS in Space. It includes UN General Assembly Resolution 47/68 which adopted '*Principles Relevant to the Use of Nuclear Power Sources in Outer Space*[20] *(1992)'* and another document is jointly published '*Safety Framework for Nuclear Power Source Applications in Outer Space' 2009*[21] (STSC/IAEA Safety Framework). Both these Principles and Safety Framework came after the Cosmos 954 accident. Both these Principles and Safety Framework are treated like soft law principles by the States. In this paper, we are not discussing these two documents but analyzing apart from these documents how liability claims were settled in this case. To study the liability aspect that to Space liability in detail concerning nuclear sources in Outer Space in general and Cosmos 954 in particular we have to do analyses of at least four international conventions. They are namely, the Outer Space Treaty, the Liability Convention 1972, the Rescue and Return Agreement, and

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[20] UNGA, *Principles Relevant to the Use of Nuclear Power Sources in Outer Space*, (47th Session), https://www.unoosa.org/oosa/oosadoc/data/resolutions/1992/general_assembly_47th_session/res_4768.html.

[21] IAEA, *Safety Framework for Nuclear Power Source Applications in Outer Space*, https://www.iaea.org/sites/default/files/safetyframework1009.pdf.

along with these space treaties, the Vienna Convention on Civil Liability for Nuclear Damage given by International Atomic Energy Agency (IAEA). Though IAEA has other liability conventions as well as significant in this area, this paper would like to mention the Vienna Convention only.

The outer Space Treaty:

The U.S.S.R. orbited the first earth satellite in October 1957 and next year the United States comes up with Explorer-I in January 1958.[22] Taking note of increasing space activities, the United States proposed (1959) priority attention to the concern of international space liability for damage caused by the launching, flight, and re-entry of payloads and associated launch vehicles.[23] In 1962 at the first '*United Nations Outer Space Legal Subcommittee*' meeting the U.S. proposed a set of substantive principles on liability. This led to the consensus with the U.S.S.R. and pave the way for the unanimously adopted 'Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space' by the United Nations General Assembly on 13th Dec. 1963[24]. This Declaration gave the foundation for the Outer Space Treaty[25] after adding a few more provisions. The generalized statement from this Declaration has helped essentially

[22] NASA, *Explorer and Early Satellites*, https://www.nasa.gov/mission_pages/explorer/explorer-overview.html.

[23] Herbert Reis, *Some Reflection on the Liability Convention for Outer Space*, 6 JOURNAL OF SPACE LAW 125, 125-128 (1978).

[24] U.N.G.A. Res. 1962/XVIII (1963).

[25] The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies (known as the Outer Space Treaty). It was considered by the Legal Subcommittee in 1966 and the same year agreement was adopted by the General Assembly by resolution 2222 (XXI) on 19th December 1966. The Treaty was opened for signatureon 27th January 1967at London, Moscow, and Washington D.C.; the entered into force on 10th October1967 and it has four depositories namely, the Russian Federation, the United Kingdom, and the Northern Ireland, and the United States of America.

to codify Article VII of the Outer Space Treaty, which says '*each State which launches or procures the launching of an object and from whose territory/facility an object is launched into outer space, is internationally liable for damage to a foreign State or its natural/juridical persons by such object/its component parts on the earth, in air space, or outer space including the moon and other celestial bodies'*.[26]

After the Outer Space Treaty, for the first time in 1963, the United States introduced the first proposal for an international convention on liability for space vehicle damages to the 'United Nations Outer Space Legal Subcommittee'. In 1972 the Convention on International Liability for Damage Caused by Space Objects[27] came into force codifying the principles laid down under Article VII of the Outer Space Treaty.The provision on liability under the Article VII of the Outer Space Treatyis more general and in a way, it constitutes '*lexgeneralis*' than the provisions of the Liability Convention and the Rescue and Return Agreement which is more elaboration of the principle of liability pronounced under the Outer Space Treaty. This is unclear and does not mean that the Outer Space Treaty could be regarded as imposing more liability than the Liability Convention itself.[28]

The Liability Convention talks about absolute liability whereas the Outer Space Treaty does not mention it. Article VII of the Outer Space Treaty deals with three essential elements, there must be i)

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[26] Reis, *supra* note 23.

[27] United Nations Office for Outer Space Affairs, Convention on International Liability for Damage Caused by Space Objects, *Convention on International Liability for Damage Caused by Space Objects* (1971), https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/introliability-convention.html.

[28] Gorove, *supra* note 15, at 142.

damage, ii) damage by a space object, and iii) proximate causation. But the treaty does not define what damage is. The Liability Convention also refers to the principles of justice and equity in determining the compensation to pay for the damage. Another prominent provision in this regard is Article VI of the Outer Space Treaty, it states that the State bear international responsibility for national activities in outer space including the moon and other celestial bodies and it should assure that such activities are carried out in conformity with the provisions of the Outer Space Treaty. Even to apply the law of international responsibility for the national activities which include tortious activities, one has to prove actual damage[29].

The Rescue Agreement:

The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space[30], 1968 (hereinafter the Rescue Agreement) is also significant to study. This Agreement is the elaboration of Article 5 and 8 of the Outer Space Treaty. The Rescue Agreement through its paragraph 1 of Article 5,imposes a duty on Contracting Party that they should notify the launching authority and the Secretary-General when it discovers that a space object / its part has come down in its territory. As per this Agreement, under two possible situations the launching authority would have to be borne by the expenses, first

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[29] Gorove, *supra* note 15, at 143.

[30] The Rescue Agreement was negotiated by the Legal Subcommittee from 1962-1967. The final consensus reached the General Assembly and in its 1640th plenary meeting on 19th December 1967, the General Assembly adopted the 2345 (XXII) Resolution on thisRescue Agreement. The Agreement was opened for signature in London, Moscow, and Washington D.C. on 22nd April 1968 and it entered into force on 3rd December 1968and it has four depositories namely, the Russian Federation, the United Kingdom, and Northern Ireland, and the United States of America. (Sources: 19 UST 7570; TIAS 6599; 672 UNTS 119).

is when they request the recovery and second is when they requested the return of its space objects (paragraphs 2 and 3 of Article 5). The Rescue Agreement under its paragraph 4 of Article 5 says if a Contracting Party believes that a space object / a part which it discovers is hazardous then it may request the launching party to take immediate and effective steps to eliminate any possible harm or danger[31]. Moreover, in such cases, the launching party may require to remove the entire object if removal of it is the only way in which the danger can be eliminated from the territory of the Contracting Party. The provision of paragraph 5 of Article 5 says that the launching authority can pay for the expenses incurred by a Contracting Party in recovering/returning a space object/component part if requested by the launching party[32]. If either or both of these conditions of paragraphs 2 and 3 of Article 5 are met, then the launching authority is required to pay the expenses associated with the recovery and return of its space objects (paragraph 5 of Article 5). The Treaty says that such 'expenses' 'shall be borne' by the launching authority. The drafted discussed this provision widely and choose the word expenses and not used word reimbursement. The expenses incurred by the Contracting Party must be borne by the launching state, and a launching authority's request for such recovery and return is a condition of this obligation[33]. During the Cosmos 954, the Canadians also inform the Soviet Union which was expected as per Article 5 of the Rescue Agreement. Initial reports of the Cosmos 954 suggest that the Canadians did not request the Soviets to take

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[31] Art. 5, The Rescue Agreement, https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/rescueagreement.html.

[32] *Id*.

[33] Dembling, *supra* note 14, at 132.

any steps to assist/eliminate the possible danger whereas they refused to have the assistance offered by the Soviet Union in this regard[34]. The Soviet Union and Canada both had signed the Liability Convention and were bound by its provisions when Cosmos 954 accident happened.

The Liability Convention:

The Convention on International Liability for Damage Caused by Space Objects, 1972 (hereinafter the Liability Convention[35]) needs to be analyzed in detail. The Outer Space Liability Convention completed its framing in June 1971 and it witnessed the most lengthy treaty negotiations since 1945[36]. As per the Convention, the launching State isliable for the damage due to its faults in space and shall be 'absolutely liable' to pay the compensation for the damage caused by its space objects on the surface of the Earth or to the aircraft. Underthis Convention, the launching State is absolutely liable so the proof of negligence is not requiring. The Convention provides the procedures for the settlement of claims for damages.The Article I of the Liability Convention defines 'damage' means the loss of life, personal injury or other impairment ofhealth; orloss/damage to property of States or of persons or property of international intergovernmental organizations. The term Launching includes attempted launching

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[34] Gorove, *supra* note 15; Eilene Galloway, *Nuclear Power Satellites: the U.S.S.R. Cosmos 954 and the Canadian claim*, 401-415, 12 AKRON LAW REVIEW 401, 401-415 (1979).

[35] Convention on International Liability for Damage Caused by Space Objects was negotiated by the Legal subcommittee from 1963 to 1972. Finally, negotiations reached an agreement and on 29th November 1971, the General Assembly in its 1998th plenary meeting adopted Resolution 2777 (XXVI). It was opened for signature in London, Moscow, and Washington D.C. on 29th March 1972. It entered into force on 1stSeptember 1972 and it has four depositories namely, the Russian Federation, the United Kingdom and the Northern Ireland, and the United States of America.

[36] Reis, *supra* note 23, at 125-128.

(Article I (b)). The term 'launching State' means'*a State which launches or procures the launching of a space objectand from whose territory or facility a space object is launched*[37]'.The Liability Convention refers to the absolute liability principle and in case two or more States jointly launch a space object then they shall be jointly and severally liable for any damage (Article V (1)). Article II of the Convention provides that '*A launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the Earth'*. The launching State shall be liable to pay damages so that the claimant will be restored to the condition which existed if the damage had not been occurred[38]. The important provisions of the Convention provide that, a State may claim compensation for the damages it suffered from a launching State (Article VIII); such claim must be presented through the diplomatic channels or through the Secretary-General of the United Nations if both States are the Members of the United Nations (Article. IX). The compensation for damages under the Liability Convention must be determined by the International Law and the principles of justice and equity[39] (Article XII). The very famous 'The Trail Smelter case'[40] is relevant here concerning activities of the State and its impact on the environment. When a lawful activity of one State causes environmental effects in the territory of another State, in such case the affected State is entitled to the compensation by showing clear and convincing proof of material damage. A clear convincing proof of substantial damage

[37] Art. I (c), the Convention on International Liability for Damage Caused by Space Objects, 1972.

[38] Art. XII, the Convention on International Liability for Damage Caused by Space Objects, 1972.

[39] *Id.*

[40] See the Trail Smelter Arbitral decision (*United States v. Canada*), 35 AM. J. INT'L L. 684 (1941).

is a precondition of the polluting State's liability to the affected State.[41] When the space activity causes any material damage to the Earth's atmosphere by any chemical emissions or due to any man-made activity then the rights and obligations arising under the Liability Convention need to be supported by the facts and findings and actual profs of scientific data as evidence of damage.[42]

It was debated that, due to the Cosmos 954 there was no loss of life, no personal injuries involved, or other impairment of health directly but the radiation did surely result into damage to Canadian property and therefore it makes the Soviet Union (being launching State) liable for the damages. The terms referred to in the Convention like loss of life, personal injury or other impairment of health may not only include physical injury but also injury affecting mental health as well as social wellbeing.[43]

The term expenses should be given wider consideration especially when the damages occurred by nuclear substances. It may include efforts taken care of by the contracting party as a precautionary measure to mitigate eventual unseen damages. Under the liability Convention, Canada's claim for damages and compensations from the Soviet Union was very much valid.

Vienna Convention on Civil Liability for Nuclear Damage:

The International Atomic Energy Agency (IAEA) [44] came with Liability Conventions and Protocols relating to civil nuclear liability. The most prominent amongst them is the Vienna Convention which we are briefly discussing here. Under the

41 Gorove, *supra* note 15.
42 *Id*.
43 Dembling *supra* note 14.
44 https://www.iaea.org/ (Last visited on 21/9/2020).

Vienna Convention on Civil Liability for Nuclear Damage[45], the operator of the nuclear facility (Nuclear Power Plant/Reactor) or device is liable for the damage upon proof that such damage has been caused by a nuclear incident. Both the Vienna Convention and the Liability Convention suggest that it possibly interpret the damages, which includes consequential damage or precautionary measures taken to avert potential or actual damage.

Conclusion:

The liability in Outer space should not be studied from the law and policy aspect only, but it also needs an assessment from a sustainable development perspective. The Cosmos 954 accident is not the only satellite with nuclear fuel abroad met with an accident. But certainly, it has shown the question of legal inadequacy in time of uncertainty. It is necessary to have several specific or in a combination of policy options, to reduce similar future accidents or hazards arising out of the use of radioactive atomic or nuclear power sources in space. It is essential to have robust safety/precautionary measures and standards in Earth-orbiting satellites carrying NPS. That will reduce the risks to an absolute minimum, helping in preventing radioactive material contaminating the Earth or the atmosphere. IAEA has Convention on early notification. Using NPS in spacecraft should follow a matter of practice to give an advance notice to the concern authorities of the impending danger at various stages of space operations. There should be international agreement on declaration of NPS by the launching State, before its launch, at the launching,

[45] IAEA, *Vienna Convention on Civil Liability for Nuclear Damage*, https://www.iaea.org/topics/nuclear-liability-conventions/vienna-convention-on-civil-liability-for-nuclear-damage.

upon descent, and in case of accident or return of such on the Earth. Technology should assist in creating a kind of shuttle or umbrella to reduce hazards reaching earth environment, and could assist in placing hazardous substances in higher and safer orbit.

We can propose some options regarding the question of liability such as coming up with the novel international agreement (an additional protocol to the Liability Convention) with a dedicated provision to cover the specific costs, such as tracking debris, public health risks and precautionary measures to be taken to prevent contamination. Where it is not possible to formulate a consensus on the new legal framework then, another option is at least, expand the interpretation of the provisions or give an illustration to existing provisions associated with damage, loss of life and property, etc. for justice and equity under available international legal framework. The preliminary offer by U.S.S.R. to forfeit damages was may be for to be fair and just to restore the Canadian conditions existed before the Cosmos 954 crash. The actual reimbursement by the U.S.S.R. for whatever reasons has become an important precedent for future incidences of damage in the field of space law.

MERGERS AND ACQUISITIONS IN THE INDIAN AVIATION SECTOR

Sakshi Gupta[*]

Abstract

Mergers and Acquisitions have become an important way of corporate restructuring in today's business world. The motives behind an M&A include economies of scale, synergy, value creation, diversification, better brand value and market power etc. Aviation sector forms the backbone of the infrastructure of any country because it opens up routes for tourism, trade and provides stimulus to business and economy. The last 3 years have seen the civil aviation industry emerge as the fastest growing industry in the country. The aviation industry also contributes majorly to the GDP (currently 72 billion USD).[1] *The aviation industry in India is currently under lot of stress and turbulence, struggling with huge fuel costs, falling yields and mounting losses amidst hyper competition.*[2] *The current Covid-19 Pandemic is making things worse and more difficult for the aviation industry due to restricted travel and grounded flight operations bringing them, almost on verge of bankruptcy. Things look pretty bleak for the aviation sector currently. Overall, in the past decade, many airlines have been unable to survive and have*

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1 Jayant Singh, *Indian Aviation, Flying High*, NATIONAL INVESTMENT AND PROMOTION FACILITATION AGENCY (Apr. 1, 2020), https://www.investindia.gov.in/sector/aviation.

2 Ministry of Commerce and Industry, *Indian Aviation Industry*, INDIAN BRAND EQUITY FOUNDATION (Jan. 24, 2020), https://www.ibef.org/industry/indian-aviation.aspx.

either left the sector or undergone mergers and acquisitions for their revival and survival. The year 2019 saw an overall economic downswing in the aviation sector. It witnessed the closure of Jet Airways, India's only private full service carrier. Air India is also seeking to go to the privatization route to save itself from piling debts. The past decade saw the collapse of the two major airlines of India, Jet Airways and Kingfisher.

The aviation sector is tapped with lot of potential for growth and if, the industry stakeholders and the policy makers work together, they can boost India's civil aviation sector by making sound and efficient polices. India can realize its dream of becoming the 3rd largest aviation market in the world by focusing on quality, interest of passengers, cost and bringing in the right policies in place.

The paper shall comprehensively deal with the Aviation Industry in India, trends of Mergers and Acquisitions in the sector and the Regulations dealing with the same. It shall then discuss the major cases on M&A in aviation sector in India with a critical analysis of the same. The paper seeks to analyse, if the mergers and acquisitions in the sector have proved to be successful for the sector or not. Finally, the paper shall conclude with the issues and challenges being faced by the aviation sector and the way forward to a bright future for the sector.

Key Words: Mergers and Acquisitions, Company Law, Aviation Industry, Services

Introduction

Mergers and Acquisitions have become the most important way of corporate restructuring in today's world. The government initiated this concept and since 1991 economic reforms, the markets have seen plethora of mergers and acquisitions as an important strategy to sustain increased competition. The M&A trends have also changed over years and across sectors.

There are two types of expansion: Internal and External. Internal or Organic expansion is when companies adopt different strategies like company augmenting its workforce, customers, infrastructure, etc. External expansion is when companies enter into mergers, acquisitions, takeovers and amalgamations.

Merger can be defined as the process in which two or more companies combine into a single entity either by absorption into one or formation of a new company. While acquisition is when one company buys/ purchases another company and it becomes a hostile takeover when the management is not ready for the deal so directly shareholders are approached.

Some of the factors encouraging mergers and acquisitions in aviation sector are explained as below:

1. Economies of Production

- To achieve economies of scale by merging all existing facilities.
- To regulate and improve the quality of service.
- To maximize consumer satisfaction.
- For advancement and use of better technology and know-how.

- For cost reduction, quality improvement and increasing market.
- To bank upon the credibility of the parent organization to maintain rapport with vendors on global basis.

2. Economies of Market

- To capture all the segments of market and to obtain new market outlets.
- To enhance public image and to possess strategic control.
- To facilitate route economies, that is, prevention of overlapping/duplication.

3. Economies of Operations

- To utilize expertise manpower like pilots, cabin crew etc. in the most optimal way.
- To enhance global corporate brand image.
- To reduce overall costs and other expenses.
- To organize overall network connectivity and to have centralized control in a coordinated way.

4. Economies of Finance

- To have a strong capital base, to improve the liquidity position, to avail tax benefits and to enhance credibility with the creditors, lenders etc.

A number of private players entered the Indian civil aviation market with the phase of liberalization in 1990s. Further, factors like structural reforms, entry of private players modernization of airport, adoption of low fare model and improvement in service standards has led to the growth of this sector. The aviation field has seen the implementation of open sky policy by the Ministry of

Civil Aviation. This open sky policy has helped a lot of businesses to enter the aviation market.

Due to the implementation of this policy, the then existent monopoly situation of national airlines has been changed; private players, air taxi operators and some new corporate houses have entered into the aviation market to reap the market synergies. Currently the aviation sector is undergoing financial crisis, many operators have undergone M&A's to capture market synergies and fight competition.

This paper aims to study the past and current trends in M&A in Indian Aviation sector. It aims to analyse the strategically important role that M&A has played in revolutionizing the Aviation sector. The paper would focus on the legal and regulatory mechanisms governing the M&A in aviation sector. I would be discussing in detail the landmark mergers that have taken place in the aviation sector in the recent decade.

The Aviation Sector – India

In a country where railways has always been the most used mode of transportation, it is right to say that, the aviation sector has successfully established itself as a credible, economically feasible and more comfortable alternative.

The last 3 years have seen the civil aviation industry emerge as the fastest growing industry in the country. The aviation industry also contributes majorly to the GDP (currently 72 billion USD).[3]

[3] Ministry of Commerce and Industry, *Indian Aviation Industry*, INDIAN BRAND EQUITY FOUNDATION, (Jan. 24, 2020, 1:00PM), https://www.ibef.org/industry/indian-aviation.aspx

The Government of India has been working towards increasing the number of airports to cater to the rising air traffic. India has envisaged increasing its airports from 103 (as of March 2019) to 190-200 by 2040.[4] It also plans to increase the fleet of aircrafts by almost 1100 planes by 2027 (as compared to present 620 aircrafts).[5]

According to the FDI policy 2017 issued by Department of Industrial Policy and Promotion (DIPP), government has allowed 100 per cent FDI in scheduled air transport service, regional air transport service and domestic scheduled passenger airline under automatic route. Government permission is needed for FDI above 49% .[6]

Legal Regulatory Framework

The Legal Regulatory Framework governing the aviation sector in India consists of the following regulatory agencies: Directorate General of Civil Aviation (main body that regulates and oversees civil aviation in India), Airports Authority of India (AAI), Bureau of Civil Aviation Security, Airports Economic Regulatory Authority and other associations like Federation of Indian Airlines, Air Cargo Agents Association of India, Indian Commercial Pilots' Association, Aeronautical Society of India etc.

Key Legislations governing the Aviation Sector:

- The Aircraft Act, 1934
- The Aircraft Rules, 1937

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4 ibid

5 ibid

6 Consolidated FDI Policy 2017, Ministry Of Commerce And Industry, Department Of Industrial Policy And Promotion, (Feb. 25, 2020, 10:02 AM), https://dipp.gov.in/foreign-direct-investment/foreign-direct-investment-policy

- The Civil Aviation Requirements Guidelines
- The Air Corporations Act, 1953
- Airports Authority of India Act, 1994
- The Carriage by Air Act, 1972
- The Tokyo Convention Act, 1975
- The Anti-Hijacking Act, 1982
- National Civil Aviation Policy, 2016

This policy was introduced by the Ministry of Corporate Affairs (MCA) in June 2016 to facilitate the growth of the aviation sector. Some key highlights of the same are:

i. 5/20 Rule: The Union Cabinet in 2014 stated that in order for any Indian aircraft to fly internationally, it must be in operation for at least 5 years domestically and possess a fleet of 20 aircrafts. But with the 2016 policy, this requirement has been modified and all airlines can fly international if they use 20 aircrafts or 20% of the total capacity, whichever is higher for domestic operations.

ii. Bilateral Traffic Rights:

iii. Regional Connectivity Scheme: an advantage to the small towns.

iv. Maintenance, Repair and Overhaul Business (MRO)

Case Studies: M&A In Aviation Sector

1) Air india- indian airlines merger:

Air India and Indian Airlines merged to form "Air India" under National Aviation Company of India Ltd. (NACIL) on July 15, 2007.[7]

[7] National Aviation Company of India Ltd, *Management Discussion and Analysis Report*, AIR INDIA (Feb. 15, 2020, 11:00 AM),

Indian Airlines:

The airline was established under the Air Corporations Act, 1953 and came into operation on 1st August 1953. It had an initial capital of 32 millions.[8] It was state owned and focused mainly on domestic routes. Ministry of Civil Aviations administered it. The 8 domestic airlines which merged to form Indian Airlines Corporation were Bharat Airways, Indian National Airways, Deccan Airways, Himalayan Aviation, Airways India, Kalinga Airlines, Air Services of India and the Domestic wing of Air India.

Air India:

Tata Air Services was renamed as Tata Air Lines in 1938. Then, on July 29, 1946, Tata Airlines under the name of Air India became a public limited company.[9]

Motives behind the Merger:

- Leadership crisis due to frequent change of the leadership.
- Cost of the Aviation Fuel was rising.
- Competition was increasing due to coming up of a number of low cost and private carriers.

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http://www.airindia.in/writereaddata/Portal/FinancialReport/1_115_1_Management_Discussion_Analysis_0708.pdf

8 India Today Web Desk, *Birth of Indian Airlines and Air India: Remembering the day when all airlines in India were nationalized*, INDIA TODAY (Feb. 23, 2020, 5:00PM), https://www.indiatoday.in/education-today/gk-current-affairs/story/indian-airlines-nationalisation-day-air-india-august-1953-air-corporation-act-1302436-2018-08-01

9 ET Online, *64 years after Air India's Nationalization, Tata Group looking at bid to fly its bird back home*, ECONOMIC TIMES, (Feb. 12, 2020, 3:40 PM), https://economictimes.indiatimes.com/industry/transportation/airlines-/-aviation/64-years-after-air-indias-nationalisation-tata-group-wants-to-fly-its-bird-back-home/articleshow/61020088.cms?from=mdr

- Pressures of costs were increasing and passenger traffic was declining.

The merger tried to achieve the following:

- Increased fleet size
- Economies of scale
- Pooling of resources like manpower and assets for better aircraft and resource allocation
- Volume Discounts
- Star Alliance membership (Air India invited to join the 21 member consortium)

Challenges and Problems:

- Resistances from employees due to fear of retrenchment.
- Issues of distrust amongst the unions also led to wage wars.
- Differences in the way of functioning and operations of both the airlines since they both had different pay structure and routes leading to conflict of interest.
- Different aircrafts fleet created problems in managing the inventory, maintenance and repair works etc.

Post-Merger Problems:

- Incomplete integration of systems, positions and infrastructure of the two companies, which created a huge problem as it led to decline of customer service.
- Inability of the employees to come to terms with the merger.

- Mounting losses due to rising prices of the fuel, less passenger traffic due to recession and wasteful and expensive acquisition of aircrafts.
- Crisis in leadership positions due to frequent change of leadership (CEO's)/
- Unfavorable government policies led to increased competition from both domestic and global airlines.

In conclusion, the decision to merge Air India and Indian Airlines was taken without proper consultation and in haste, which resulted in the downfall of Air India. Both of them are complete opposites of each other in respect of their work cultures, working conditions, areas of operations, compensation etc. Thus the merger led to huge dissatisfaction and frustration amongst the employees. It now appears that a no-merger scenario would have been more preferable. Air India, though is trying its best to bring continuous improvement in services provided to passengers. But it also had to purchase aircrafts leading to a huge debt on its books, which are affecting the company's performance.

Current Position of Air India

The government is firm on its resolve to sell the airline; they want a buyer who can turn the fate of the airline around. Since the Air India has been performing poorly, it lags behind most domestic airlines in terms of cancellation and other performance factors.

The government has started the disinvestment process for the airline and invited bids for selling its 100% complete stake in Air India. The government looks for disinvestment in the airline once all the debt is taken off its books, they want to present Air India as a premium asset to the private sector bidders. This is government's

second attempt after its 2018 attempt to sell Air India. Government, this time, has allowed for sale of 100% stake and giving full management control to the new owner, unlike the previous deal where it struggled to attract bidders, when it decided to divest only 74% interest.[10]

2) Kingfisher- Air Deccan Merger

Kingfisher Airline Limited is an airline group, founded by Mr. Vijay Mallya in 2003, under the parent company of United Breweries (UB) based in Bangalore. Kingfisher came into operation on 9th May 2005.[11] Air Deccan was founded by a retired Army captain, G. R. Gopinath and it came into existence on 25th August 2003. The airline underwent rapid growth from 2005-2007. Air Deccan was recognised as the first low cost carrier of India and it mainly focused on the middle class households by offering low fares.[12]

In early May 2007, there were rumors that Vijay Mallya wanted to buy Air Deccan. Then, finally on May 31, 2007, UB Group (United Breweries) acquired a controlling stake of 26% in Deccan. Then, on 1st April 2008, Kingfisher was merged with Deccan Air.[13]

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[10] Saurabh Sinha, *Air India Sell Off: In Second Attempt, Centre Offers 100% Stake for sale*, TIMES OF INDIA (Feb. 20, 2020), https://timesofindia.indiatimes.com/business/india-business/govt-to-sell-100-per-cent-stake-in-air-india-issues-bid-document/articleshow/73651820.cms.

[11] Mihir Dalal, *How Vijay Mallya inherited an empire and proceeded to lose it*, **LIVE** MINT (Feb. 27, 2020), https://www.livemint.com/Companies/1YrLuntaxmNyeNoYFbUX1L/How-Vijay-Mallya-inherited-an-empire-and-then-proceeded-to-l.html.

[12] Anshul Dhamija, *Air Deccan: Back in the skies*, FORBES INDIA (Feb 27, 2020), https://www.forbesindia.com/article/big-bet/air-deccan-back-in-the-skies/49175/1.

[13] PR Sanjai, *UB Group: Flying into turbulence*, LIVE MINT, (Feb 24, 2020, 11:09 AM), https://www.livemint.com/Companies/l7NMT9V0o0eZBr61cpTLyK/UB-Group-Flying-into-turbulence.html

Motivations for Merger:

Kingfisher:

- Increasing Costs
- Difficulty in maintaining brand image
- Competition from Low Cost Carriers
- 5yr Ceiling Cap for International Operations
- Access to new routes

Deccan:

- Increasing costs
- Brand not synonymous with quality
- Prices too low to be profitable
- Competition
- Problem of cash crunch
- Better utilization of existing resources

After the merger, both the airlines benefitted from airport infrastructure sharing, airlines spares and other logistics sharing, optimum manpower utilisation etc. However it was not a successful merger.

The end of Kingfisher:

Kingfisher started off as a positive and promising aviation projects, which offered luxury to even the middle class people at affordable rates and in 2011, it was even admitted into the One-World alliance. The airline had been reporting losses ever since it started

its flights in 2005. It was further worsened by the acquisition of loss making Air Deccan in 2007.

The problem with Kingfisher started when its financial situation began to erode, and it took debts and its equity value started declining. In 2010 matter even worsened as Jet Airways overtook Kingfisher to become the largest passenger airline. With new competitors like Indigo who were performing so well, Kingfisher found it difficult to capture market and these were signs of the airline's imminent doom but which went unnoticed by Kingfisher.

In 2011, the airlines for the first time declared about its cash problems, blaming the same to rising fuel prices. Due to its poor performance in 2011, the Kingfisher airline was burdened with huge debts and interest/other payments on it and was unable to meet the same. The walls were closing on it from all sides, with only their brand value remaining as their only financial asset.

The Kingfisher was started being asked by various banks for payments on loans and debts, there were strikes by the employees for their salaries and other perks, thus overall condition of airline started declining. Many of its pilots also started leaving for rival firms.

2012 proved to be the most turbulent year for the airline, as on January 5, 2012, State Bank of India (SBI), Kingfisher's largest creditor declared it as a non-performing asset (NPA). Things started becoming difficult for the management so they declared numerous job cuts and also long work hours. On 18th February 2012, airlines grounded most of its aircrafts and its license got

suspended by Directorate General of Civil Aviation in October 2012.[14]

Kingfisher was also refused to take further borrowings by the consortium of banks headed by SBI for any until it raises some fund. Hence, by now Kingfisher's accounts stood frozen by banks due to non-payment of dues.

In summary, improper financial management and wrong decisions with regard to expansion led to the failure of Kingfisher. They initially concentrated on providing luxury facilities to their middle class travellers without working out their profitability. Their failed low cost model, inability to sustain competition from other low cost carriers like IndiGo and SpiceJet, and their delayed acquisition of Air Deccan, all these factors led to its collapse.

3) Jet- Sahara Deal

On 14 January 1995, Jet Airways was given the status of a scheduled airline.[15] Sahara airline was established on 20 September 1991. It started its international operation on 22nd March 2004.[16]

Jet Airways made the first attempt to acquire Air Sahara by offering to purchase it for 500 million USD (in cash) in January

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[14] Business Standard Reporter, *Kingfisher Airlines loses licence*, BUSINESS STANDARD (Mar. 2, 2020), https://www.business-standard.com/article/companies/kingfisher-airlines-loses-licence-to-fly112102100028_1.html.

[15] Business Standard Reporter, *Jet Airways (India) Ltd. (JETAIRWAYS) - Company History*, BUSINESS STANDARD (Mar. 23, 2020), https://www.business-standard.com/company/jet-airways-5586/information/company-history.

[16] Barkha Mittal, *Acquisition of Air Sahara by Jet Airways Case Study*, K.V.S.S. NARAYANA RAO'S HANDBOOK OF MERGERS AND ACQUISITIONS (Mar 12, 2020), http://nrao-m-a-handbook.blogspot.com/2007/09/acquisition-of-air-sahara-by-jet.html.

2006.[17] When the news reached the investors, they gave mixed responses saying that Jet tried to overtake Sahara. The news received mixed responses from the investors in the market. Despite getting the approval from the Indian Civil Aviation Ministry, the deal could not be finalized due to disputes over price, which was followed by filing of the lawsuits by both the companies to claim damages. Another attempt was made in 2007 in which Jet Airways was successful in buying Air Sahara for Rs. 1450 crores. [18] With this deal, began the phase of consolidation in the Indian aviation industry.

Motive of Acquisition:

The main motive of Jet acquiring Sahara was to get access to its fleet of 27 aircrafts and its infrastructure and other logistics. Another reason was to gain visibility in those areas where Jet was not present earlier. Jet wished to capture a higher market share with this deal and to become the best private airline in India. Post merger; the merged entity would have become the biggest domestic private airlines operating with market share of 42%.[19] Jet would have become the only private airlines permitted to fly international routes.

In conclusion, this merger was economically and commercially feasible since it gave Jet the infrastructure and manpower help it needed and was already facing a shortage of. Also, Air Sahara

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[17] ibid

[18] India Times News Network, *Jet buys Sahara Airlines at Rs 1450 cr*, ECONOMIC TIMES (March 9, 2020), https://economictimes.indiatimes.com/industry/transportation/airlines-/-aviation/jet-buys-sahara-airlines-at-rs-1450-cr/articleshow/1898015.cms?from=mdr.

[19] Competition Commission of India, *Competition Issues in the Air Transport Sector in India*, CCI (Apr. 12, 2020), https://www.cci.gov.in/sites/default/files/transport_20090421133744.pdf.

proved to be a good purchase since it was performing much better financially than its rivals.

Problems with the merger:

- The Jet had rushed into the deal and overvalued the company (Sahara), which lacked a good business model, the fact of which was discovered later by Jet, causing them to ask for a discount upto 20-25% later. This was termed as an expensive deal by many and only showed how Jet had not done its pre-buying analysis properly.
- Jet had entered this deal with the sole aim of becoming the number one private player and attaining monopoly, which was now not seeming possible due to the proposed merger of Air India and Indian Airlines, which was stated to occupy 1/3rd of the market share, thus, thereby becoming the biggest direct competitors to Jet- Air Sahara. [20]

Post Merger Scenario and Analysis:

Jet overtook Air Sahara after a long legal battle for Rs. 14.5 billion.[21] The airline industry had become quite competitive by that time and all the airlines were rapidly expanding their fleet to capture whole of the market share at the cost of their profitability. Costs such as fuel costs and other miscellaneous costs of the airlines were rising but they were not able to recover the same by raising fares due to competition. This caused all the airlines to slide

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[20] Mihir Mishra, *Indian Airlines merger has caused Air India's downfall*, ECONOMIC TIMES (Apr. 3, 2020), https://economictimes.indiatimes.com/opinion/interviews/indian-airlines-merger-has-caused-air-indias-downfall-ashwani-lohani/articleshow/52998986.cms?from=mdr.

[21] Heather Timmons, *Jet Airways agrees to take over Air Sahara*, NY TIMES (Apr. 3, 2020) https://www.nytimes.com/2007/04/12/business/worldbusiness/12iht-sahara.4.5258307.html

into debts and losses. The operating margins in 2007-08 were at minus 15% and economic recession of 2008 further worsened the condition.[22] Jet could fully realize its targets and aimed profits only by early 2009, which was way later than it had expected. Hence, this deal could not be said to be a complete success.

Current Position of Jet Airways:

Jet Airways continued to run into losses and its financial position started deteriorating, its debts started rising. By 2018, the service providers started turning down servicing of Jet planes and by 2019, the airlines was stuck with cash crunch and had to be grounded with over billions of debt pending to the creditors. Jet Airways stopped its operations on 17th April 2019 and is currently undergoing bankruptcy proceedings at the NCLT, Mumbai Bench after its lenders led by State Bank of India dragged it to the court.[23] It had previously invited expression of interests from the investors to bail it out from the distressed situation. However, while many were expressing interest and some even came forward and submitted bids. But no one actually came up with the required resolution plan, which sent the airline into bankruptcy.

Conclusion

In conclusion, it can be said that mergers, acquisitions and consolidation are not always the best options for survival, Jet Airways - Sahara, Kingfisher - Deccan and Air India with Indian Airlines are all examples of it. With the bankruptcy of Jet Airways

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22 Ibid.

23 Prabuddha Ghosh, *From Jet Airways closure to Air India crisis: How India's aviation sector stalled in 2019,* THE NEW INDIAN EXPRESS (Apr. 5, 2020), https://www.newindianexpress.com/specials/2019/dec/25/from-jet-airways-closure-to-air-india-crisis-how-indian-aviation-sector-got-stalled-in-2019-2080409.html.

in 2019 and the air transportation licenses of Kingfisher Airlines revoked in 2012, two major players of the sector had fallen out, with only Air India and Vistara remaining as the two full- service carriers. Even the financial condition of Air India has not been healthy for last so many years - so far government is unable to find a suitable buyer for this Airlines. Mergers and Joint Ventures do not always work in aviation sector because the acquirer ends up taking on a bigger burden like it has happened in case of Jet-Air Sahara and Kingfisher-Air Deccan.

The Indian Aviation sector has huge potential for global market, which hasn't been put to use, but with its own set of difficulties. There is a huge gap in the aviation market considering India's huge population and increasing demand for air travel. The number of airlines and their fleet of aircrafts is less, if we compare with USA and China. This failure can partly be attributed to rising fuel prices, rupee depreciation and lack of governmental efforts to improve the same, also their protectionist attitude towards Air India. The price cap fixed for regional domestic flights is quite low which has led to the failure of full service carriers, since only the low cost carrier model can survive such a price cap. IndiGo and SpiceJet are recent success stories which have emerged from India's aviation sector and they can expand well into the future if they don't commit the same mistakes that their predecessors made of raising huge debts and not applying their minds while making expansions. The government needs to allow the private players to grow and develop on their own independently without much interference and obstruction.

Whenever an airline shuts, it affects the market on the whole in form of risen travel demand, rise in ticket prices, travellers being

stranded, lesser options to fly to smaller cities, job losses and other revenue losses etc. The current need is to help the sector grow by relaxation of tax charges and airport infrastructure charges, which would help in improving the profitability of Indian aviation sector. The implementation of the recent National Civil Aviation Policy, 2016 by Ministry of Corporate Affairs (MCA) is also to be seen at both short and long-term basis. The India's Aviation sector is suffering its own part of bad luck on the supply front with so many airlines disappearing from the industry, first, the Kingfisher in 2012 then, the Jet Airways last year and now the disinvestment plans of Air India by the Government. If these problems were already not enough, the Indian aircrafts also suffer from structural issues, regulatory hurdles, high taxation rates and wavering fuel prices etc.

High costs, low yields and persistent technical issues are the factors ailing the Indian aviation industry; they have thrown the Indian aviation sector into a circle of chaos, uncertainties and difficulties. The year 2019 was summed up as a "year of sharp U-turns" due to the fluctuations from record profit in 2018 to huge losses.[24] The most unpredictable and shocking episode for aviation sector in 2019 was the grounding of the Jet Airways flight operations which was once the biggest known name in the aviation market. But Jet is clearly not the only one, since we also see Air India lined up with its debt payments worth thousands of crores and with limited means to meet them. Both IndiGo and SpiceJet

[24] Anirban Chowdhury, *What's ailing the Indian aviation industry?*, ECONOMIC TIMES, (Apr.10, 2020, 4:09 PM), https://economictimes.indiatimes.com/industry/transportation/airlines-/-aviation/whats-ailing-the-indian-aviation-industry/articleshow/68970564.cms?from=mdr

have been facing several technical glitches with their aircrafts; with the SpiceJet fleet's Boeing 737 Max aircraft being grounded after the reported plane crashes of Ethiopian airlines and Lion Air.[25] The grounding of these aircrafts and delay in resolution of the existing technical glitches will impact the industry capacity.

A closer look at some factors ailing the industry:

- High Prices, Low Returns: The aviation fuel prices are higher in India as compared to other parts of the world and thus account for a major faction of the costs of the airplanes (about 40%).[26].
- Government Indifference: The airlines have been looking for a tax rebate on fuel since forever, as fuel prices here is 35-40% more expensive than elsewhere.[27] This issue has not been promptly take up by the Civil Aviation Ministry and regulators. Moreover, there are several cumbersome regulations and unclear policies which should be reformed to bring more clarity and for betterment of the sector. Also, the regulators like DGCA should be professionalized more to ensure they understand the sector better and bring in better systems.

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[25] Sriram Iyer, *13 of SpiceJet and five of Jet Airways' fleet are Boeing 737 Max flights—and they risk being grounded after the Ethiopian Airlines crash*, BUSINESS INSIDER (Apr. 12, 2020), https://www.businessinsider.in/13-of-spicejet-and-five-of-jet-airways-fleet-are-boeing-737-max-flights-and-they-risk-being-grounded-after-the-ethiopian-airlines-crash/articleshow/68355227.cms.

[26] Press Trust of India, *Aviation fuel price cut 23%, costs one-third of petrol, diesel*, ECONOMIC TIMES (Apr. 12, 2020), https://economictimes.indiatimes.com/industry/energy/oil-gas/aviation-fuel-price-cut-23-costs-one-third-of-petrol-diesel/articleshow/75514470.cms?from=mdr.

[27] Ibid.

- Pilot Shortage: It is predicted that the there will be a gap between the number of the aircrafts and the crew in future, thus increasing the demand and dependency on expats.

It is important that right type of infrastructure exists at the right place at the right time to ensure that demand can be met well; also ensure a regulatory environment that fosters a competitive and healthy growth of the sector. A robust and financially sound industry is important to deliver benefits such as creating jobs, facilitating business, supporting trade, investment and economic growth. The Indian Aviation sector is quite laxative as compared to its rivals abroad. We could see this from a few examples: First, despite knowing about the closure of Dubai Airport, no Indian airline lobbied or put their case up with Dubai aviation authorities like other international airlines did asking for a change or realignment of landing slots. Second, when oil prices were rising and rupee falling, no Indian airline took preemptive actions to ensure their profits aren't affected much. Third, they did not protest with the government when it imposed a 5% import duty on jet fuel and there are many more such glaring examples.

Some steps that can be taken are a) Easing government regulations, b) B**etter airport facilities like infrastructure and connectivity to and from the airport,** c) More International Partnership Agreements in form of revenue sharing agreement, alliance membership etc. and**;** d) **Improved management and operations in form of more investment in revenue management, marketing, sales, e- commerce etc.**

With the current ongoing pandemic of Corona Virus, where almost all countries of the world have been affected, it is predicted that most airlines will go bankrupt by end May 2020, due to their non-

operation in light of various travel restrictions imposed by countries, technical bankruptcy and low cash reserves due to grounded flights.[28] One of the first covid casualties from Asia is the Virgin Australia Holdings Ltd a because of being debt ridden and having no income at all.[29] Airlines are struggling to save themselves from perishing with many already on the brink of destruction. Government support is most needed for the aviation sector right now to survive this crisis.

[28] Lalatendu Mishra, *Coronavirus will make most global airlines go bankrupt by May: CAPA*, THE HINDU (Apr. 21, 2020), https://www.thehindu.com/business/Industry/coronavirus-following-large-scale-air-travel-restrictions-most-global-airlines-will-go-bankrupt-by-may-2020-says-capa/article31083030.ece.

[29] Angus Whitley, *Virgin Australia Collapses as Virus Wipes Out Global Air Travel*, THE BLOOMBERG (Apr. 23, 2020), https://www.bloomberg.com/news/articles/2020-04-20/virgin-australia-collapses-as-airline-calls-in-administrators-k992yqn6.

COMMUNITY CONTACT TRACING – A PROGRESSIVE PATH

Somya Jain[*]

Abstract

The paper talks about the advancements in the field of GIS and Remote Sensing, specifically about Community Contact Tracing. In today's times when the entire world is suffering from an unprecedented pandemic COVID-19, techniques to prevent the spread of such life-threatening diseases should be encouraged. The paper talks about the new developments and the recreation of traditional contact tracing methods which uses technologies like spatial analytics that uses location to trace the people who have been in a direct and prolonged contact. The aim of the paper is to study this technique in detail, its effects, and the problems that it suffers and in the end to evaluate whether the technique is positive enough to be implemented throughout. Further, special mention of the strategy undertaken by India has been researched upon. After analysing the data collected in detail I have come to the conclusion that this technique will be beneficial to a large extent. Considering the ever growing concern of pandemic, spreading at a rapid pace, this technique gives a base for preventing the spread of the disease. Its data collection backed by strong technology and location based analysis makes it possible for the contact tracers

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to achieve their target in no time. Though this technique will prove to be beneficial yet it needs to tread upon all the implications arising out of the Community Contact Tracing.

INTRODUCTION

Contact tracing as the name suggests traces and tracks down people who have been exposed to individuals suffering from an infectious disease. This tracking and tracing has a backdrop which could be originated from the spreading of smallpox. Diseases which are transmitted either through the air via droplet transmission or through direct contact leads to an epidemic which if not controlled can be lethal to the very existence of the entire nation. Contact tracing was one technique which hindered the spread of such infectious disease. Initially, this technique was performed by local medical officers or health commissioners or members of the health department who would visit the patients and isolate them either in their homes or in isolation hospitals. With technological developments in the late 20th century, the contact tracing was performed by electronic reporting and today, with latest advancements in the field of GIS and remote sensing technologies one can perform the technique of contact tracing and managing the contacts at the same time through various apps.

Infectious diseases can become fatal to the country if it advances to the community spread thereby making it impossible to control the transmission of this life-threatening disease. The remote sensing technology which collects the data and information of events on earth, along with Geographical information systems (GIS) which represent the data collected in terms of maps and analyses the same, made it possible to control the spread of such malignant

diseases. These two disciplines jointly created a system of community contact tracing whereby location bases tracing is added to person to person tracing. It now allowed the authorities with person to person to location-based tracing which contemplates an innovative method to prevent the spread and gives an insight to advance interventions.[1]

Community Contact Tracing

As discussed earlier in contact tracing the workflow helps to identify specific people who has been in contact with the confirmed case. This can be traced to a family member; a friend or a coworker, followed by an isolation period and can quarantine themselves. This approach is applicable in situations where the disease has not spread to a large extent.

Due to extensive interconnectedness an innate mobility in the modern world, a person who has been tested positive travels to various places like grocery stores, medical shops, cinema halls, restaurants etc. which would provide an opportunity for community transmission where the source of new infections cannot be traced to known contacts. In this case traditional methods of contact tracing becomes ineffective as they do not get the information of potential exposures and thus fails to fulfill their purpose of preventing the spread of disease.

[1] Este Geraghty, COVID-19: INTRODUCING COMMUNITY CONTACT TRACING, 2020, https://www.esri.com/about/newsroom/blog/introducing-community-contact-tracing/ (last visited August 12, 2020.

Geographic Information System and Remote Sensing Technology

Geographic Information System and Remote Sensing Technology enables the data collection of the events occurring on the face of the Earth and representing the data in terms of maps and other empirical forms, and provide with analyses of the event. This system gives a spatial data and a comprehensive set of analytical methods which provides location-based analyses of the data.[2] Further, this data could be represented through or collaborated with maps, apps, dashboards and reports. This technique is an upcoming technique in understanding the roots of any events including epidemics.

Community Contact Tracing for Covid-19

Coronavirus disease or COVID-19, an unprecedented pandemic which costed many lives, started with few cases but later entered into the stage of community spread where the host of the disease is not known and cannot be traced back to the carrier who has travelled in an affected area or through the contact with the person who is infected. This stage reflects the condition whereby the virus is spread throughout the community and can infect people with no background of travelling to an infected area or contacting an infected person.

Initially, when coronavirus was in its first or second stage it was possible to trace infected people and provide them with proper medications through simple technique of contact tracing whereby the health officers or people who has been appointed to complete

[2] ABOUT ARCGIS, 2020, https://www.esri.com/en-us/arcgis/about-arcgis/overview (last visited August 12, 2020)

the said task would identify and trace these infected people and then isolate them from the rest of the society in order to prevent the spread of the disease. But since coronavirus has entered into the stage of community spread, it has become impossible for this simple technique to trace infected people and isolate them as the source of acquiring the disease cannot be traced back to any one infected person. Therefore, a new model for tracking infected people and also the hotspots had to be invented. Hence, the term Community Contact Tracing was coined.

Procedure of Community Contact Tracing and Usage of GIS

Community Contact Tracing take into considerations the location information which further compliments the process by not only accounting for infected people but also places in the community where these people have visited. This would enable to uncover various insights for community transmission as to where new cases are occurring and take targeted actions in those places where new infections are found. There are various steps that needs to be performed for effective Community Contact Tracing method. These are:

1. *Collect and Manage Data:*

In this first step of collecting and managing data the prime goal is to collect data regarding the locations which were visited by the infected cases. An interview of the COVID-19 positive patient will provide data as to the contacts he/ she has made, the addresses of the contacts and the places he/ she has visited and the addresses of the same. For the effective collection of the data the information collected by the contact tracers should be specific and not vague. For example if the patient is asked whether he/ she has travelled

domestically in the last 14 days. If the answer to this question is affirmative then the contact tracer is asked to fill in the details of the state. Such kind of information is far too large and non-specific in its nature.

Therefore, the contact tracers are expected to collect a more location-based data like some shops, malls, restaurants etc. so that a location-based analysis can be conducted effectively. The contact tracers can interview the infected people through online portal or through any other medium. Integrating the system gives a more holistic analyses of the data collected so it is appreciated if the data is collected and managed through online platform like ESRI which is a global market leader in GIS and provides solutions to problems through the means of GIS.[3] ESRI under the platform ArcGIS has introduced the procedure to collect and manage the data. The contact tracers are assigned the task of interviewing the patients through the data which is provided to them by National Electronic Disease Surveillance System (NEDSS). This information has the advantage of collecting specific locations visited by the case. Further, the case is investigated and report is sent to the coordinator who can review each case through this portal. The coordinator can also view the wellness check monitoring whereby the patients themselves send their improvement reports and the coordinator can check their progress and provide with essential help.[4]

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3 Ibid.

4 Contact Tracing: Using Digital Tools, 2020, https://www.cdc.gov/coronavirus/2019-ncov/downloads/digital-contact-tracing.pdf, (last visited at August 13, 2020)

2. *Performing Analysis:*

After collecting the locations through the efforts of contact tracers, the information is then displayed on the map marking the very beginning step in the spatial analysis. There are various analytical functions which can be utilized to interpret the data collected. Like for example the density analysis which provides some early clues about higher risk locations. Next would be link analysis which provides a better understanding of person-to-person connections and if location analysis is added one can determine person to person to place connections. Locations also adds additional information as to whether a place is or would be under a higher risk. With the help of spatial patterns, we can visualize the confirmed cases and create a hotspot analysis.

Through the GIS system one can analyze the places which are most visited by the infected people, thus, creating a hotspot. Patients whose background of acquiring the virus is not known, through the technological advancements in GIS we can get the location as to where these patients visited and can get the prospective hotspots. Through this technique one brings context to the content of contact tracing system. Through these insights we can focus our efforts on those places and contacts that represent the higher potential community transmission risk.

3. *Evaluate and Make Decisions:*

Effective contact tracing depends on the timeliness of case identification, case isolation and quarantine of contacts. The time between when the contact was in close contact with the case and the average five days' incubation period before they show symptoms for coronavirus, where two days prior to showing

symptoms the cases are infectious, we only have the rest three days of incubation period whereby the contact tracers can make contact with these cases and help them to self-quarantine and take necessary measures.[5]

For that the contact tracers should keep up with the metrics of the three essential components namely, case identification, case isolation and quarantine of contacts. Through this kind of visibility one can coach the contact tracers that are not keeping up, or hiring new contact tracers if the problem lies with the workload. Or identifying other bottlenecks in the system which could be affecting the efficiency and therefore affecting the whole process.

What is not included in Community Contact Tracing?

1. Community Contact Tracing is not about using GPS on one's device to track individual movements and notifying people if they have been in close proximity to a case. Though this can be faster in tracking down people who are infected and would involve less human resource but a huge concern about using this technique is privacy issues on a large scale. Apart from that this technique may give false positives as the GPS may not know the difference between close contact and people in proximity which may not be in contact with the person.
2. Community Contact Tracing is not about creating an app where people log in and uses Bluetooth to give their location and then gets notified if they are in close contact with a positive case. This technique suffers from various problems as it can only

[5] World Health Organization, Laboratory testing strategy recommendations for COVID-19 (Interim Guidance) (https://www.who.int/publications-detail/critical-preparedness-readiness-and-response-actions-for-covid-19, last visited August 13, 2020).

work effectively when a large number of people downloads the app and feeds in their data. This technique also suffers from false positive problem as seen earlier in GPS technique.

Benefits of Community Contact Tracing

Location based analyses supplementing the traditional contact tracing enables increased odds of containing Covid-19 or any other community spread contagion. Through Community Contact Tracing, the contact tracers can uncover the commonalities and patterns in the case data. It provides a clear visual as to how cases and contacts and place are interconnected and the pattern of the spread of COVID-19 could be studied. This will enable us to give an edge to contain the spread of the disease by providing new insights about community spread.

Another benefit provided by this technique is data protection under security and privacy regulations that differ from country to country. The data collected through the interview is protected and the contact tracers do not reveal to the contacts as to who is the positive case.[6] Moreover, they do not track down the people, instead they are contacted through call or text and then interviewed. So this technique ensures data protection.

Community Contact Tracing does not show false positives as opposed to traditional contact tracing or usage of techniques like GPS tracking or Bluetooth Tracking. Community Contact Tracing ensure that it identifies and tracks people who surely are positive to COVID-19 and enable to take measures to isolate them.

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[6] World Health Organization, Contact tracing in the context of COVID-19 (Interim Guidance)

Moreover, Community Contact Tracing is relatively a faster process, when it is established in its entirety, as against the traditional contact tracing which is a tedious and a time consuming process. It is much more effective as it locates the hotspots and enables the authorities to take action and prioritize people in that area. It is a focused and a centric approach.

Challenges of Community Contact Tracing

Though Community Contact Tracing is beneficial on a large scale, yet it suffers from various obstacles. One of the major concerns related to Community Contact Tracing is privacy. Health Insurance Portability and Accountability Act (HIPAA) sets the standard for sensitive patient data protection. There are two categories under which data can be protected:

1. Personally Identifiable Information (PII) which can identify a specific individual or can be linked to a specific individual and does not directly fall under HIPAA protection.
2. Protected Health Information (PHI) which involves health information and can be linked to a specific individual. It is protected under HIPAA compliance.

HIPAA protection applies to HIPAA covered entities that includes healthcare providers, health plans or healthcare clearing houses. But disease surveillance and outbreak response activities like Community Contact Tracing are not covered functions under HIPAA and the data collected cannot be termed as PHI.[7]

[7] Centres for Disease Control and Prevention, List Requirements for Protecting Health Information, https://www.cdc.gov/coronavirus/2019-ncov/php/contact-tracing/list-requirements-for-protecting-health-info.html, (last visited August 14, 2020)

Next concern is the time consuming nature of this technique. This technique takes around 2-3 months to be fully established in a developed country and function effectively. During the period of COVID-19 such a time-consuming process may cost thousands of lives.

The success of this process relies upon the successful completion of contact interview as the interview provides with vital information of the places visited by the cases which would create a prospective hotspot and enable the authority to take necessary actions. For this mass participation is required which is a difficult task altogether. Further, the cases are resistant to share information about the contacts and the places visited in the past few days. This makes the task more tedious and difficult.

Contact tracers needs to be efficient and up to date. They should be trained and coached as to how the technique is to be conducted. They should be able to keep up with the metrics. For example if 75% of cases are identified in the past 24 hours then the contact tracers need to conduct the interview of a reasonable portion of 75% within 24 hours as the incubation period gives a timeframe of only three days.

India's Strategy

In India, the Government has undertaken steps towards contact tracing by launching a mobile app named "Aarogya Setu". The application uses Bluetooth and GPS to trace and track people who may have come in contact with a positive case. When a person having the Aarogya Setu app on his/ her phone comes in contact with another person having the same app and who is tested positive, will notify the person the risk of infection based on the

recent interaction and proximity of interaction with such person.[8] The Aarogya Setu app includes automatic contact tracing using Bluetooth, self-assessment, risk status, geo-location based and nationwide COVID-19 statistics, emergency helpline contacts, approved labs and testing facilities, e-pass integration and support 12 languages.

India having a huge population uses GPS to not only track people who have been affected by coronavirus but also to trace the path that has been traversed by the contacts so that potential hotspots could be located and further the spread of the disease could be prevented and the area could be sanitised. It also identifies infected people in that area even though they may not have contacted the person as such. Further, if one takes the self-assessment test on the app it can figure the risk factor in the area uncovering the potential hotspots and taking necessary steps to prevent the same.

Aarogya Setu has emerged as the world's most downloaded Covid-19 tracing app, as indicated by the most recent report by Sensor Tower.[9] The downloads of Aarogya Setu application topped in the long stretch of April at a gauge of 80.8 million while the total downloads stood at 127.6 million. According to Principal Scientific Advisor K Vijay Raghavan, Niti Aayog CEO Amitabh Kant, and IT secretary Ajay Prakash Sawhney 600 potential hotspots were identified in an analysis conducted by developers of the Aarogya Setu app. These hotspots were located by tracking 12,500 COVID-19 patients on the app as well as self-assessment

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8 Aarogya Setu FAQs, 2020, https://static.mygov.in/rest/s3fs-public/mygov_159056978751307401.pdf , (last visited August 14, 2020)

9 Shubham Verma, *Aarogya Setu now world's most downloaded Covid-19 tracking app*, INDIA TODAY (July 16, 2020), https://www.indiatoday.in/technology/news/story/aarogya-setu-now-world-s-most-downloaded-covid-19-tracking-app-1701273-2020-07-16.

information. More than 23 per cent of the 85,000 individuals deemed to be the highest risk by the application have turned out to be COVID-19 positive after the information was sent to ICMR.[10]

Though the app benefited the society but there are many concerns related to the app. The major concern is that the app should be downloaded by mass population and updating the health status on a regular basis. Moreover, the requirement of GPS and Bluetooth is not present in all types of phones.

Next major concern is related to privacy. As India does not follow HIPAA compliance, the security of data cannot be guaranteed. Further, using GPS and Bluetooth asks for admin access which is a security risk as the application can take more data than what is required. There is no security of personal data protection guaranteeing the absolute protection of sensitive data of the patients. Moreover, there is a concern of false positives as using GPS and Bluetooth cannot differentiate between patients who comes in contact with people and patients who are in proximity. This illusion may create confusions and make the task for the contact tracers more tedious in nature.

Conclusion

In the early stages of an outbreak, contact tracing has always been a vigorous intervention for containment efforts. However, when an outbreak takes the shape of a pandemic and the transmission advances to the community stage, many people who may have contracted the disease may not even be sure as to how they contracted the same. This is where a location based community

[10] Karishma Mehrotra, 2020, Aarogya team shares 600 potential local hotspots, https://indianexpress.com/article/coronavirus/aarogya-team-shares-600-potential-local-hotspots-6402438/ , (last visited at August 15, 2020)

contact tracing steps in through adding the location data to the traditional and simple tracking process, public health analysts will be able to perform location analytics to highlight the places where the viral spread is taking place outside prolonged and direct contact between two individuals. Through this advanced step the contact tracing workflow can be undertaken from data collection and management to analytics and outcome evaluation. This ensures that specific actions towards sensitive areas and contacts are taken up. Potential and existing hotspots could be easily identified which would in turn provide with necessary and timely actions. But, this technique like any other technique suffers from problems which should be rectified and a high quality of analysis should be performed for better results. During this pandemic, our focus should be to reduce and prevent the spread of the disease which can be attained with a focused and an objective based technique like that of Community Contact Tracing.

COMMERCIAL EXPLOITATION OF RESOURCES IN OUTER SPACE: A GLOBAL SOUTH PERSPECTIVE

Anikait Vasantavada[*]

Abstract

Noting technological advancements and revitalized interest in exploiting resources in outer space through initiatives like the Artemis Accords and establishing a working group in the COPUOS, this paper seeks to engage in a discussion on property rights in outer space from a global south perspective. The paper has two parts. The first is focused on understanding the lex lata of property rights in outer space by delving into questions of what property can be owned in outer space and who can own the said property. The second part of the paper delves into lex feranda and proposes a property rights system centered around the principle of "Common Heritage of Mankind." Time and again, the principle of "Common Heritage of Mankind" has been rejected on the grounds that it hinders private industry in outer space and is mutually exclusive to profitability. This paper analyzes property rights systems in the deep seabed and orbital slot allocations in the geostationary orbit and proposes an interpretation of 'Common Heritage of Mankind" that enjoys consensus between the global north and the global south. The only exception to this consensus is the representation of the global south, where the author believes there cannot be any compromise. Using said the interpretation of "Common Heritage of Mankind," this paper proposes a

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property rights system in consonance with Article 11 of the 1979 Moon Agreement.

Key words: Property rights, commercial exploitation, Non-Appropriation, Common Heritage of Mankind, Moon Agreement

Introduction

The law surrounding outer Space continues to be a nebulous arena where multiple stakeholders divided along multiple lines are trying to position their interpretation of the law as the valid one.[1] One area where the lack of consensus is evident is the question of property rights, for which no comprehensive legal framework exists.[2] One may argue that in the 20th century, the absence of technology to exploit resources meant that the absence of a legal framework had few consequences.[3] However, the same cannot be said for the 21st century, where consequences are bound to be felt.

Rapid improvements in technology, like usage of cost-effective rocket delivery systems[4] coupled with the rise of private mining corporations like Planetary Resources and Moon Express,[5] make

1 Fabio Tronchetti, Fundamentals of Space Law and Policy, pg. 3-4, (Springer, 2013).

2 Kurt Anderson Baca, Property Rights in outer space, 58 J. Air L. & Com. 1041 (1993); Rand Simberg, Property Rights in Space, The New Atlantis, (Sept. 12, 2021, 9:20 PM), https://www.thenewatlantis.com/publications/property-rights-in-space; Sarah Coffey, Establishing a Legal Framework for Property Rights to Natural Resources in outer space, 41 Case W. Res. J. Int'l L. 119 (2009); Hertzfeld, Henry R. and von der Dunk, Frans, "Bringing Space Law into the Commercial World: Property Rights without Sovereignty", Space, Cyber, and Telecommunications Law Program Faculty Publications, pg. 15, (2005).

3 Sarah Coffey, Supra Note 2, at 125; Shadi A. Alshdaifat, Who Owns What In outer space? Dilemmas regarding the Common Heritage of Mankind, II, Pecs Journal of International and European Law (2018); Abigail D. Pershing, Interpreting the outer space Treaty's Non-Appropriation Principle: Customary International Law from 1967 to today, The Yale Journal of International law, Vol. 44:1` (2019).

4 Rand Simberg, supra note 2.

5 *Id.*

the act of mining resources in outer space more accessible than ever and raise serious questions about the ownership and commercial usage of resources in outer Space and Celestial bodies.

Taking note of advancements in technology, initiatives like the Artemis Accord are signs of increasing interest in answering the question of property rights in Outer Space with a specific interest in the commercial exploitation of space resources. However, the most appropriate solution is the result of discussions at global forums where the views and interests of all countries can be discussed, which is a view that several countries have expressed at COPOUS.[6] In such a situation, it is good to note that interest has revitalized in the COPUOS, where a working group is being set up to ascertain the views of member states on the topic of resource utilization in Outer Space.[7]

In light of the revitalized interest in this subject, this paper seeks to shed light on the existing position of law on this matter and propose a path forward. The first section of this paper shall focus on *Lex Lata* by discussing the right to commercially exploit resources in Outer Space, rights over *in situ* property, and who enjoys these rights.

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6 COPUOS, Report of the Legal Subcommittee on its fifty-eighth session, held in Vienna from 1 to 12 April 2019, A/AC.105/1203 (18 April 2019); COPUOS Draft Report, General exchange of views on potential legal models for activities in the exploration, exploitation and utilization of space resources , A/AC.105/C.2/L.314/Add.2, (4 June 2021); COPUOS Draft Report, General exchange of views on potential legal models for activities in the exploration, exploitation and utilization of space resources A/AC.105/C.2/L.309/Add.3 (9 April 2019); COPUOS, Note by the Secretariat, Responses to the set of questions provided by the Moderator and Vice-Moderator of the Scheduled Informal Consultations on Space Resources, A/AC.105/C.2/2021/CRP.8, (27 May 2021).

7 COPUOS, Proposal on the mandate, terms of reference and method of work of the working group established under the Legal Subcommittee agenda item entitled "General exchange of views on potential legal models for activities in the exploration, exploitation and utilization of space resources", A/AC.105/L.326, 25 June 2021.

The second section of this paper engages with *lex feranda* and proposes a property rights system for Outer Space. For the longest time, the Moon Agreement has been rejected with neoliberal discourses on profits being used to discredit the agreement.[8] Rejecting such arguments, this paper builds on the principle of Common Heritage of Mankind envisaged by the Moon Agreement[9] and proposes a system of property rights that is centered around the experiences and interests of the global south, with a special focus on countries that lack the financial resources to be able to have spacefaring capabilities. The system proposed will be based on analogies drawn from the allotment of slots for Geosynchronous satellites and the mining of resources in the Deep-Sea bed.

To understand why the system is centered around the principle of Common Heritage of Mankind, one must understand that the global north colonized and exploited the global south for centuries to feed home industries and luxuries.[10] The situation has not changed in the 21st century, with neo-colonialization taking place through neo-liberal policies that the global north thrusts on the

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8 Sarah Coffey, supra note 2, at 128; Hertzfeld, Henry R. and von der Dunk, Frans, supra note 2, at 85; David Sarnacki, Property Rights in Space: Asteroid Mining, 2 TEX. A&M J. PROP. L. 130 (2014); Frans von der Dunk and Fabio Tronchetti, Handbook of Space law, 782-786, (Edgar Elwar publishing, 2015); Lynn Fountain, Note, Creating Momentum in Space: Ending the Paralysis Produced by the "Common Heritage of Mankind" Doctrine, 35 CONN. L. REV. 1753, 1763–64 (2003); Blake Gilson, Defending Your Client's Property Rights in Space: A Practical Guide for the Lunar Litigator, 80 Fordham L. Rev. 1384 (2011).

9 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 5, 1979, 1363 U.N.T.S. 3 [Hereinafter "Moon Agreement"].

10 Robert J. Polack, Social Justice and the Global Economy: New Challenges for Social Work in the 21st Century, *Social Work*, Volume 49, Issue 2, Pages 281–290, (2004); Catherine Lu, Colonialism as Structural Injustice: Historical Responsibility and Contemporary Redress, The Journal of Political Philosophy: Volume 19, pp. 261–281, (2011); Bipin Chandra, India's struggle for Independence 1857-1947, 67-79, Penguin Books, (1988).

global south.[11] The result is that countries from the global north and global south are on an unequal financial and technological standing, and a 'first-come-first-served' system will result in the global north effectively having a monopoly on space resources.[12]

Outer Space represents a *Tabula Rasa,* where everyone can be equal regardless of nationality, gender and race. The global community can prevent the devastating impact of centuries of injustices and discrimination faced by the global south[13] seeping into outer Space if it creates a framework of law that is built keeping in mind the experiences of the global south. Delegations have consistently expressed a desire for equality in the COPOUS in a host of discussions on property rights in Outer Space.[14] Such a

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[11] B.S. Chimni, Third World Approaches to International Law: A Manifesto, International Community Law Review 8: 3–27, (2006); Mutua, Makau, and Antony Anghie. "What Is TWAIL?" *Proceedings of the Annual Meeting (American Society of International Law)* 94 (2000);

[12] COPUOS, Report of the Legal Subcommittee on its fifty-eighth session, held in Vienna from 1 to 12 April 2019, A/AC.105/1203 (18 April 2019); COPUOS Draft Report, General exchange of views on potential legal models for activities in the exploration, exploitation and utilization of space resources A/AC.105/C.2/L.309/Add.3 (9 April 2019); COPUOS, Note by the Secretariat, Responses to the set of questions provided by the Moderator and Vice-Moderator of the Scheduled Informal Consultations on Space Resources, A/AC.105/C.2/2021/CRP.8, (27 May 2021).

[13] Shadi A. Alshdaifat, *Supra* note 3, at 22; Lina Benabdallah, Carlos Murillo-Zamora and Victor Adetula, Global South Perspectives on International Relations theory, International Relations theory, E-International Relations Publishing (2017); Alexander Nnaemeka Agbaenyi, North-South Dialogue and Global Inequality: Meaning, Challenges and Prospects, Nnamdi Azikiwe Journal of Political Science. Vol. 3 No. 1. (2012); 'Justice' not 'aid' for the Global South, *Koen Bogaert, Julie Carlier, Brecht De Smet, Marlies Casier, Dorien Vanden Boer and Bernard Mazijn, European Association of Development Research and Training Institutes,* (Sept. 12, 2021, 9:20 PM), http://www.developmentresearch.eu/?p=512.

[14] COPUOS, Report of the Legal Subcommittee on its fifty-eighth session, held in Vienna from 1 to 12 April 2019, A/AC.105/1203 (18 April 2019); COPUOS Draft Report, General exchange of views on potential legal models for activities in the exploration, exploitation and utilization of space resources , A/AC.105/C.2/L.314/Add.2, (4 June 2021); COPUOS Draft Report, General exchange of views on potential legal models for activities in the exploration, exploitation and utilization of space resources A/AC.105/C.2/L.309/Add.3 (9 April

system that recognizes the structural disadvantages faced by the global south will truly help humanity usher into an era where mistakes of the past can be rectified, monopolies by a few countries can be prevented[15] , and substantial equality can be achieved. Such a system will also equip humanity to deal with existential threats like climate change and help satisfy humanity's needs for centuries.

Understanding Lex Lata

Five treaties primarily govern the international management of outer space. The outer space Treaty,[16] the 1968 Rescue and Return Agreement,[17] the 1972 Liability Convention,[18] the 1975 Registration Convention[19] , and the 1979 Moon Agreement. Of these treaties, the outer space treaty is central to analyzing property rights in outer space. However, notwithstanding its lack of popularity,[20] the paper shall analyze The Moon Agreement to supplement the interpretation of the outer space treaty.

2019); COPUOS, Note by the Secretariat, Responses to the set of questions provided by the Moderator and Vice-Moderator of the Scheduled Informal Consultations on Space Resources, A/AC.105/C.2/2021/CRP.8, (27 May 2021).

15 COPUOS, Report of the Legal Subcommittee on its fifty-eighth session, held in Vienna from 1 to 12 April 2019, A/AC.105/1203 (18 April 2019); COPUOS Draft Report, General exchange of views on potential legal models for activities in the exploration, exploitation and utilization of space resources A/AC.105/C.2/L.309/Add.3 (9 April 2019);

16 Treaty on Principles Governing the Activities of States in the Exploration and Use of outer space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter "outer space treaty".

17 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into outer space, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119.

18 Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187.

19 Convention on Registration of Objects Launched into outer space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15.

20 Kurt Anderson Baca, supra note 2, at 1069; Elizabeth Svoboda, Who Owns the Moon? Salon,(Jan. 19, 2008, 10:00 AM), http://www.salon.com/news/feature/2008/01/19/moon_real_estate/; Erlank W "Property Rights in Space: Moving the Goal Posts so the Players don't Notice" PER /

The 1967 Outer Space treaty marks a significant achievement in the governance of Outer Space. Often referred to as the "Constitution of Outer Space,"[21] foundational principles governing Outer Space, such as mandating the use of Outer Space for peaceful purposes[22] and prohibition of the exercise of sovereignty in Outer Space,[23] are enshrined in this treaty. To analyze property rights in this treaty, the articles of this treaty analyzed shall be Article I and Article II. Other treaty articles will be used to supplement interpretations of Articles I and II.

Article I

Article I of the Outer Space treaty states-

The exploration and use of Outer Space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all Mankind.

Outer Space, including the Moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on the basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies.

PELJ 2016(19); Listner MJ "The Ownership and Exploitation of outer space: A Look at the Foundational Law and Future Legal Challenges to Current Claims" Regent J Int'l L 75-94 (2008).

21 Jill Stuart, The Outer Space Treaty Has Been Remarkably Successful—But Is It Fit for the Modern Age?, CONVERSATION (Jan. 27, 2017, 11:59 AM), https://theconversation.com/the-outer-spacetreaty-has-been-remarkably-successful-but-is-it-fit-for-the-modern-age-71381, Fabio Tronchetti, supra note 1 at pg. 8.

22 Article I, Outer Space treaty.

23 Article II, Outer Space treaty.

There shall be freedom of scientific investigation in Outer Space, including the Moon and other celestial bodies, and States shall facilitate and encourage international cooperation in such investigation.

To begin with, the phrase "province of all Mankind" should not be confused with the "Common Heritage of Mankind" principle mentioned in the Moon Agreement.[24] The "Common Heritage of Mankind" principle is concerned with managing resources in designated international zones, whereas the "province of all Mankind" principle is concerned with the idea of responsibility for territory and its governance.[25] The phrase "province of Mankind" denotes Outer Space as a zone that any single country cannot govern but a zone that shall be governed by humanity as a whole.[26] This paper will discuss the "Common Heritage of Mankind" principle later.

The next phrase to be looked at is that "*The exploration and use of outer space, including the moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries.*" The primary question raised by this phrase is whether Article I imposes an obligation on states to distribute resources acquired in Outer Space to all countries regardless of their contribution to the appropriation of the resources. Spacefaring nations have answered

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[24] Carol R. Buxton, Property in Outer Space: The Common Heritage of Mankind Principle vs. the First in Time, First in Right, Rule of Property, 69 J. Air L. & Com. 689 (2004); Brandon C. Gruner, A new hope for international space law: incorporating nineteenth century first possession principles into the 1967 space treaty for the colonization of outer space in the twenty-first century, Vol. 35:299, Steton Hall law review, 300 (2004); Jefferson H. Weaver, Illusion or Reality? State Sovereignty in Outer Space, 10 B.U. INT'L L.J. 203, 227 (1993);

[25] Carol R. Buxton, supra note 24, at 698; Philip Morris, Space Mining, Space Law, and Why No State Can Boldly Go Forth Alone, (2018), (thesis, University of Amsterdam).

[26] *Id*.

this question in the negative. The United States believes that Article I is "a statement of general goals" and that it does now lay down any specific obligations per se[27] , and the USSR also expressed this view and stated that the Article has no "precise significance."[28]

Such views have led to the belief that the obligations under Article I are more of a moral and philosophical nature, with the only legal obligation being that no country can exercise territorial jurisdiction over Outer Space.[29]

In more recent times, this argument has been affirmed by U.N General Assembly Resolution 51/122,[30] which states that states are free to determine all aspects of cooperation in exploration and usage of Outer Space.[31]

Thus, we can conclude that Article I does not place any specific legal obligations except the prohibition on exertion of sovereignty by states

Article II

Article II of the outer space Treaty states-

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[27] Treaty on Outer Space: Hearings Before the Senate Committee on Foreign Relations, 90th Cong., 1st Sess. 1, 74 (1967); Nandasari Jasentuliyana, Article I of the Outer Space Treaty Revisited, 17J. SPACE L. 129, 139 (1989).

[28] Adrian Buekling, The Strategy of Semantics and the "Mankind Provisions" of the Space Treaty, 7J. SPACE L. 15, 18 (1979).

[29] Nandasari Jasentuliyana, supra note 27, at 130; David Goldman, Settlement and Sovereignty on Outer Space, 22 U. W. ONT. L. REV. 155, 157-158 (1984); Francis Lyall and Paul B. Larsen, Space Law, a treatise, pp.63-65 (Ashgate, 2009); COPUOS Draft Report, General exchange of views on potential legal models for activities in the exploration, exploitation and utilization of space resources, A/AC.105/C.2/L.314/Add.2, (4 June 2021);

[30] General Assembly resolution 51/122, Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries, A/RES/51/122 (4 December 1997).

[31] *Id* at 3.

outer Space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.

Through a bare perusal of Article II, one can conclude that it bans national appropriation by any means. However, to truly understand this provision, one must have an in-depth understanding of what is meant by "national appropriation" and "by any other means." Then, one must understand what "appropriation" means.

Understanding "National appropriation prohibited by claim of sovereignty, by means of use or occupation, or by any other means" and its implications on who can own property in Outer Space

A cursory reading of this phrase is enough for one to conclude that no state can engage in the appropriation of outer space by any means whatsoever. Furthermore, there is consensus that the prohibition on appropriation applies to private parties,[32] with individuals like Stephen Gorove, who interpret the term "national" to exclude private parties,[33] being in the minority. However, there seem to be misconceptions about the jurisprudential basis of this

[32] Prakash Maheshwari, property rights in outer space- relevance of nemitz case in development of jurisprudence, Vol. 1(1), International Journal of Legal & Social Studies, (2014); Abigail D. Pershing, supra note 3, at 156; C. Wilfred Jenks, Space law 201 (1965); Ricky J. Lee, Article II of the outer space Treaty: Prohibition of State Sovereignty, Private Property Rights, or Both? Australian journal of International law, 11 Aust.I.Lj. 128·142, (2004); Fabio Tronchetti, The Non-Appropriation Principle Under Attack: Using Article II of the Outer Space Treaty in Its Defence, 5 PROC. L. OUTER SPACE 530 (2007); Sters, Tennen, Preliminary jurisprudential observation concerning property rights on the moon and other celestial bodies in the commercial space age, proceedings of the colloquium on the law of outer space, 50 (1996); Virgiliu Pop, Appropriation in outer space: The Relationship Between Land and Ownership and Sovereignty on the Celestial Bodies, 16 SPACE POL'Y 275, 276 (2000).

[33] Stephen Gorove, Interpreting Article II of the outer space Treaty, proceedings of the colloquium on the law of outer space, Vol. 11, 40, (1968).

prohibition, with authors arguing that the prohibition is a result of the phrase "by any other means."[34]

This part of the paper shall demonstrate that while there is a prohibition on appropriation by private parties, the jurisprudential basis of this prohibition lies in several other sources. These sources are provisions of the outer space treaty, travaux preparatoires of the outer space treaty, the Moon Agreement, and Customary international law. While understanding these bases for the prohibition, it shall become clear why the basis for the prohibition is not the phrase "by any other means."

However, it must first be noted that there is an exemption to the prohibition on private appropriation of outer Space. The exemption concerns extractable resources and will be explained later in the paper.

Travaux preparatoires of the outer space treaty

The outer space treaty implicitly prohibiting the appropriation by private parties is demonstrated in the *travaux preparatoires* of the outer space treaty. The statements of the delegates of Belgium and France confirmed that Article II prohibits appropriation by private parties.[35]In particular, the delegate of Belgium stated that his country *"had taken note of the interpretation of the term 'non-appropriation' advanced by several delegations—apparently without contradiction—as covering both the establishment of sovereignty and the creation of titles to property in private law."*

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[34] Prakash Maheshwari, supra note 32, at 29; Ricky J. Lee, supra note 32, at 36;

[35] Fabio Tronchetti, supra note 32, at 3; Abigail D. Pershing, supra note 3, at 156; Prakash Maheshwari, supra note 32, at 31; John G. Wrench, Non-Appropriation, No Problem: The Outer Space Treaty Is Ready for Asteroid Mining, 51 Case W. Res. J. Int'l L. 437 (2019);

[36]It is clear from this statement that the prohibition on appropriation extends to private parties.

Article VI of the outer space treaty

Few authors have proposed that private property rights exist in outer Space in the form of individual sovereignty because the outer space treaty only prohibits states from exercising sovereignty in outer Space.[37] This argument is supported by the fact that in civil law jurisprudence, property rights can exist in the absence of sovereignty as civil law distinguishes the concepts of ownership and sovereignty.[38] This understanding of property rights is in contrast to the Common law understanding of property rights, where the sovereign is the owner of all property, and property rights cannot exist in the absence of sovereign power.[39]

However, Article VI of the outer space treaty demonstrates the flaws with this argument on two levels. First, Article VI requires that states bear responsibility for the national activities of governmental and non-governmental entities.[40] It also requires private activities to be authorized by the state.[41] Since states are ultimately responsible for the authorization of activities of private individuals, private individuals cannot engage in actions that the

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36 Abigail D. Pershing, supra note 3, at 156;

37 Prakash Maheshwari, supra note 32, at 31; V.G. Pop, *Who Owns the Moon?: Extraterrestrial Aspects of Land and Mineral Resources Ownership* 63, (1st, Springer Publishing, Romania 2009).

38 Prakash Maheshwari, supra note 32, at 30; Wayne N White, Real Property Rights in Outer Space, Proceedings, 40th Colloquium on the Law of Outer Space, 370 (1998); Blake Gilson, supra note 8, at 1374.

39 Prakash Maheshwari, supra note 32, at 30; Wayne N White, supra note 38, at 370;

40 Article VI, outer space treaty.

41 Article VI, outer space treaty.

state itself cannot engage in.[42] The result is that "individual sovereignty" cannot exist because individual activities in Space cannot exist in the absence of sanction of the state, and the state cannot sanction private individuals to undertake actions that it is itself prohibited from undertaking. Furthermore, Bin Chang argues that a state recognizing private ownership of land presupposes territorial sovereignty of the state being exercised over the land, thus violating Article I and II of the Outer Space treaty.[43]

Second, Article VI of the outer space treaty states that the state shall bear responsibility for "national activities."[44] F.G. Von der Dunk delved into the interpretation of the term "national" and discussed how one interpretation is a noun instead of an adjective.[45] In such a situation, the term "national" would mean a person with the state's nationality in question.[46] This interpretation of the term "national" would mean that the prohibition on "national appropriation" would involve a prohibition on appropriation by private citizens.

This argument demonstrates why the phrase "by any other means" in itself does not prohibit appropriation by private parties. The result of interpreting "national" as an adjective is that private appropriation is prohibited only to the extent that it is done on behalf of the state, precluding purely private appropriation of outer Space. However, the interpretation of the term "national" as a noun

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42 Abigail D. Pershing, supra note 3, at 116; Fabio Tronchetti, supra note 32, at 3; Jenks, supra note 32, at 201; Virgiliu Pop, supra note 32, at 277; Francis Lyall and Paul B. Larsen, supra note 29, at pp.184-185.

43 Bin Cheng, studies in international law, the 1967 space treaty, 14, (1997).

44 Article VI, outer space treaty.

45 Von der Dunk, Frans G., "The Origins of Authorisation: Article VI of the Outer Space Treaty and International Space Law" (2011). Space, Cyber, and Telecommunications Law Program Faculty Publications. 69.

46 *Id*, at 5-6.

leads to the complete prohibition on private appropriation of Outer Space. Such an interpretation of the term also means that the state exercising personal or functional jurisdiction to provide a basis to private appropriation would amount to 'national appropriation' and violate Article II.

Customary international law

The resolutions adopted before the passage of the outer space treaty and works of contemporary legal scholars demonstrate that the prohibition on private appropriation of outer Space existed as a rule of customary international law.

The argument that private appropriation of outer Space was prohibited before the passage of the outer space treaty is evident from two unanimously adopted U.N. General Assembly Resolutions adopted in 1961[47] and 1962,[48] respectively, which are evidence of the prohibition of private appropriation being a part of customary international law. The resolution adopted in 1961 explicitly states the prohibition on "national appropriation."[49] Furthermore, it requires states to maintain control of non-governmental activities in Outer Space.[50] The unanimous adoption of these resolutions clarifies that the prohibition on any form of appropriation of outer Space preceded the outer space treaty itself and existed as a principle of customary international law.[51]

Apart from these resolutions, the work of contemporary legal scholars also demonstrates the consensus of the prohibition of

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47 G.A. Res. 1721 (XVI), 6 (Dec. 20, 1961), [hereinafter Resolution 1721].
48 G.A. Res. 1802 (XVII), 5 (Dec. 14, 1962), [hereinafter Resolution 1802].
49 Resolution 1721, supra note 47.
50 *Id.*
51 Fabio Tronchetti, supra note 32, at 5; Abigail D. Pershing, supra note 3, at 156.

private appropriation of outer Space[52] , with the only notable exception being Stephen Gorove.[53]

What does "Appropriation" entail?

Cambridge Dictionary defines the term Appropriation as "the act of taking something for your own use, usually without permission"[54] while Black's Law Dictionary defines the term as "To make a thing one's own; to make a thing the subject of property; to exercise dominion over an object to the extent, and for the purpose, of making it subserve one's own proper use or pleasure."[55]

From the definitions above, one can conclude that appropriation means having the right to own something. However, that would be a very limited understanding of this term. To truly understand the meaning and legal implications of the term "appropriation," one must understand the nature of property rights. Property rights do not exist in the dichotomy of ownership or lack of any rights over the property. Property rights exist in the form of a bundle of rights that can be added and subtracted to create different relations with the property.[56] While there are several rights included in this bundle of rights, the most important rights are the "right to exclude," the "right to use," and the "right to alienate,"[57] and

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[52] John G. Wrench supra note 35, at 51; Virgiliu Pop, supra note 32, at 277; Abigail D. Pershing, supra note 3, at 156; Fabio Tronchetti, supra note 32, at 3.

[53] Stephen Gorove, supra note 33, at 351.

[54] *Appropriation,* Cambridge Dictionary, (23 Sept. 2021, 9:00AM), https://dictionary.cambridge.org/dictionary/english/appropriation.

[55] *Appropriation,* Black's Law Dictionary (10th ed. 2014).

[56] Kurt Anderson Baca, supra note 2, at 1049; Richard A. Epstein, 'Property and Necessity', 13 HARV. J.L. & PUB. POL'Y 2, 3 (1990); Blake Gilson, supra note 8, at 1373; Thomas C. Grey, The Disintegration of Property, 22 Nomos: property 69 (1980).

[57] Kurt Anderson b, supra note 2, at 1049; Thomas C. Grey, supra note 56 at 22; Blake Gilson, supra note 8, at 1373.

having "ownership" over something would entail having these three significant rights.[58]

The "right to exclude" is generally understood as the initial position that gives the possessor exclusive access to the property.[59] It is a negative right in that it does not bestow any right concerning the property per se but gives the possessor the right to secure the property against others.[60] Despite the negative nature of this right, it is the most fundamental right that lays down the foundation for other positive powers. The "right to use" is a positive right that enables the possessor to use the property to serve their needs.[61] This right gives rise to production, enables land usage for oneself, and creates a surplus that benefits society.[62] The "right to alienate" allows individuals to exchange their properties to maximize the property's utility.[63] These three rights exist to create a property system that will maximize efficiency.[64]

While these rights may seem to be flowing in one direction, as will be demonstrated, this is far from the case. Different rights can exist at different stages independent of one another.

Considering that it is ownership that the outer space Treaty prohibits, let us understand which of the individual rights in the bundle of rights are prohibited. Owing to unique histories, there will be a separate analysis of these rights for extractable resources and *in situ* property

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58 Kurt Anderson Baca, supra note 2, at 1049.
59 Kurt Anderson Baca, supra note 2, at 1050; Richard A. Epstein, supra note 56, at 3-4.
60 Kurt Anderson Baca, supra note 2, at 1050; Richard A. Epstein, supra note 56, at 3-4.
61 Kurt Anderson Baca, supra note 2, at 1050; Richard A. Epstein, supra note 56, at 4-5.
62 Kurt Anderson Baca, supra note 2, at 1050; Richard A. Epstein, supra note 56, at 4-5.
63 Kurt Anderson Baca, supra note 2, at 1051; Richard A. Epstein, supra note 56, at 4-5.
64 Kurt Anderson Baca, supra note 2, at 1050-1051; Richard A. Epstein, supra note 56, at 4-5;

Extractable resources

The original position concerning extractable resources was a blanket prohibition on any appropriation by any means.[65] This original position existed not only in the form of an interpretation of the Outer Space treaty but preceded the outer space treaty itself in the form of customary international law[66], with Article II merely codifying and formalizing this stance. Evidence of the position as customary international law can be traced to unanimously accepted resolutions of the U.N. General Assembly adopted in 1961[67] and 1962,[68] which formed the basis for Article II.[69]

However, the position changed over the years with respect to the interpretation of the treaty and the position of customary international law. The current position is heading in the direction that the prohibition on appropriation does not apply to the exploitation of extractable resources.[70] While no judicial body has reinterpreted the position, this shift in international law is taking place through state practice, which is a means of creating new customary international law.[71]

To understand the shift in the interpretation of Article II, one must look at the draft conclusions on subsequent agreements and

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65 Abigail D. Pershing, supra note 3, 155-157; Fabio Tronchetti, supra note 32, at 530; Rand Simberg, supra note 2.

66 Abigail D. Pershing, supra note 3, at 156; Fabio Tronchetti, supra note 32, at 5; Francis Lyall and Paul B. Larsen, supra note 29, at pp.54 and 71.

67 Resolution 1721, supra note 47.

68 Resolution 1802, supra note 48.

69 Abigail D. Pershing, supra note 3 at 155-157; Fabio Tronchetti, supra note 32 at 5.

70 Abigail D. Pershing, supra note 3 at 157-161; Sarah Coffey, supra note 2, at 126; John G. Wrench, supra note 35, at 447; Jijo George Cherian & Job Abraham, Concept of Private Property in Space- An analysis, Journal of international Commercial Law and Technology, Vol 2, Issue 4, (2007).

71 Draft conclusions on identification of customary international law, with commentaries, UN Doc A/73/10, (2018) [hereinafter referred to as "Draft conclusions on identification of customary international law"].

practices in relation to international treaties. Draft conclusions on subsequent agreements and practice in relation to international treaties states that in accordance with Article 31 and 32 of the VCLT, subsequent practices and agreements of states can provide an authoritative interpretation of the treaty by narrowing or widening its scope.[72] The term 'subsequent practice' involves conduct involving the application of the treaty by parties to the treaty that establishes an agreement of the parties to the interpretation of the treaty.[73] It is crucial to note that subsequent practice among all parties includes silence and omission, leading to tacit consent to other states' practices.[74] Let us look at state practice that has brought about the shift in the interpretation of Article II.

With respect to state practice, through various missions to the Moon over the years, countries like the United States and The USSR have collected lunar material, which they have treated as their property.[75] Their relationship with the lunar material can clearly be understood as full-fledged ownership as NASA has explicitly stated that "lunar material retrieved from the Moon during the Apollo Program is U.S. government property.[76] Furthermore, the USSR also sold lunar materials to other private citizens, thus exercising its right to alienate and cement its

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[72] Draft conclusions on subsequent agreements and subsequent practice in relation to the interpretation of treaties, UN Doc A/73/10, (2018) [hereinafter referred to as "Draft conclusions on subsequent agreements and subsequent practice in relation to the interpretation of treaties"].

[73] Draft conclusions on subsequent agreements and subsequent practice in relation to the interpretation of treaties, supra note 72, at 2.

[74] Temple of Preah Vihear (Thailand v. Cambodia), Judgment, ICJ Reports 1962, 6, 23, 30-33; Draft conclusions on subsequent agreements and subsequent practice in relation to the interpretation of treaties, supra note 72, at 4.

[75] Abigail D. Pershing, supra note 3 at 158; Sarah Coffey, supra note 2 at 126.

[76] NASA office of inspector gen., IG-12-007, NASA'S management of moon rocks and other Astro materials loaned for research, education, and public display (2011) at v n.8.

ownership over the lunar materials.[77] These practices of Space faring nations have resulted in a shift in customary international law.

Furthermore, several countries have consistently argued in COPUOS discussions that commercial exploitation of resources does not amount to 'appropriation' under Article II of the Outer Space treaty.[78] Lastly, international agreements like the Artemis Accord involve countries like the United States, Australia, Canada, Italy, UAE, UK, and Luxemburg interpreting Article II such that commercial exploitation of extractable resources does not amount to 'appropriation.'[79] Australia's involvement is of particular interest because it has ratified the Outer Space treat and the Moon Agreement. According to Article 18 of the Vienna Convention of Law of Treaties, a state cannot engage in acts that defeat the object and purpose of the treaty.[80] The result is that Australia's signing of the Artemis Accord presupposes the exploitation of extractable resources to align not only with the Outer Space treaty but the Moon Agreement's prohibition on "Appropriation," as well.

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77 Abigail D. Pershing, supra note 3 at 158.

78 COPUOS Draft Report, General exchange of views on potential legal models for activities in the exploration, exploitation and utilization of space resources A/AC.105/C.2/L.309/Add.3 (9 April 2019); COPUOS Draft Report, General exchange of views on potential legal models for activities in the exploration, exploitation and utilization of space resources , A/AC.105/C.2/L.314/Add.2, (4 June 2021); COPUOS, Note by the Secretariat, Responses to the set of questions provided by the Moderator and Vice-Moderator of the Scheduled Informal Consultations on Space Resources, A/AC.105/C.2/2021/CRP.8, (27 May 2021); COPUOS, Report of the Legal Subcommittee on its fifty-eighth session, held in Vienna from 1 to 12 April 2019, A/AC.105/1203 (18 April 2019).

79 The Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids, NASA, (Oct. 15, 2021, 9:00 PM)) https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-130ct2020.pdf, [hereinafter Artemis Accords]

80 Vienna Convention on the Law of Treaties, opened for signature 23 May 1969, 1155 UNTS 331 (entered into force 27 January 1980) art 18 (hereinafter "VCLT")

It should also be noted that there was no dissent against the aforementioned practice by other states.[81] It is well established that silence can be construed as consent and multiple factors determine whether the silence of a state can be construed as tacit consent.

To begin with, draft conclusions on the identification of customary international law states that only deliberate abstention by a state can be construed as consent to a practice.[82] The report also states that abstention needs to be a result of acceptance as law to satisfy the requirements of *opinio juris.*[83] The report states that *opinio juris* in such circumstances can be construed if the state had an obligation to react and protest.[84] It should be noted that a state cannot argue political considerations as a defense for its silence, and as long as the legal requirements of a duty to speak are being met, the state is bound by its silence.[85]

Determination of whether the state had an obligation to protest involves determining whether the state has interests and rights that are affected by the practice of other states. If it is found that the state has a duty to protest because its interests are being impacted, silence will be construed as consent.[86] The ILC confirmed this in the draft conclusions on subsequent agreements and subsequent

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81 Sarah Coffey, supra note 2, at 126; John G. Wrench, supra note 35 at 51.

82 Draft ILC conclusions on identification of customary international law, supra note 71, at 133.

83 Draft ILC conclusions on identification of customary international law, supra note 71, at 141-142.

84 Draft ILC conclusions on identification of customary international law, supra note 71, at 141-142.

85 Temple of Preah Vihear, supra note 74, at 91 (Judge Wellington Koo); Minquiers and Ecrehos Case (France/United Kingdom) [1953] ICJ Rep 12, 66.

86 Case Concerning the Arbitral Award made by the King of Spain on 23 December 1906 (Honduras/Nicaragua) [1960] ICJ Rep 209, 56.

practices in relation to the interpretation of treaties.[87] However, this rule is not absolute, and silence in the absence of direct state interests still holds significant relevance in cases of the development of general customary international law that involves common interests, like governance of land, which is *res communis*.[88]The International Court of Justice noted this in the Anglo-Norwegian Fisheries Case.[89] Another aspect of determining whether there was a duty to protest is the nature of the act towards which reaction is expected. Acts involving significant legal effects that modify legal obligations and rights need to be responded to, as opposed to acts with little to no legal effect.[90]

In order to determine whether a capacity to protest exists, one needs to determine whether the state knew the actions it is bound to protest against. This is a very low threshold to meet, and the ICJ has consistently rejected pleas of ignorance with the exception of one case.[91] The court sees notifications of claims and rights as communication of knowledge, and silence in such cases can be treated as consent.[92] Furthermore, acts published and done openly are deemed knowledge that all states have.[93] The ICJ has also

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87 Draft conclusions on subsequent agreements and subsequent practice in relation to the interpretation of treaties, supra note 72, at 4; Draft ILC conclusions on identification of customary international law, supra note 71, at 141-142.

88 SS 'Lotus' (France v Turkey) (Judgment) [1927] PCIJ (ser A) No 9, 23.; Anglo-Norwegian Fisheries Case (United Kingdom v Norway) [1951] ICJ Rep 138, 39.

89 Anglo-Norwegian Fisheries Case, supra note 88, at 26.

90 Case Concerning Delimitation of the Maritime Boundary in the Gulf of Maine Area (Canada/USA) [1984] ICJ Rep 304 ,144; Barbados/Trinidad and Tobago Arbitration, 363, (Award of the Arbitral Tribunal, 11 April 2006); Minquers and Ecrehos Case, supra note 85, at 70-71; Temple of Preah Vihear Case, supra note 74, at 70 (Judge Moreno Quintana).

91 Sovereignty over Certain Frontier Land (Belgium/Netherlands) [1959] ICJ Rep 227, 229.

92 Temple of Preah Vihear Case, supra note 74, at 55 (Judge Fitzmaurice).

93 Sovereignty over Pedra Branca/Pulau Batu Puteh, Middle Rocks and South Ledge (Malaysia v Singapore) [2008] ICJ Rep 51, 75

construed knowledge in cases where vital interests are involved.[94] Other elements in understanding whether there was a capacity to protest are restrictions upon a state's freedom of will[95] and whether the state suffers from internal political instability.[96]

Lastly, time is a relevant factor in that a state's silence for a long time can be construed as the state consenting to the claim of other states.[97] ILC confirmed time as a factor in the draft conclusions on the identification of customary international law.[98]

Countries reinterpreting Article II of the OST were met with silence, which amounts to consent. To begin with, all countries had the capacity to protest the reinterpretation considering that countries like the U.S. and the USSR made their position public through international agreements,[99] press releases,[100] and domestic legislation.[101] Furthermore, there was an obligation on Spacefaring countries to protest the shift in the interpretation of the OST owing to their interests being directly affected. It can also be argued that the exploitation of resources is a matter that involves the interests of all countries, considering the fact that Outer Space exists as a zone which is the 'province of all mankind' and its governance rests

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94 Anglo-Norwegian Fisheries Case, supra note 88, at 139.

95 I M L DeSouza, 'The Role of State Consent in the Customary Process '44(3) International and Comparative Law Quarterly 525, (1995).

96 Eritrea-Yemen Arbitration Award, Phase I – Territorial Sovereignty and Scope of the Dispute, 70 (Permanent Court of Arbitration, 9 October 1998).

97 Land, Island and Maritime Frontier Dispute (El Salvador/Honduras, Nicaragua intervening) [1992] ICJ Rep 401, 354, 355; Case Concerning the Arbitral Award made by the King of Spain, supra note 86, at 46, 47.

98 Draft conclusions on identification of customary international law, supra note 71, at 142.

99 Artemis accords, Section 10.

100 NASA office of inspector gen., IG-12-007, NASA'S management of moon rocks and other astromaterials loaned for research, education, and public display (2011) at v n.8.

101 Spurring Private Aerospace Competitiveness and Entrepreneurship (SPACE) Act), Pub. L. No. 114-90, † 51303, 129 Stat. 721 (2015) [hereinafter SPACE Act 2015].

with humanity as a whole.[102] However, there was no protest from Spacefaring countries or any other states.[103] Silence in such a situation can very well be construed as consent to the shift in the interpretation of Article II.

Concerning the shift in the position of customary international law, only the element of *opinio juris* shall be discussed because state practice was discussed in the aforementioned paragraphs.

Draft conclusions on the identification of customary international law states that a state's legal opinions are evidence of *opinion juris.*[104] Thus, the passage of legislation that enables private citizens to engage in commercial recovery of resources from outer Space and sell them, like the Spurring Private Aerospace Competitiveness and Entrepreneurship Act, 2015[105] in the U.S., and similar legislation being considered in UAE,[106] Japan[107] , and Australia[108], demonstrate that practice of states to shift the position of customary international law is accompanied by *opinio juris.*

In 2020, China stated that it is open to sharing the Lunar material it has acquired from the Cheng e5 mission and stated that outer space resources are a "Common asset of humanity."[109] However, it is doubtful whether this changes the status of customary international

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[102] Article 1, outer Space treaty.

[103] Abigail D pershing, supra note 2, at 156.

[104] Draft conclusions on identification of customary international law, supra note 71, at 140.

[105] SPACE Act, 2015, supra note 101.

[106] Lucy Barnard, UAE to Finalise Space Laws Soon, NATIONAL (Sept. 3, 2021, 4:00 AM), https://www.thenational.ae/business/uae-to-finalise-space-laws-soon-1.219966.

[107] Rishika Daryanani & Travis Fulton, Asteroid Mining: Developments in Space Property Rights, NAT. RES. BLOG (Aug. 24, 2021), https://www.accenture.com/us-en/blogs/blogs-asteroid-mining- developments-space-property-rights.

[108] *Id.*

[109] Andrew Jones, China says it's open to sharing moon rocks as Chang'e 5 samples head to the lab, (Sept. 5, 2021. 4:00AM), https://www.space.com/china-sharing-chang-e-5-moon-samples.

law. First, countries can only claim not to be bound by a rule of customary international law if they dissented against the rule while it was being created and maintained their objection to the rule.[110] Considering China did not dissent from the shift in customary international law when it occurred, it is bound by the position that there is no bar on the appropriation of extractable resources.[111] Second, in light of international agreements like the Artemis Accord, the number of states in favor of customary international law allowing appropriation of extractable resources outweigh protesting states like China.[112]

With respect to scholarship on this change, the draft conclusions on the identification of customary international law state that scholars' opinions are evidence of customary international law.[113] Over the years, scholars have begun interpreting the term "use" in Article I to suggest that the outer space treaty does not prohibit the appropriation of extractable resources.[114]

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[110] Draft conclusions on identification of customary international law, supra note 71, at 152.

[111] Sarah Coffey, supra note 2, at 126; John G. Wrench, supra note 35, at 447.

[112] Paul-Whitfield-Jones, One Small Step for property rights in outer space?, Mayer Brown, (Sept. 12, 2021, 10:20 PM),https://www.mayerbrown.com/en/perspectives-events/publications/2020/05/one-small-step-for-property-rights-in-outer-space; Reuters "Trump administration drafting 'Artemis Accords' pact for moon mining – sources",5 May 2020, https://www.reuters.com/article/us-space-exploration-moon-mining-exclusi/exclusive-trump-administration-drafting-artemis-accords-pact-for-moon-mining-sources-idUSKBN22H2SB (15 May. 2020 2:30 AM).

[113] Draft conclusions on identification of customary international law, supra note 71, at 142.

[114] Abigail D. Pershing, supra note 3 at 157-161; Wayne N White, supra note 38 at 370; Richard B. Bilder, A Legal Regime for the Mining of Helium-3 on the Moon: U.S. Policy options, Fordham International law Journal, Vol. 33:243, (2009); Stephen DiMaria, Starships and Enterprise: Private Spaceflight Companies' Property Rights and the U.S. Commercial Space Launch Competitiveness Act, Vol, 90 (2016); Thomas Gangale & Marilyn Dudley-Rowley, To Build Bifrost: Developing Space Property Rights and Infrastructure 8 (Amer. Inst. Aeronautics & Astronautics, Working Paper, 2005), http://www.astrosociology.com/Library/PDF/Submissions /To%20Build%20Bifrost.pdf; Sarah Coffey, supra note 2, at 125; Lawrence A.

Last but not least, evidence of the new position is reflected in Article 11(3) of the Moon Agreement, which states:

Neither the surface nor the subsurface of the Moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person.

The delegation of the U.S. made a statement that the American interpretation of the words "in place" implies that property rights apply to extracted resources.[115] Said interpretation received no dissent from other states.[116] While Article 11(5) of the Moon Agreement requires the establishment of an international regime to govern the exploitation of natural resources, there is no prohibition on commercial exploitation of resources, and said exploitation is merely being made conditional to the establishment of an international regime.

Therefore, from the above discussion, one can conclude that the ban on appropriation does not extend to extractable resources, and all three property rights exist with respect to extractable resources.

In Situ Property

The situation concerning *In Situ* property is that there is no ownership over such property because there is a rejection of some

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Cooper, Encouraging Space Exploration Through a New Application of Space Property Rights, 19 SPACE POL'Y 111, 117 (2003).

[115] Abigail D. Pershing, supra note 3 at 159; Richard B. Bilder, supra note 114, at 268; Leslie I. Tennen, towards a New Regime for Exploitation of outer space Mineral Resources, 88 NEB. L. REV. 794, 813 (2009); Stephen DiMaria, supra note 114, at 425.

[116] Abigail D. Pershing, supra note 3 at 159;

rights in the bundle of rights. This part of the paper will focus on analyzing which rights exist with respect to *In Situ* property.

To begin with, one can safely argue that the 'right to use' exists with respect to *In Situ* property. The most significant proof of this would be Article 9 of the Moon Agreement, which explicitly allows state parties to establish crewed and uncrewed stations on the Moon as long as the stations do not impede access to all areas of the Moon[117] and are not being used for military purposes.[118] While Article 9 only mentions the Moon, Article 1 of the Moon agreement states that the provisions applying to the Moon shall apply to all celestial bodies.[119]

Second, Article I of the outer space treaty and Article 4 of the Moon Agreement provide for the 'use' of outer space, Moon, and Celestial bodies. The term 'use' cannot be understood without some degree of appropriation taking place[120].

Thus, one can conclude that the 'right to use' exists with respect to *In Situ* property.

Regarding the 'right to exclude,' exercising this right on any territory other than installations, vehicles, or stations over which the state has quasi-territorial jurisdiction, would amount to an exercise of territorial jurisdiction, thus violating Article I and II of the Outer Space Treaty.[121] Accordingly, the right to exclude does not exist with respect to any territory other than the installations, vehicles, or stations over which the state already enjoys quasi-

[117] Article 9 (2), Moon Agreement.
[118] Article 3 (4), Moon Agreement.
[119] Article 1 (2), Moon Agreement.
[120] Kurt Anderson Baca, supra note 2, at 1066; Stephen DiMaria, supra note 114, at 422.
[121] Bin Cheng, supra note 43, at Outer Space: The International Legal Framework—the International Legal Status of Outer Space, Space Objects, and Spacemen, 3.

territorial jurisdiction. The lack of enforcement of the 'right to exclude' on territory other than stations, installations and vehicles is reflected in the case of Nemitz v. the United States,[122] where an individual claimed that he owned an asteroid on which NASA landed. The individual maintained that NASA had violated his private property rights and he deserved compensation. However, the domestic courts in the United States ruled in favor of NASA and did not recognize the plaintiff's property rights.[123]

Even with respect to a state's installations, vehicles and, stations, the 'right to exclude' seems disputed in light of the conflicting positions between Article XII of the Outer Space treaty and Article 15 of the Moon Agreement. Article XII of the Outer Space treaty states that states shall keep their stations, installations and, vehicles open on a reciprocal basis, meaning that states can exercise a 'right to exclude.'[124] On the other hand, article 15 of the Moon Agreement states that every state party is required to keep its facilities, stations, and installations on the Moon open to use by other State parties, the only limitation being a notice requirement by the other state.[125] However, the effectiveness of this article is debatable because non-compliance with Article 15 is to be resolved via consultations between the state parties.[126] One can argue that lackluster enforcement of Article 15 means that the 'right to exclude' still exists with respect to a state's objects over which it enjoys quasi-territorial jurisdiction.

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[122] Nemitz v. United States, No. CV-N030599-HDM (RAM), 2004 WL 3167042 (D. Nev. Apr. 26, 2004).
[123] Sarah Coffey, supra note 2, at 140; Blake Gilson, supra note 8, at 1391; Abigail D. Pershing, supra note 3, at 163.
[124] Article XII, Outer Space treaty.
[125] Article 15, Moon Agreement.
[126] Article 15, Moon Agreement.

In light of the Artemis Accords, the question of 'right to exclude' has arisen in the context of debates on safety zones.[127] Section 11(7) of the Artemis Accords states that parties are to set up 'safety zones' where parties notify their activities and coordinate with other parties to avoid harmful interference.[128] The section states that the size, scope, and operation period of the safety zones should depend on the nature of operations.[129] The rationale behind these zones is to create areas that require management to avoid conflict, and they have their basis in Article IX of the Outer Space Treaty, which states that state parties shall undertake activities in Outer Space and the Moon with due regard to the interests of other states.[130] Article IX further goes on to state that state parties must engage in international consultations before proceeding with activities that could cause harmful interference with the activities of other state parties and that if a state party has a reason to believe that an activity undertaken by another state can cause harmful interference with its activities, it should request a consultation regarding the same.[131] Thus, article IX supports the Artemis Accords idea of safety zones being areas where notification of activities is required and the safety zone being respected on a good faith basis.

However, there are doubts about the extension of jurisdiction to the areas surrounding the lunar installations because such an extension of jurisdiction would not only violate Article II of the Outer Space treaty but also distort Article VIII of the Outer Space treaty, which

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127 Artemis Accords, Section 11(7).
128 Artemis Accords, Section 11(7).
129 Artemis Accords, Section 11(7).
130 Article IX, Outer Space treaty.
131 Article IX, Outer Space treaty.

only allows quasi-territorial jurisdiction to exist on objects registered by a state.[132] One solution to this problem can be the concept of functional jurisdiction to regulate the rights of other states and persons in designated zones for specific purposes like ensuring the safety of operations while not impinging the freedom of exploration.[133] In the present context, functional jurisdiction can be defined as jurisdiction exercised with respect to a particular area to ensure protection and safety for the exploitation of resources. Such jurisdiction does not have its basis in territorial or quasi-territorial jurisdiction and exists solely to ensure the orderly conduct of an activity.[134] Such jurisdiction's size, scope, and operation period must be tailored according to the function in mind.[135]

There are several examples of such jurisdiction being exercised on the high seas. One such instance is the legal regime governing the continental shelf, where a state has sovereign rights over the continental shelf for the sole purpose of exploring and exploiting the natural resources as long as the exercise of sovereignty is reasonable.[136] States cannot use this right to impede freedom of navigation and cannot make claims of unqualified sovereignty.[137] Another example is fisheries zones, where states can enforce jurisdiction to enjoy exclusive fishing rights but cannot affect

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[132] Jack Wright Nelson, Safety Zones: A near-term Legal Issue on the Moon, 44 J. Space L. 604 (2020).

[133] Imre Anthony Csabafi, The concept of state jurisdiction in international space law: a study in the progressive development of space law in the United Nations 131 (1971); Jack Wright Nelson, supra note 132, at 619.

[134] Imre Anthony Csabafi, supra note 133, at 131.

[135] Imre Anthony Csabafi, supra note 133, at 131.

[136] Article 2, *Convention on the Continental Shelf*, 29 April 1958, United Nations, Treaty Series, vol. 499, p. 311.

[137] Imre Anthony Csabafi, supra note 133, at 135.

traditional freedoms like navigation or flight freedom.[138] Lastly, states can create contiguous zones to prevent infringement of customs or immigration regulations.[139]

However, it is debatable whether a state can enforce such functional jurisdiction to penalize states for violating the safety zones. Article IX, which is the basis for 'safety zones,' provides consultation as the only means of resolving conflicts between activities of different countries. It is doubtful whether one can interpret Article IX to enforce jurisdiction to ensure no harmful interference with activities.[140] This is reflected in the Artemis Accords, where the safety zones only require parties to notify and coordinate amongst themselves.[141] Even in the system of allocation followed in the geostationary orbit, violation of radio regulations can be dealt with via consultation or arbitration between relevant parties.[142] Thus, it is doubtful whether functional jurisdiction can allow a state to sanction other states or its nationals for achieving its function. A better solution would be that functional jurisdiction is followed on the basis of good faith to not go beyond the scope of Article IX.[143] Functional jurisdiction can only be accepted to the extent of making rules but not the ability to enforce them and can function on a good faith basis.[144]

Thus, one can conclude that the 'right to exclude' exists only with respect to a state's installations, stations, and vehicles and not

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138 Imre Anthony Csabafi, supra note 133, at 64.
139 Article 24, Convention on the Territorial Sea and the Contiguous Zone, 29 April 1958, 516 UNTS 205, 15 UST 1606.
140 Article IX, Outer Space treaty.
141 Section 11(7), Artemis Accords.
142 Nandasiri Jasentuliyana, *Regulatory Functions of I.T.U. in the Field of Space Telecommunications*, 34 J. AIR L. & COM. 62 (1968).
143 Imre Anthony Csabafi, supra note 133, at 100.
144 Bin Cheng, supra note 43, The Extraterrestrial Application of International Law, 2.

beyond them. Any restrictions in the areas surrounding the installations, stations, and vehicles would have to be followed on a good faith basis.

The last right in the bundle is the 'right to alienate.' There has never been any implicit or explicit understanding that such a right exists with respect to *In Situ* property in outer space. An integral aspect of the right to alienate is the right to dispose of property,[145] and there have never been instances of legitimate selling of *In Situ* property in outer space. While there have been cases where private individuals have claimed to be selling parcels of celestial property to other private entities,[146] the International Institute of Space Law (IISL) released a statement targeting such companies and individuals.[147] The IISL board's statement noted that the individuals and companies had no "legal title to their claims" and "the deeds they sell have no legal value or significance and convey no recognized rights whatsoever."[148] Apart from the statement by IISL, the absence of a response from states and international organizations can be understood as evidence of these claims being treated as childish and implausible.[149]

Further evidence of the prohibition on *in situ* property rights is the admission by the United States that such rights do not exist. The admission is reflected in the Nemitz case and the SPACE Act, 2015. Section 51 of the Act states that:

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[145] Kurt Anderson Baca, supra note 2, at 1050; Blake Gilson, supra note 8, at 1376;
[146] Rand Simberg, supra note 2; Prakash Maheshwari, supra note 32, at 28.
[147] 'Statement by the Board of Directors * Of the International Institute of Space Law (IISL) On Claims to Property Rights Regarding The Moon and Other Celestial Bodies' (12 Sept. 2021, 10:00AM) http://www.iislweb.org/docs/IISL_Outer_Space_Treaty_Statement.pdf.
[148] *Id*.
[149] Prakash Maheshwari, supra note 32, at 29.

A United States citizen engaged in commercial recovery of an asteroid resource or a space resource under this chapter shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell the asteroid resource or space resource obtained in accordance with applicable law, including the international obligations of the United States.

Thus, one can conclude that no right to alienate exists with respect to *In Situ* property,

It should also be noted that even if the outer space treaty was uncertain about the subject of private appropriation, the Moon Agreement clarified this aspect. The article dealing with this issue is Article 11 (3) of the Moon Agreement. It states:

Neither the surface nor the subsurface of the Moon, nor any part thereof or natural resources in place, shall become property of any State, international intergovernmental or non-governmental organization, national organization or non-governmental entity or of any natural person. The placement of personnel, space vehicles, equipment, facilities, stations, and installations on or below the surface of the Moon, including structures connected with its surface or subsurface, shall not create a right of ownership over the surface or the subsurface of the Moon or any areas thereof. The foregoing provisions are without prejudice to the international regime referred to in paragraph 5 of this article.

From a bare perusal of Article 11 (3), it is clear that any form of appropriation by private parties is prohibited on the Moon. Since Article 1 states that the provisions of this Agreement applying to

the Moon shall apply to other celestial bodies,[150] Article 11 (3) essentially prohibits any form of appropriation of any celestial bodies.

From the above discussion, it is clear that there is a prohibition on the appropriation of outer space by private entities.

However, it must be noted that there is an exemption to prohibition on private appropriation of outer space. Several scholars argue that state entities and private entities can appropriate extractable resources.[151]The position results from a shift in customary international law inferred from the legislation passed by countries like the United States[152] and the United Arab Emirates[153] that have allowed private entities to mine space resources and alienate the said resources in any manner desired. Such legislations are also being considered by countries like Japan, China, and Australia.[154]

Furthermore, since any restriction in the outer space treaty is primarily on the state, and the prohibition on private entities is being inferred to be an extension of that restriction by bringing private activities under the ambit of the term "national," any exemption enjoyed by the state will logically apply to private entities.

From the above discussion on the outer space treaty, the position on property rights in outer space is as follows:

a. There cannot be any appropriation of *In Situ* property by both state and non-state entities.

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150 Article 1, Moon Agreement.
151 Abigail D. Pershing, supra note 3, at 161; Thomas Gangale & Marilyn Dudley-Rowley, supra note 114, at 5;
152 SPACE Act, supra note 101.
153 Lucy Barnard, supra note 106.
154 Rishika Daryanani & Travis Fulton, supra note107.

b. Exploitation of extractable resources by state and non-state entities does not fall under “appropriation” under Article II of the Outer Space treaty.

The above discussion concludes the first part of the paper that analyses the current legal framework governing outer space. The next part of the paper shall focus on the changes needed first, to make the position of the law explicit and second, to create a legal framework where *In Situ* property rights can be enjoyed equitably in consonance with the principle of "Common Heritage."

Delving into Lex Feranda

To begin with, the first recommendation would be to make amendments to the outer space treaty and the Moon Agreement that explicitly recognize the right to appropriate extractable resources. Such an amendment will bring closure to the debate and prevent further confusion on this matter. Any amendment made in this regard must also recognize the ability of private entities to appropriate these extractable resources. However, it should be mentioned that the right to appropriate extractable resources should not be left as an absolute right. The proposed amendments must limit this right per the framework proposed in this paper.

To understand this paper's proposed framework, one must first understand the principle of "Common Heritage of Mankind," enshrined in the Moon Agreement. A caveat is that the proposed framework is a very rudimentary model that needs to be explored in great depth elsewhere.

Common Heritage of Mankind

The principle of "Common Heritage of Mankind" can be traced back to the works of Grotius, who laid down one of the earliest

definitions for the doctrine.[155] In modern times, this concept was introduced on the international plane by the Maltese ambassador Arvid Pardo, who introduced the concept to the General Assembly in the context of the Deep seabed.[156] On a fundamental level, this principle ensures that no country or group of countries own certain internationally designated areas.[157] The international community as a whole sets out to govern the area and exercises ownership over the area, generally through an international institution.[158] The most controversial feature of this principle is that the benefits arising out of the designated zone must be used for the benefit of Mankind[159] , and it is over the last requirement that there is a sharp divide between the global north and global south.[160]

The global south believes that international areas designated as the "Common Heritage of Mankind" belong to all nations. Hence, any resources exploited from these regions shall benefit all nations.[161]

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[155] Sivash Mirazee, Outer space and common heritage of mankind: Challenges and solutions, 102-114, RUDN JOURNAL OF LAW. 21. (2017).

[156] John E. Noyes, The Common Heritage of Mankind: Past, Present, and Future, 40 DENV. J. INT'L L. & POL'Y 447 (2012); Carol R. Buxton, supra note 24, at 694; Brandon C. Gruner, supra note 24, at 326; Jeremy L. Zell, Putting a Mine on the Moon: Creating an International Authority to Regulate Mining Rights in outer space, 15 MINN. J. INT'l L. 489 (2006).

[157] Carol R. Buxton, supra note 24, at 691-692; Brandon C. Gruner, supra note 24, at 327; Jeremy L. Zell, supra note 156, at 497; John E. Noyes, supra note 156, at 450-451; Kudirat Magaji W. Owolabi, The Principle of the Common Heritage of Mankind, 4 NNAMDI AZIKIWE U. J. INT'l L. & Juris. 51 (2013).

[158] Jeremy L. Zell, supra note 156, at 497; John E. Noyes, supra note 156, at 450; Kudirat Magaji W. Owolabi, supra note 157, at 52;

[159] Jeremy L. Zell, supra note 156, at 497; John E. Noyes, supra note 156, at 450; Kudirat Magaji W. Owolabi, supra note 157, at 52;

[160] Carol R. Buxton, supra note 24, at 692-693; Brandon C. Gruner, supra note 24, at 328; Jeremy L. Zell, supra note 156, at 496; Edward Guntrip, the common heritage of mankind: an adequate regime for managing the deep seabed? Melbourne Journal of International Law, (2003); Kudirat Magaji W. Owolabi, supra note 157, at 51.

[161] Carol R. Buxton, supra note 24, at 692; Mary E. Schwind, Open Stars: An Examination of the United States Push to Privatize International Telecommunications Satellites, 10 SUFFOLK TRANSNAT'L L. REv. 93, 94 (1986); Jeremy L. Zell, supra note 156, at 496;

Concerning the meaning of "the benefit of all nations," the global south believes that benefits of exploited resources shall be distributed equally among all nations regardless of the role in the appropriation.[162] The global south also interprets the principle to enable access to zones for not only nations currently possessing the means to do so but also countries that may gain such technology in the future.[163] From the discussion above, one can understand that the principle of "Common Heritage of Mankind" for the global south involves the negative element of limiting access of developed countries and the positive elements of increasing the access of developing countries and equal distribution of resources.

On the other hand, the global north has understood the principle to mean equal access to resources.[164] It is a formalist understanding of equality concerned with no country having the right to exert exclusive ownership in outer space[165] and does not involve recognizing structural disadvantages that prevent certain countries from exercising this right of access. Thus, for the global north, the principle involves benefitting all nations by ensuring that no one country exerts exclusive jurisdiction over the designated international areas.

Debates on this principle have not halted its inclusion in treaties made to govern various international zones on Earth like the deep

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[162] Carol R. Buxton, supra note 24, at 692; Jeremy L. Zell, supra note 156, at 496; Brandon C. Gruner, supra note 24, at 328.

[163] Jeremy L. Zell, supra note 156, at 506; Wolfrum, The Common Heritage of Mankind,in Max Planck Encyclopedia of Public International Law, www.mpepil.com (updated Nov, 2009, last visited Dec. 10, 2010.

[164] Jeremy L. Zell, supra note 156, at 507; Carol Buxton, supra note 26, at 693; Wolfrum supra note 163, at 322;

[165] Carol Buxton, supra note 26, at 693; Jeremy L. Zell, supra note 156, at 507;

seabed[166] and the Antarctic region.[167] Before delving into the various examples of this principle being applied on Earth, let us understand its application in the Moon Agreement. However, before looking at the Moon Agreement, let us understand why the principle matters.

The author believes that any system governing outer space must be centered around the principle of recognizing outer space as the "Common Heritage of Mankind" that involves the distribution of resources and representation of the global south along the lines demanded by the global south. For centuries, the global north colonized and exploited the global south to feed home industries and luxuries. In the present times, neo-colonialization takes place through neo-liberal policies that the global north thrusts on the global south.[168] Outer space presents a *tabula rasa* that can finally be used to create a just system where the global south has access to the resources and help it deserves. A system that recognizes the structural disadvantages faced by the global south will truly help humanity usher into an era where mistakes of the past can be rectified, and true substantive equality can be achieved.

Furthermore, the environment of Earth has faced unparalleled devastation in the name of free-market capitalism.[169] On the other hand, as evident from the management of the Antarctic

[166] Carol Buxton, supra note 26, at 693; Jeremy L. Zell, supra note 156, at 501; John E. Noyes, supra note 156, at 461; Timothy G. Nelson, Vol. 17:2, The moon agreement and private enterprise: lessons from investment law, 399, (2011); Edward Guntrip, supra note 160.

[167] Carol Buxton, supra note 26, at 693; Jeremy L. Zell, supra note 156, at 501; John E. Noyes, supra note 156, at 461; Edward Guntrip, supra note 160.

[168] B.S. Chimni, supra note 11, at 3; Mutua, Makau, and Antony Anghie, supra note 11, at 35.

[169] C. J. Polychroniou, is saving the planet under capitalism really possible? (Sept 12, 2021, 10:00PM), globalpolicyjournal.com/blog/20/04/2021/saving-planet-under-capitalism-really-possible.

region[170]and UNCLOS III treaty,[171] systems based on the principle of "Common Heritage of Mankind" can regulate the activities of states to ensure the sustainability of operations and preservation of international zones for future generations.

The paper aims to create a rudimentary system that incorporates principles of equality while achieving a common ground between the global north and the global south.

Moon agreement and "Common Heritage of Mankind."

Article 11 (3) of the Moon Agreement states that the Moon shall be the "Common Heritage of Mankind."[172] To implement this principle, Article 11 states that an international regime needs to be established to govern the exploitation of resources on Moon.[173] While there is a reference to the need for equitable sharing of the benefits derived from the resources with a particular concern for developing countries,[174] there is no description of the enforcement of the principle of "Common Heritage of Mankind" in terms of the composition of the said international regime, its mandate, its powers and how equitable sharing of benefits shall take place.

Despite not delving into more depth about the international regime and the execution of the "Common Heritage" principle, the mere

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[170] Convention on the Regulation of Antarctic Mineral Resource Activities, 27 I.L.M. 859, 859 (1988) [hereinafter CRAMRA], Article 2(3), Article 4(2)(b), Article 8(1), Article 51; Carol Buxton, supra note 26, at 696; John E. Noyes, supra note 156, at 462; Sarah Coffey, supra note 2, at 131;

[171] United Nations Convention on the Law of the Sea, Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS III], Article 145, Article 162(2)(w).

[172] Article 11(3), Moon Agreement.

[173] Article 11(5), Moon Agreement.

[174] Article, 11(7), Moon Agreement.

prospect of being forced to share resources was enough to deter Spacefaring countries from signing the treaty.[175]

Considering the fact that the Moon Agreement provides little answers to the enforcement of the principle of "Common Heritage of Mankind,"[176] let us analyze its implementation in the context of the Deep seabed and the geostationary orbit, to draw upon some practical conclusions for the Moon Agreement.

Deep seabed

The 1960s saw the rise of the possibility of commencing mining operations in the deep seabed, which was touted to be filled with valuable resources.[177] The possibility of mining led to the need for an international regime to govern the appropriation of resources in the deep seabed. The result was the Third Law of the Sea Convention (UNCLOS III).[178] The treaty states that the deep seabed area is the "Common Heritage of Mankind" where no state can exert sovereignty.[179] However, the treaty goes beyond the Moon Agreement and elaborates on what is meant by this principle. The treaty goes beyond the Moon Agreement by creating the International Seabed Authority (ISA), which is in charge of the resources in the areas designated as the Common Heritage of

[175] Sarah Coffey, supra note 2, at 128; Carol Buxton, supra note 26, at 699; David Sarnacki, supra note 8, at 129; Brandon C. Gruner, supra note 24, at 329.

[176] Edward Guntrip, supra note 160; Nelson, supra note 166, at 401; Jeremy Z. Lell, supra note 156 at 500; Sarah Coffey, supra note 2 at 133; Kurt Anderson Baca, supra note 2, at 1069;

[177] Carol R. Buxton, supra note 24, at 694; Lea Brilmayer & Natalie Klein, Land and Sea: Two Sovereignty Regimes in Search of a Common Denominator, 33 N.Y.U. J. INT'L L. & POL. 703, 726 (2001).

[178] UNCLOS III

[179] Article 136, UNCLOS III; Article 137, UNCLOS III.

Mankind.[180] The ISA comprises an assembly and an executive council.[181]

To understand the regime proposed by UNCLOS III, one needs to first understand the two phases that the treaty went through. The first phase was from 1982 to 1994, when the treaty understood the "Common Heritage of Mankind" principle in a manner unacceptable to the global north and the second phase was ushered in 1994, as a result of compromise between the global north and global south.

In the 1982 treaty, the assembly was the supreme organ of the authority, and all contracting states had a vote in its functioning.[182] The assembly members would vote for the executive council members,[183] which would, in turn, approve plans for mining in the deep seabed.[184] It is important to note that the treaty called for proportional representation of land-locked countries and developing countries in the executive council.[185] The authority also comprised an "enterprise" that would undertake mining opportunities on orders of the authority.[186] The 1994 agreement retains the enterprise but modifies its functions, as demonstrated below.

Concerning the mining itself, the treaty envisaged reserved zones where only developing countries[187] and the "enterprise" could

[180] Article 157, UNCLOS III.
[181] Article 158, UNCLOS III.
[182] Article 160, UNCLOS III.
[183] Article 161, UNCLOS III.
[184] Article 162, UNCLOS III.
[185] Article 161, UNCLOS III.
[186] Article 170, UNCLOS III.
[187] Wolfrum supra note 163, at 329-330;

mine.[188] Apart from these zones, there was a parallel system through which developed states would have opportunities to undertake mining activities along with the authority.[189] However, there were high costs for the operation of states in the forms of a license fee[190] and mandatory transfer of technology to developing countries[191] and the "enterprise."[192] State parties were also mandated to fund the activities of the "enterprise."[193] Perhaps the most essential aspect of the treaty is enshrined in Article 140(2), which requires the financial and economic benefits derived from mining to be shared equitably.[194]

Developed countries boycotted the treaty until 1994, when a new agreement was signed that radically transformed the provisions of the original treaty.[195] Scholars argue that the 1994 agreement has diluted the process such that it only does lip service to the principle of "Common Heritage of Mankind."[196] While the Agreement retains the aspect of the ISA exercising control over mining activities,[197] the requirement of mandatory transfer of technology was removed,[198] the "enterprise" was to operate in joint operations

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188 Annex III, Article 8, UNCLOS III.
189 Article 153, UNCLOS III.
190 Annex III, Article 13, UNCLOS III.
191 Article 144, UNCLOS III; Annex III, Article 5, UNCLOS III.
192 Article 144, UNCLOS III; Annex III, Article 5, UNCLOS III.
193 Annex IV, Article 11, UNCLOS III.
194 Article 140(2), UNCLOS III.
195 Agreement Relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea of 10 December 1982, G.A. Res. 48/263, Preamble, U.N. Doc. AfRes/48/263 (July 28, 1994) [hereinafter Part XI Agreement] (agreeing to the implementation of the ISA contemplated in Part XI of the Sea Convention).
196 Vladimir-Djuro Degan, The Common Heritage of Mankind in the Present Law of the Sea, in 2 LIBER AMICORUM JUDGE SHIGERU ODA 1363 (Nisuke Ando et al. eds., 2002); John E. Noyce, supra note 112, at 464;
197 Annex § 1(1), Part XI Agreement.
198 Annex § 5, Part XI Agreement.

with "sound commercial principles,"[199] and states were not mandated to fund the "enterprise."[200] More importantly, the relationship between the assembly and the council was altered to the point where the assembly was left with mere residual powers.[201] In the original treaty, the assembly was the supreme organ that could consider adopting the council's recommendations.[202] The 1994 amendment made the assembly bound to function on the council's recommendations[203] , and the composition of the council was altered to the point where developed countries can hijack the assembly via the council. Initially, the council functioned on the principle of majority.[204] The 1994 agreement composed the council of 5 groups of states, with one group being developed countries [205], and any decision adopted by the council based on majority can be overridden if a majority of the members of a group vote against the decision.[206] With these veto powers, developed countries can hijack the council and thus hijack the assembly, and all that the assembly can do is request the council to reconsider its recommendations.[207]

The hegemony of the United States was bolstered as it was guaranteed a seat in the executive council, and its previous claims to mining sites were recognized.[208] Furthermore, As a part of explicit recognition of the free-market-oriented policies, the Agreement set up a financial committee, with a guaranteed seat for

199 Annex § 2, Part XI Agreement.
200 *Id*.
201 Edward Guntrip, supra note 160; Annex § 3(4), Part XI Agreement.
202 Article 160(f)(i), UNCLOS III.
203 Annex § 3(4), Part XI Agreement.
204 Article 161(8), UNCLOS III.
205 Annex § 3(15), Part XI Agreement.
206 Annex § 3(5), Part XI Agreement.
207 Annex § 3(4), Part XI Agreement.
208 Edward Guntrip, supra note 160.

the United States, that has the powers to block any financial distributions.[209] However, despite the dilution of the assembly's powers, it still decides how the revenues from mining shall be distributed, albeit on the finance committee's recommendations.[210] The Agreement also retains a mining fee, albeit drastically reduced, that private parties and states must pay for being able to undertake mining operations.[211]

The journey of the UNCLOS III treaty shows that the global north's problem is not the element of distribution of benefits of mining, and this is evident from the fact that the 1994 agreement retains the aspects of distribution of benefits of mining.[212] While the global north would ideally like to believe that the concept of "Common heritage of Mankind" should mean unlimited access to all countries, the most it is willing to compromise is at the distribution of the benefits and fee on mining operations. The disagreement between the global north and the global south is with respect to affirmative action for the effective participation of the global south. The 1994 agreement seriously impaired developing countries' ability to participate in mining operations by removing mandatory technology transfers.[213]The Agreement also impairs the voice of the global south by reserving seats for developed countries on committees that can override the decisions of the assembly.[214] Wolfrum noted this disagreement and argued that the global north had no problem with the distribution of revenues, but the global south felt that it was not appropriate to limit its rights to mere

[209] Annex § 9(3), (7)-(8), Part XI Agreement.
[210] Annex § 3(7), Part XI Agreement.
[211] Annex § 8, Part XI Agreement.
[212] Annex § 9, Part XI Agreement.
[213] Annex § 5, Part XI Agreement.
[214] Annex § 9(3), (7)-(8), Part XI Agreement.

receipts but that there needs to be more significant affirmative action.[215]

Regardless of the possibility of distributing the benefits of mining, changes in the 1994 agreement created a system where the principle of "Common Heritage of Mankind" is without the force that it deserves. The author is of the view that any detailed system for the enforcement of the "Common Heritage of Mankind" cannot be along the lines of the 1994 agreement, where some countries enjoy inherent benefits over the others, and committees comprised of countries from the global north enjoy veto powers in fiscal matters. Any system that exists must exist with the principle of equality where the vote of all countries is equal. The constitution of committees like the finance committee with veto powers for the developed nations[216] ensures that any meaningful distribution of benefits is highly unlikely. The removal of the mandatory transfer of mining techniques combined with a first-come, first-serve basis of allocating mining rights creates an outcome where developing countries and land-locked countries are unlikely to apply for any mining activities before the industrialized nations.

The above discussion demonstrates how the international community has adopted an interpretation of the "Common Heritage of Mankind" principle that is merely limited to prohibiting assertions of sovereignty and ownership by any country. Any possibilities of equal distribution of resources are hampered by making the distribution contingent on the whims of the developed countries. Such an understanding is going against the original ideals that this principle invoked. When the Maltese

[215] Wolfrum, supra note 163, at 322.
[216] Annex § 3, Part XI Agreement.

ambassador Pardo introduced this concept before the U.N General Assembly, he saw it as a principle that would ensure developing countries equal access to the benefits and governance of international zones.[217] Pardo was convinced that the resources in the deep seabed could be used to bridge the gap between the global north and the global south.[218] By adopting a free-market-oriented system and allowing the global north to enjoy disproportionate powers in the management systems, international zones can become the property of countries from the global north, albeit indirectly. Discourses on the validity of the neo-liberal model of international law uphold the status quo and maintain the global north's hegemonic status and must change.[219]

The next part of the paper will focus on the interpretation of the principle of "Common Heritage of Mankind" in the management of the geostationary orbit.

The geostationary orbit

The geostationary orbit sits at over 22,300 miles above the surface of Earth, and satellites are placed in this orbit to maintain communication systems on Earth.[220] However, only a limited number of satellites can be placed in orbit because of physical and radio interference by other satellites.[221] The international

[217] Jeremy L. Zell, supra note 156, at 496; Carol R. Buxton, supra note 24, at 694; Kemal Baslar, The concept of the common heritage of mankind in international law 4 n.22 (1998); John E. Noyes, supra note 156, at 459-460;

[218] Jean Buttigieg, Arvid Pardo – a diplomat with a mission, 12 SYMPOSIA MELITENSIA NUMBER, (2016).

[219] B.S. Chimni, supra note 11, at 15;

[220] Brandon C. Gruner, supra note 24, at 325; Office of technology assessment, radiofrequency use and management impacts from the world administrative radio conference OF 1979 73 (1982) [hereinafter OTA WARC Report]; Kurt Anderson Baca, supra note 2, at 1072;

[221] Kurt Anderson Baca, supra note 2, at 1073; OTA WARC Report, supra note 137, at 73.

telecommunications Union, acting through the World Administrative Radio Conference, regulates the geostationary orbit to ensure regulation and coordination of activities in this limited area.[222] For regulation of the orbit, the ITU uses two systems, the *a priori*, and *a posteriori* system.[223] The *a priori* system operates by providing slots to all countries regardless of their capabilities, whereas the *a posteriori* system provides slots on a first-come-first-served basis as the need arises.[224] Such a dual approach was out of recognition of the concerns of the developing countries that insufficient technological access will prevent their access to the orbit.[225] The system proposed by the ITU has also envisaged the entry of private entities in the form of states lending out their slots to private entities of their choice.[226]

Any slots allotted to countries do not translate to an assertion of sovereignty. The prohibition on sovereignty can be understood from the fact that countries overwhelmingly rejected the Bogota Agreement, where a few countries claimed sovereignty over the geostationary orbit[227] but continue to follow the ITU system. Furthermore, the ITU system's allocation of slots can be seen as analogous to the UNCLOS III treaty's system of allowing state

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[222] Kurt Anderson Baca, supra note 2, at 1075; Susan Cahill, Give Me My Space: Implications for Permitting National Appropriation of the Geostationary Orbit, 19 WIs. INT'L L.J. 231, 232 (2001);

[223] Carol Buxton, supra note 2, at 703; Susan Cahill, supra note 222, at 238; Timothy Justin Trapp, Taking up space by any other means: coming to terms with the non-appropriation article of the outer space treaty, 4, University of Illinois Law review, (2013).

[224] Carol Buxton, supra note 2, at 703; Susan Cahill, supra note 222, at 239; Timothy Justin Trapp, supra note 223, at 1702.

[225] Carol Buxton, supra note 2, at 703; Susan Cahill, supra note 222, at 239; Timothy Justin Trapp, supra note 223, at 1702.

[226] Timothy Justin Trapp, supra note 223, at 1702

[227] Timothy Justin Trapp, supra note 223, at 1699; Susan Cahill, supra note 222, at 240; Timothy G. Nelson, supra note 166, at 409.

parties to exploit resources in a particular area.[228] It can also be understood that the allocation of slots does not equal claims of ownership, as the slots are seen as resources that can be accessed but not owned.[229] In particular, Timothy Justin Trapp argues that through its international nature and proportionate response to property rights concerns, the ITU system ensures that it walks a delicate balance that does not violate the principle of non-appropriation.[230]

From the discussion above, one can understand how the system created by the ITU has incorporated elements of the principle of "Common Heritage of Mankind" despite not mentioning it explicitly.[231] It ensures that all countries have access to the orbit, prohibits any assertions of sovereignty, and envisages creating an international institution that looks into the zone's management.

The Path Forward

As noted previously, developing countries view that there need to be positive and negative elements to ensure equal benefits of the designated zones.[232] The negative element is to limit the activities of the industrialized countries, and the positive element is giving developing countries opportunities to access the seabed by endorsing their activities.[233]

From an understanding of the 1994 agreement and the ITU system, the negative elements of an international authority administering

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[228] Article 6, Annex III, UNCLOS III.
[229] Susan Cahill, supra note 222, at 241; Jannat C. Thompson, Comment, Space for Rent: The International Telecommunications Union, Space Law, and Orbit/Spectrum Leasing, 62 J. AIR L. & COM. 279, n.2 (1996).
[230] Timothy Justin Trapp, supra note 223, at 1709-1711.
[231] Jannat C. Thompson, supra note 231, at 304;
[232] *See supra pp.* 16.
[233] Wolfrum, supra note 163, at 322-323.

the resources in an area,[234] requirements of license fee payment for conducting mining operations[235] and reserving certain zones for the "enterprise"[236] enjoy the consensus of the global north and the global south.

Concerning the positive elements, in the 1982 UNCLOS III treaty, these took the form of mandatory technology transfers,[237] production limits,[238] reservation of certain zones for the "enterprise"[239] and developing countries[240] , and distribution of revenues.[241] Out of these, the reservation of certain zones for the "enterprise" and developing countries,[242] the distribution of benefits of mining[243] and mining fee[244] were accepted by both the global north and global south and retained in the 1994 agreement. While one might argue that the aspect of distribution of benefits is rendered meaningless in the 1994 agreement, that is because of the changes made to the system of representation,[245] changes this paper disagrees with. In the system proposed by the ITU, the positive element took the form of allocating slots to countries

234 Annex § 1(1), Part XI Agreement.
235 Annex § 8, Part XI Agreement.
236 Annex III, Article 8, UNCLOS III; Annex § 1(10), Part XI Agreement.
237 Article 144, UNCLOS III; Annex III, Article 5, UNCLOS III.
238 Article 151, UNCLOS III.
239 Wolfrum supra note 163, at 329-330; Annex III, Article 8, UNCLOS III.
240 Annex III, Article 9, UNCLOS III.
241 Article 140(2), UNCLOS III.
242 Annex § 1(10), Part XI Agreement; The reservation for developing countries can be inferred from the fact that the Part XI Agreement does not invalidate Annex III, Article 9, UNCLOS III, which enabled reservation provisions for developing countries.
243 This can be inferred from the fact that the Part XI Agreement does not invalidate Article 140(2), UNCLOS III.
244 Annex § 8, Part XI Agreement.
245 *See supra pp. 19.*

regardless of their ability to use them.[246] The latter was accepted by the global north and the global south.

This paper's proposed framework draws on these conclusions and incorporates the negative and positive elements of the "Common Heritage of Mankind" principle, which enjoy consensus between the global north and the global south. There is an exception to the requirement of consensus, and that is various forms of affirmative action to ensure the representation of the global south in the international institutions being set up.

The framework proposed by this paper envisages the creation of an international regime akin to the ISA. The international regime known as the Space Resource authority (SRA) shall be formed under Article 11(5) of the Moon Agreement. To create the authority, it is recommended that Article 11(3) of the Moon Agreement be amended to vest ownership in the international regime envisaged in Article 11(5) as was done in Article 137 of the UNCLOS III treaty. It must be made clear that the allocation of slots under the SRA does not amount to ownership and that the only method of disposing of the slots is by leasing them to other states and private parties. Restrictions on the right to alienate will ensure that no ownership rights can materialize. Furthermore, the setting up of the SRA should bring about an amendment to Article II of the outer space treaty. Article II should be amended to explicitly state that extractable resources can be mined only on property allocated by the SRA, and private entities can also undertake mining of extractable resources under state supervision.

[246] Carol Buxton, supra note 2, at 703; Susan Cahill, supra note 222, at 239; Timothy Justin Trapp, supra note 223, at 1702

Like the ISA, the SRA shall comprise an assembly and an executive council. The assembly shall be the central authority comprised of all country's signatories to the Moon Agreement. The executive will comprise members voted by the assembly, with seats reserved for developing countries

Concerning the allocation of property rights by the SRA, the method of allocating property rights shall be done in the form of allocating land slots to countries. The technical committee working under the executive council shall allocate slots, subject to the executive council's approval. While all countries will be assured a certain minimum number of slots, there are bonus slots that countries can be allotted. The number of bonus slots allocated will be inversely proportional to the GDP. Countries shall be allotted slots of land regardless of their capability of using those slots, and countries are free to lease the slots to other countries or private entities underrates fixed by the executive council. While there are valid concerns of countries not knowing the quality of the land allocated, the SRA will conduct studies and allot higher quality of land to countries with a lower GDP. Slot allocation shall be reviewed at a period of 20 years to note the changes in GDP. To allow the SRA to study the land, land allocation on any celestial body or asteroid will begin five years after its discovery. The slots allocated to countries shall also function as 'safety zones' which require co-ordination of different activities to prevent harmful interference. The 'safety zones' shall be respected on a good faith basis and no country can exercise jurisdiction to exclude other countries.

With respect to the mining itself, countries lacking mining technology can pool together funds and transfer them to the

technical committee to create mining technology available to all countries. It should also be noted that countries will have to pay a fixed fee in order to commence mining operations, which will be used for the functioning of the authority. Countries will also have to pay a fixed tax on any minerals mined, the proceeds of which will be distributed among the least developed countries. Apart from the fee mentioned above, countries are free to sell or use their mined resources in any manner that fancies them.

A critique of such a structure is that it will repel developed countries. However, the case with the UNCLOS need not repeat over here. To begin with, there are no mandatory transfers of technology and production limits. The only obligations being placed are mandatory tax and slot allocations accepted by countries like the United States in the 1994 agreement and the ITU system. The only aspect included that the global north has rejected is the making the assembly as the supreme organ of the SRA. However, this is necessary for the representation of the global south, an aspect where one cannot compromise. Furthermore, unlike in the case of deep-sea mining, where the United States firmly believed the right to mine the deep seabed is permissible under customary international law, in the case of outer space, the United States has forfeited its right to *In Situ* property, and this Agreement is an option to expand those rights.[247]

Most importantly, the author firmly believes that the representation of the global south cannot be compromised in the name of consensus. A moral onus exists on the global north that academia has been avoiding in the name of neoliberal discourses on

[247] Abigail D. Pershing, supra note 2, at 176.

consensus and efficiency.[248] The discourse should shift towards a genuine reflection of the centuries of oppression and appropriation of the global south's people and environments. This reflection must culminate in recognizing the rights of the global south and in particular, its right to representation Unless civil society, academicians, and countries of the global south start the discussion on this matter, the status quo will be upheld, and institutional discrimination will continue to plague the global south at a time when all countries need to be on the same page to tackle existential threats like climate change.

Conclusion

The purpose of this paper was to understand the current position of the law and provide a rudimentary framework for governing property rights in outer space. The framework proposed in this paper is a rudimentary one, and every aspect of it deserves to be researched in greater depth, critiqued, debated, and built upon. However, its core value of equality must be preserved.

While specific aspects of the framework are fallible and criticisms are welcome, civil society must stop critiquing the desire for equality and actively shift the discourse towards one that champions equality and keeps it at its core.

Furthermore, notwithstanding civil society debates on this issue, it is up to states to take meaningful steps towards creating an equally beneficial framework for allocating property rights in outer space. In light of existential threats like climate change looming upon all nations, it becomes imperative to create a framework for property rights in outer space to mine and learn about resources that have

[248] B.S Chimni, supra note 124, at 15.

the potential of countering such a threat and changing the fortunes of several underdeveloped countries.

The law of outer space needs to wake up to advancements in science and capitalize on them to stay true to the principles of equality enshrined in the outer space treaty and the Moon Agreement and manage it as the "Common Heritage Mankind."

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