UDAYANA JOURNAL OF LAW AND CULTURE

E-ISSN 2549-0680
Vol. 7, No. 2, July 2023, pp. 144-164

Legal Issues Pertaining to High Altitude Platform Station Implementation in Indonesia as an Archipelagic State

Yaries Mahardika Putro[1], Ridha Aditya Nugraha[2], Taufik Rachmat Nugraha[3], Rio Christiawan[4], Aldhanti Bodhihanna[5], Jason Pratama Ong[6], Muhammad Revaldi Testarosa[7]

[1] Faculty of Law Universitas Surabaya, Surabaya, Indonesia
[2] Air and Space Law Studies Universitas Prasetiya Mulya, Tangerang, Indonesia
[3] National University of Singapore, Singapore
[4] Faculty of Law Universitas 17 Agustus 1945 Jakarta, Jakarta, Indonesia
[5, 6, 7] International Business Law Program Universitas Prasetiya Mulya, Tangerang, Indonesia

Keywords

High-Altitude Platform Station (HAPS); National security; Personal data protection; Sovereignty.

DOI

https://doi.org/10.24843/UJLC.2023.v07.i02.p06

Author E-mail

[1] yariesmp@staff.ubaya.ac.id
[2] Correspondence: ridha.nugraha@prasetiyamulya.ac.id
[3] trn93@nus.edu.sg
[4] rio.christiawan@uta45jakarta.ac.id
[5] aldhanti.bodhihanna@student.pmsbe.ac.id
[6] jason.ong@student.pmsbe.ac.id
[7] muhammad.testarossa@student.pmsbe.ac.id

Abstract

Information is a necessity for the interests of government, the economy, social culture, as well as defense and security in the era of industrial revolution 4.0. Since 1976, the Indonesian government has been working on developing a satellite communication system starting with the Palapa A1 Satellite, followed by its subsequent generations. However, this system has limitations, particularly in providing coverage to rural areas in Indonesia. To address this issue, the government has started the procurement of the Wahana Dirgantara Super or High-Altitude Platform Station (HAPS) in Indonesia. HAPS are stations positioned at altitudes of 20 to 50 km above the Earth's surface. Given Indonesia's geographical location, HAPS is seen as the most suitable solution as it utilizes non-ground terrestrial technology to improve information and communication technology coverage in rural areas. However, the location on which the HAPS is positioned might trigger new issues, particularly with regard to state sovereignty and disruption of flight traffic. The operation of HAPS also needs further consideration so that the protection of personal data in Indonesia will not be disrupted. This article employs normative juridical research as a methodology. The research collected and analyzed primary sources in the form of law, regulation, and policy at the national and regional levels, as well as secondary sources that are available in textbooks, journal articles, and website content. This article aims to explain the development of HAPS regulations based on international law and national law and to examine the legal issues related to the procurement of HAPS in Indonesia . At the end, this article suggests that it is necessary to regulate HAPS in Indonesia with reference to aviation safety, security,

and liability issues as well as maintaining state sovereignty and ensuring personal data protection.

1. INTRODUCTION

Indonesia is a country with abundant natural resources but classified as a middle-income country on the basis of the World Bank Classification.[1] The country's ability to follow developments in information and communication technology has an impact on the country's position in the globalization era. Indonesia needs to stay updated on the latest news to broaden the understanding on how to process its natural resources according to the demands of the international trade market in the globalization era. As an archipelago, Indonesia's geographical state is one of the major concerns in the development of communications infrastructure therein.

In 1976, the Government of Indonesia tried to overcome the limitations of communication infrastructure in Indonesia by launching the Palapa A1 satellite communication system, followed by another generation of satellites. Over time, the Government of Indonesia started to develop a communication infrastructure through the planning of the National Broadband Plan. In 2014, Indonesia issued the Presidential Decree No. 96 of 2014 on the Indonesian Broadband Plan 2014-2019. Article 1 of the Presidential Decree No. 96 of 2014 explains that the broadband was defined as internet access with guaranteed perpetual connectivity, guaranteed information security and a triple-play capability with a minimum speed of 2Mbps for fixed access and 1Mbps for mobile access. Broadband was targeted to provide fixed access in urban areas for up to 71% of the households (20Mbps) and 30% of the population. Meanwhile, the target for rural areas was 49% of households (10Mbps) and 6% of the population, mobile access was 52% of the population (1Mbps).[2]

According to the Indonesian Telematics Society or *Masyarakat Telematika Indonesia* (Mastel) and the Indonesian Telecommunication Regulatory Board or *Badan Regulasi Telekomunikasi Indonesia* (BRTI), providing connectivity services in rural areas proved to be challenging for the telecommunications industry because the rural topography in Indonesia were very diverse —there were highlands, hills and mountains.[3] This type of topography must use the open Base Tranceiver Station (BTS) technology or High-Altitude Platform Station (HAPS) in order to reach the entire area.

Based on the International Telecommunications Union (ITU), HAPS operates at an altitude of 20-50 km from the surface of the Earth.[4] The main

[1] Neil Fantom and Umar Serajuddin, "The World Bank's Classification of Countries by Income," https://documents1.worldbank.org/curated/en/408581467988942234/pdf/WPS7528.pdf

[2] Presidential Regulation No. 96 of 2014 concerning Indonesia Broadband Plan 2014-2019, Annex, 96.

[3] Sigit Haryadi, "Ikhtisar Organisasi Regulasi Telekomunikasi," preprint (INA-Rxiv, February 28, 2018).

[4] Steve Chukwuebuka Arum, David Grace, and Paul Daniel Mitchell, "A Review of Wireless Communication Using High-Altitude Platforms for Extended Coverage and Capacity," *Computer Communications* 157 (2020): 232-56.

advantage of HAPS is the free placement, the low operating costs, the low spread delay, the wide angle, the wide range of activated elevations which can be used for broadband, broadcast, even in the event of a disaster.[5] However, HAPS has shortcomings in terms of vehicle monitoring, balloon technology, which still requires further development, as well as on-board stabilization of the antenna, which is not good yet. In addition, even though HAPS operates at an altitude of 20-50 km or below the outer space, its characteristic differ from aircraft. Therefore, it is necessary to examine the applicable law in the operation of HAPS.

Subsequently, the operation of HAPS might also potentially affect, among others, state sovereignty, flight traffic, and personal data protection. It needs to be highlighted HAPS operates at the strasopheric layer and a third party is involved in establishing its technology and operation, which is conducted within Indonesia's sovereign territory. The Project Loon test flight in India[6] raised significant concern on sovereignty issue, it might be a lesson learned for Indonesian government to ensure that the HAPS operation will not endanger Indonesian sovereignty.

Furthermore, the Indonesian government also must be ensured that HAPS operations do not interfere with other activities in the Indonesian airspace, such as flight traffic and it must also ensure that the HAPS operation does not interfere with the protection of personal data in Indonesia. Stipulating areas that are prohibited for HAPS could be a solution to ensure flight safety and privacy issue. China, French and US had enacted HAPS prohibited areas to address threats of privacy and flight safety concerns of HAPS.[7]

Certainly, a number of previous studies have been conducted on the subject of HAPS. Zhou (2020)[8] has discussed the development and regulatory aspects of HAPS in his writing. According to the results of his research, many private companies are currently developing HAPS technology in order to provide internet access to all regions, especially those that are not covered by terrestrial ground-based systems. In order to provide a legal framework for the operation of HAPS, the ITU has also issued HAPS-related regulations. To ensure legal certainty in the use of HAPS, however, there is still a need for implementing rules in each nation. In addition to Zhuo's research, Budiyanto, Jamil, and Rahayu (2019)[9] conducted a feasibility study of the Loon Project in Indonesia. They attempted to apply the SWOT analysis to the Loon project in Indonesia. In terms of regulation, the

[5] Gunes Karabulut Kurt et al, "A Vision and Framework for the High Altitude Platform Station (HAPS) Networks of the Future," *IEEE Communications Surveys & Tutorials* 23, no. 2 (2021): 729-79.

[6] Diah Yuniarti, "Regulatory Challenges of Broadband Communication Services from High Altitude Platforms (HAPs)," in *2018 International Conference on Information and Communications Technology (ICOIACT)* (2018 International Conference on Information and Communications Technology (ICOIACT), Yogyakarta: IEEE, 2018), 919-22.

[7] *Ibid*.

[8] Dong Zhou et al, "Overview of Development and Regulatory Aspects of High Altitude Platform System," *Intelligent and Converged Networks* 1, no. 1 (2020): 58-78.

[9] Setiyo Budiyanto, Muhammad Jamil, and Fajar Rahayu, "Feasibility Analysis of the Application of Project Loon as an Equitable Effort for Communication Infrastructure Development in Indonesia," *Jurnal Telekomunikasi dan Komputer* 9, no. 2 (2019): 61.

provisions for HAPS have been established based on the ITU's radio regulation, but there is concern about potential interference with neighboring countries if the project is implemented in Indonesia.

Furthermore, Damayanti and Supriadhie (2017),[10] Yuniarti (2018)[11] and John (2015)[12] conducted a legal study on HAPS. Both Damayanti and Supriadhie and Yuniarti explained that the operation of HAPS on the territory of the Republic of Indonesia must take security and national sovereignty into account. The foreign ownership of HAPS necessitates a thorough examination of licensing and supervision issues to prevent their misuse for harmful purposes and to protect Indonesia's security and sovereignty. Yuniarti also suggested to classify an unmanned free balloon based on High-Altitude Platform Station (HAPs) technology as a UAV (Unmanned Aerial Vehicle). HAPs should adhere to the regulations imposed on UAVs in many countries, which encompass aspects of privacy and safety. Specific considerations such as weight and altitude may be added. Additionally, the proposed law aims to enhance security provisions. John explains that flying dozens of HAPS in airspace over different sovereign nations or even US can raise many legal questions. While these vehicles providing Internet access do not revolve around the Earth like conventional satellites, they do operate at high altitudes in the sky. They emit radio waves, and when multiple vehicles are in operation, they may consume significant portions of the radio spectrum.[13] Additionally, certain HAPs may opt to use unregulated infrared light for communication, rather than relying on radio spectrum. Therefore, it is necessary for the US and other countries to establish or update their respective rules to properly govern these new internet-providing HAPS.

However, among all these studies, there has been no research focusing specifically on the legal obstacles and consequences of implementing HAPS in Indonesia. The author attempts to demonstrate that, if not properly prepared and operated, HAPS threatens not only the sovereignty and security of Indonesia, but also flight safety and personal data protection. In light of the paucity of prior research in this area, the author considers this to be the article's original contribution.

This study employs normative juridical research, in which law is conceptualized as what is written in laws and regulations (law in books) or law is conceptualized as rules or norms, which are standards for acceptable human behavior.[14] This research examines the implementation of the Indonesian legal framework pertaining to national security, flight safety, sovereignty, as well as data protection for HAPS procurement plan in Indonesia.

---

[10] Cholifah Damayanti and Anjar Supriadhie, "Legal Implication of Placing the Google Balloon in National Air Space," *Jurnal Dinamika Hukum* 16, no. 3 (2017): 325-31.

[11] Yuniarti, *loc.cit.*

[12] George V. John, "Welcome To The Space Jam: How United States Regulators Should Govern Google And Facebook New Internet Providing High Altitude Platforms," *American University Business Law Review* 4, no. 3 (2015): 471-503.

[13] *Ibid.*

[14] Agus Budianto, "Legal Research Methodology Reposition in Research on Social Science," *International Journal of Criminology and Sociology* 9 (2022): 1339-46.

2. RESULT AND ANALYSIS

2.1. High Altitude Platform Station (HAPS)

2.1.1. The Characteristics of HAPS

Many developing countries struggle with managing its telecommunication infrastructures especially in rural areas, which later affect the economy and social developments.[15] Until the present time, terrestrial ground-based systems and satellite systems are still the most reliable and well-established mobile communications services. They tend to be low-cost, have short propagation delays, and provide good scalability of system capacity.[16] However, due to their vast distance from the Earth, the low level of penetration of satellite-based communication is seen as a disadvantage.[17] Therefore, people are looking for innovative ways to develop a more modern and sufficient telecommunication infrastructure that could permeate rural areas, i.e., via HAPS.[18]

Since the 1960s, the US had been exploring the idea of having a low-cost alternative satellite.[19] A concept for developing a stratospheric platform was discovered, however it was difficult to realise since airborne platforms were considered flimsy against the wind. Fortunately, several years later along with the advancement in technology, the realisation of HAPS seemed to become more achievable.[20]

The term HAPS was first established in the World Radio Communication Conference 1997 (WRC-97) that was organized by the ITU which defined HAPS as 'an aircraft positioned above 20-50 km altitude, in the stratosphere at a specified, nominal, fixed point relative to the Earth, in order to compose a telecommunication network or perform remote sensing for both civilian or military applications.'[21] In other words, HAPS is a technology located on the stratospheric area with a specified, nominal, fixed point relative to the Earth with a specific radio spectrum allocations based on the latest ITU WRC-19 in 2019 as listed on the table below.

---

[15] Eddy Setiawan, "The Potential Use of High Altitude Platform Station in Rural Telecommunication Infrastructure," *Indonesia-ITU Concern Forum (IICF)* (2018): 35-37.

[16] Anggoro K. Widiawan and Rahim Tafazolli, "High Altitude Platform Station (HAPS): A Review of New Infrastructure Development for Future Wireless Communication," *Wireless Personal Communications* 42, (2007): 387.

[17] Yaries Mahardika Putro and Ridha Aditya Nugraha, "Space Economy is the Future, But How to Realize It?," https://www.thejakartapost.com/opinion/2023/03/16/space-economy-is-the-future-but-can-indonesia-realize-it.html

[18] Abbas Mohammed et al, "The Role of High Altitude Platforms (HAPs) in the Global Wireless Connectivity," *Proceedings of the IEEE* 99, no. 11 (2011): 1945.

[19] Kunsel Izet-Unsalan and Deniz Unsalan, "A Low Cost Alternative for Satellites-Tethered Ultra-High Altitude Balloons," in *Proceedings of 5th International Conference on Recent Advances in Space Technologies - RAST2011* (2011 5th International Conference on Recent Advances in Space Technologies (RAST), Istanbul, Turkey: IEEE, 2011), 13-16.

[20] Anthony Euler, Surjit Badesha, and Larry Schroeder, "Very High Altitude Tethered Balloon Feasibility Study," in *11th Lighter-than-Air Systems Technology Conference* (11th Lighter-than-Air Systems Technology Conference, Clearwater Beach,FL,U.S.A.: American Institute of Aeronautics and Astronautics, 1995).

[21] Radio Regulation (RR) 1.66 A ITU (ITU, 2012), *High Altitude Platforms* (HAPs).

Table 1. HAPS Spectrum Allocation WRC-19

Frequency Band	Bandwith	Coverage
2 GHz	145MHz-170MHz (x2)	R1,[22] R2,[23] R3[24]
6 GHz	80 MHz (x2)	R1, R3
21.4-22 GHz	600 MHz	R2
24.25-27.5 GHz	3250 MHz	R2
27.9-28.2 GHz	300 MHz (x2)	R1, R3
31 GHz	300 MHz	R2
39-39.5 GHz	1500 MHz	Worldwide
47/48 GHz	300 MHz	Worldwide

Source: Widiawan and Tafazolli, 2007.[25]

HAPS utilization is in accordance with radio-frequency spectrum regulation governed by ITU-Radiocommunication. As seen in Table 1, each frequency is able to cover a broad area. Ergo, a single HAPS implementation could replace a large number of terrestrial base station.[26] Although the current satellite technology is also a well established communication infrastructure, HAPS has a feature that neither terrestrial ground based system nor satellite system has, which is its free space like path loss characteristic.[27] Meaning, a 22-km-above-the-ground-HAPS has a path loss comparable to a terrestrial ground-based cell in 2 km radius.[28]

A HAPS communication system consists of the air vehicle or the platform and the onboard communications payload which are completed by phased array antennas, transmit antennas, and a large processor that handles receiving, multiplexing, switching, and transmitting functions.[29] The key to the high performance of HAPS lies in the antenna subsystem. It will later channel cells from HAPS onto the ground in a cellular pattern which makes the communication system sensitive to interference. To avoid such matter, it is necessary to utilize high performance antennas and implement the assigned radio frequency by ITU-R. However, these are still merely conceptual. Further development and trials are required to receive the best outcome.

Moreover, HAPS itself has different utilization depending on the circumstances of how it is being used. There are three different HAPS configurations, from the simplest; that is Standalone HAPS Network; a far more advanced one - Integrated Terrestrial HAPS Satellite Heterogeneous

[22] ITU Region 1 which includes Europe and Africa.

[23] ITU Region 2 which includes Americas, Indonesia, Pakistan, Japan, Vietnam, Iran, Thailand, Burman, North Korea, Sri Lanka, Mongolia, Bhutan, Maldives, Russia, Phillipines, South Korea, Uzbekistan, Malaysia, Kazakhstan, Kyrgyztan, and Lesotho.

[24] ITU Region 3 which includes Asia-Pacific and Australia.

[25] Widiawan and Tafazolli, *loc.cit.*

[26] *Ibid.*

[27] *Ibid.*, 389.

[28] *Ibid.*

[29] Kurt et al, *op.cit.,* 732.

Networks; and the most complicated one - the Constellation of Multiple Interconnected HAPS. The standalone HAPS network is by far the simplest and most commonly used HAPS configuration.[30]

The main advantage of this HAPS configuration is the convenience that it provides for network providers, whereby users of the network are directly connected to the HAPS itself, therefore it is mainly used during disaster relief missions that are caused by natural disasters. The Integrated Terrestrial HAPS Heterogeneous Network on the other hand is a mixed HAPS system that works uniquely within the HAPS itself, the satellite and a terrestrial system. This way, there will be a link between and throughout the three main components of this system. With its unique operating characteristics, this system will be able to serve the purpose of providing adequate high-speed network services in an area whereby radio transmissions are obstructed due to the presence of a physical object like tall skyscrapers or even mountains and valleys. Lastly, the Constellation of Multiple Interconnected HAPS system is designed to make it visible that several HAPS are covering a common regional area, in which these HAPS may or may not overlap one another.

Currently, there are several developments of the HAPS platform happening all throughout the world such as Airbus-zephyr, Nasa-Barrel, Titan Aerospace, Facebook-Aquila, and one of the most well known HAPS projects - the Google-Project Loon (Loon). The Loon project has been conducted in several countries including Indonesia. Google's mission was to deliver internet to rural areas through stratospheric balloon platform. The trial was conducted in 2013 for a one year collaboration with three largest telecommunications operators in Indonesia, namely Telkomsel, XL Axiata, and Indosat Ooredoo.[31] Unfortunately, Loon is yet to be implemented since it is considered as a new technology. Thorough study from various aspects needs to be conducted for it to be able to fly in Indonesian airspace.

2.2. HAPS and Conventional Satellite (Terrestrial or Satellite)

ITU's definition of HAPS clearly differentiates HAPS from any other terrestrial ground and satellite systems. Apart from being located in the stratospheric area, it also has other characteristics as shown in the table below.

[30] Zhou et al, *op.cit.,* 59.

[30] *Ibid.*

[31] Diah Yuniarti and Hilarion Hamjen, "Status dan Perkembangan Proyek Loon Terkini," *Buletin Pos dan Telekomunikasi* 15, no. 1 (2017): 15.

Table 2. Comparing HAPS to Terrestrial and Satellite

Subject	HAPS	Terrestrial	Satellite
Cell radius	3-7 km	0.1-2 km	50 km
Base Station (BS) Coverage area radius	30 km	5 km	A few hundred km
Elevation angles	High	Low	High
Propagation delay	Low	Low	Noticeable
BS power supply	Solar	Electricity	Solar
BS maintenance	Less complex in terms of coverage area	Complex	Impossible
BS cost	Economical	Medium (considering BS)	High
Operational cost	Medium (airship maintenance)	Medium (considering BS)	High
Deployment complexity	Low	Medium	High

Source: Gultom and Yuniarti, 2016.

In a matter of hours, HAPs can be quickly deployed into the sky and begin their missions. When applied to a scenario involving a disaster or an emergency, this clearly constitutes an advantage. The capacity for growth of the system is an important factor. Terrestrial networks call for the installation of a significant quantity of hardware in order to provide the desired level of coverage. The establishment of a network for mobile telephones can take several years. Satellite-based networks are limited by their existing capacity because the cost of adding more capacity and the availability of new satellites and launch systems to place them in orbit are both limiting factors. Theoretically, it is possible to achieve rapid deployment of HAP networks as well as capacity expansion.[32]

The extent of the network's geographic coverage is determined by a number of factors, including terrain, antenna height, and power. Because of antenna height, signal attenuation, and terrestrial networks can only cover a radius of a few kilometers around each base station. Satellite networks have the potential to reach every part of the Earth; however, this will require a constellation of satellites.[33] Twenty to forty satellites orbiting the Earth at an altitude of 500-1.500 km each make up a constellation known as Low Earth Orbit (LEO). A network in Medium Earth Orbit (MEO) typically consists of 8 to 20 satellites and is located at an altitude of 5,000-12,000 km. While a single Geostationary Satellite (GEO) can cover 34% of the

[32] Eric C. Cook, "Broad Area Wireless Networking via High Altitude Platforms," (Master's Thesis, Naval Postgraduate School, 2013), 45.

[33] Alejandro Aragon-Zavala et al. *High-Altitude Platforms for Wireless Communications* (Canada: John Wiley & Sons, 2018), 115.

Earth's surface from its position at an altitude of approximately 36.000 km.[34]

2.3. HAPS Utilizations

Several countries have been developing HAPS into a reliable technology. For instance, the US created SkyStation, High Altitude Long Operations (HALO), SkyTower, and Stratellite. In Asia-Pacific, Japan came up with SkyNet. Furthermore, South Korea, through its Korea Aerospace Research Institute (KARI), is currently working on a stratospheric airship. In this section, the author examines the development of HAPS utilizations in several countries, including the US, Japan and South Korea.

a. The US

In 1978, the US Navy proposed for an airship with the following characteristics: solar powered, fuel cell for energy storage, and supported by propeller.[35] These requests are similar with what HAPS are now. A few years later, another HAPS related project, HI-SPOT programme, was initiated but it was ineffective due to its need to be frequently refuelled and returned to the ground.[36] Thus, it remained a mere theory. Around 20 years later, a group of physicists formed Sky Station Inc. and managed to create various revolutionary HAPS projects.[37]

The US started with Sky Station as their first HAPS which is able to provide internet for approximately 37 km from the platform to Urban Area Coverage (UAC) and 78 km from UAC to Suburban Area Coverage (SAC).[38] Then HALO appeared with a more developed technology. It has the coverage area of 4.800 km^2.[39] Compared to Sky Station, HALO shows a significant improvement in technology. It seems more likely for HAPS to be utilized in the near future.

Later on, a more efficient technology has emerged, known as Helios. It is a solar-powered airship that can float for up to six months or more in the stratosphere. [40] Through this HAPS, fixed wireless broadband total throughput is projected for around 5-15 Gbps per platform with user speeds

[34] Yaries Putro, Ridha Nugraha, and Taufik Nugraha, "Geostationary Orbit Slot Reconceptualization In Accommodating the South," *Indonesian Journal of International Law* 19, no. 3 (2022): 373-98.

[35] Yuanming Xu et al, "Improvement of Endurance Performance for High-Altitude Solar-Powered Airships: A Review," *Acta Astronautica* 167 (2020): 245-59.

[36] W.L. Marcy and R.O. Hookway, "Propulsion Options for the HI Spot Long Endurance Drone Airship," Final Report (Philadelphia: Naval Air Development Center, September 15, 1979). p.6.

[37] Yee-Chun Lee and Huanchun Ye, "Sky Station Stratospheric Telecommunications System, a High Speed Low Latency Switched Wireless Network," in *17th AIAA International Communications Satellite Systems Conference and Exhibit* (17th AIAA International Communications Satellite Systems Conference and Exhibit, Yokohama, Japan: American Institute of Aeronautics and Astronautics, 1998), 25-32.

[38] Widiawan and Tafazolli, *op. cit.*, 387.

[39] *Ibid.*, 401.

[40] Xiongfeng Zhu, Zheng Guo, and Zhongxi Hou, "Solar-Powered Airplanes: A Historical Perspective and Future Challenges," *Progress in Aerospace Sciences* 71 (2014): 36-53.

exceeding 50 Mbps. Sky Tower made partnership with Japan company and successfully provided HDTV service with less power than a 3G videophone.[41]

Aside from Sky Station Inc., Sans wire Networks, LCC USA attempted to develop a HAPS called Stratellite.[42] The system covers approximately 21 km^2 of area and support 3G/4G mobile communications, fixed wireless communications, HDTV, etc. Moreover, another US company, Space Data Corp. came up with weather balloon-based HAPS to connect rural areas with telecommunications services. In the present time, the system provides 24/7 two-way data communications in Texas, Oklahoma, Louisiana, New Mexico, Arkansas, and the Gulf of Mexico.[43]

b. Japan

The Science and Technology Agency (STA) under the Japanese Ministry of Posts and Telecommunications (MPT) led a national project to develop a balloon-based stratospheric platform (SPF). Its objective is to provide communications, broadcasting, and environmental observation. Each SPF is able to cover an area up to 100 km. The users, whether located in the metropolitan area, suburb, or rural area, has the opportunity to receive up to 100 Mbps data rate in the downlink and a maximum 6 Mbps in the uplink.[44]

c. South Korea

Starting on December 2000, KARI has started a 10-year program to develop a stratospheric airship for telecommunication relays and ground observation. [45] This project is supported by the Korean Ministry of Commeerce, Industry and Energy (MOCIE). In October 2003, the Via 50 flew for the first time. Although there were some minor problems along the way, an improvement was found in its autopilot capabilities.[46] Thus, it shows a promising future of HAPS technology development for South Korea.

2.4. Recent Developments of Legal Framework on HAPS

HAPS technology improvements, as explained in section 2.2. are seen to be promising to be used in the future and could be the answer for states with remote locations, which currently do not have a capable enough telecommunication infrastructure. Certainly, the usage of HAPS needs to be accompanied with governing laws. However, there are dilemmas when talking about governing HAPS, due to the fact that HAPS is an airship and is able to fly, but it does not move anywhere. It is located neither on the airspace nor it is in the outer space, but the stratosphere. There is no established international legal principle that specifically determines the

[41] *Ibid.*

[42] Widiawan and Tafazolli, *op. cit.*, 387.

[43] *Ibid.*

[44] Y. Hase, R. Miura and S. Ohmori, "A Novel Broadband All-Wireless Access Using Stratospheric Platforms", *Proceeding of VTC,* (1998): 1191.

[45] Yung Gyo Lee, Dong-Min Kim, and Chan-Hong Yeom, "Development of Korean High Altitude Platform Systems," *International Journal of Wireless Information Networks* 13, no. 1 (2006): 33.

[46] *Ibid.*

boundary between airspace and outer space.[47] However, certain individuals propose using the von Karman Line, which is located around 100 km above the Earth's surface, as a reference point to distinguish between airspace and outer space.[48] Meanwhile, the existence of HAPS challenges lawmakers to resolve the grey area to ensure HAPS legal certainty.

Both air law and space law will determine how states deal with issues related to HAPS, such as its safety, security, and liability challenges. Article 1 of the Convention on Civil Aviation of 1944 (widely known as the Chicago Convention) recognizes the complete and exclusive sovereignty of each state over the airspace above its territory.[49]

Even though international space law did not recognize state covereignty, it is far more stringent than international air law, since space activities are riskier.[50] Considering the absence of jurisdiction in outer space, space law relies on states to be responsible and liable for any damage done by a space object on the Earth's surface or to an aircraft in flight.[51] Thus, the countermeasures related to HAPS depended on which law is suitable.

HAPS is a station that floats in a fixated point above the Earth. Despite its ability to float in the sky, HAPS does not exactly conform with the definition of aircraft stated in the Annecx 7 of the Chicago Convention, which is defined as "any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the Earth's surface."[52] Under this definition, HAPS is only considered as an aircraft during its descent phase but not on the ascent phase of its flight. Its static motion and placement at only a certain ordinate are exceptions of HAPS as an aircraft.[53] Thus, it could not be subject to the Chicago Convention. It is also inadequate for HAPS to be subject to the international regulations governing outer space activities done by government or non-government entities also known as the Outer Space Treaty of 1967 since HAPS is only located in the stratospheric area.

Evidently, it is not enough to determine which law is applicable to HAPS by mere definition due to its mixed nature. The current technology allows the Concorde (the highest-flying commercial aircraft) to fly at 18 km

[47] Zhu, Guo, and Hou, *op.cit.*

[48] Dean N Reinhardt, "The Vertical Limit of State Sovereignty," *Journal of Air Law and Commerce* 72, no. 1 (2007): 65-137.

[49] Peter Haanappel. "Aerial Sovereignty: From Paris 1919, Through Chicago 1944, to Today", in *Behind and Beyond the Chicago Convention The Evolution Aerial Sovereignty,* Ed. Pablo Mendes de Leon and Niall Buissing (Netherland: Kluwer Law International, 2019), 25.

[50] *Ibid.*, 3.

[51] Article 7 of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies. 18 U.S.T. 2410 610 U.N.T.S. 205, 61 I.L.M. 386 (1967) states:

"*Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the Moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space, including the Moon and other celestial bodies.*"

[52] Chicago Convention, Annex 7.

[53] Damanyati and Supriadhie, *op.cit.* 327.

altitude. In the near future, it is not impossible for aircraft to have higher cruising altitudes and operate in the stratospheric area considering the rapid development of technology. Thus, the boundary of airspace will remain higher and air law will still prevail parallel to the increasing limit.[54]

On that matter, the air law should be considered as the underlying provision for HAPS, also considering the fact that its altitude is closer to the Earth and not in-orbit but equipped with adjustments regarding space safety especially its components along with some specific systems such as environmental control, controllability, and manoeuvrability. [55] Besides, designating HAPS as an unmanned aircraft allows the government to reduce regulatory uncertainty through in-air authority.[56] When HAPS malfunctions and causes accidents, countries have the right to monitor all activities carried out in spaces above their territory so that they do not pose a threat to the security of their country. [57] However, not many countries have regulated HAPS specifically into their national legislation.

The US regulates aviation law through the Federal Aviation Administration Act of 1958. Within the regulation, an aircraft is defined as a device that is used or intended to be used for flight in the air.[58] The National Aeronautics and Space Act regards a space object as 'aeronautical and space vehicles' which is defined as aircraft, missiles, satellites, and other space vehicles, manned and unmanned, together with related equipment, devices, components, and parts.[59]

Japan's regulation on aviation law can be found in the Civil Aeronautics Act in which an aircraft is described as any aeroplane, rotorcraft, glider and airship which can be used for air navigation with a person on board and any other apparatus used for air navigation as may be specified by Cabinet Order.[60] The definition of aircraft in the South Korean Aviation Act is airplanes, airships, gliders, rotorcraft, and other apparatus to be used for aviation, prescribed by Presidential Decree.[61] Under the Space Development Promotion Act, a space object means an object designed and manufactured for use in outer space, including space launch vehicles, artificial satellites, spaceships, and parts thereof.[62]

---

[54] Reinhardt, *op.cit,* 67.

[55] Annelie Schoenmaker, "Certification and Safety Aspects Relating to the Transport of Passengers on High Altitude Balloons in Europe," *Acta Astronautica* 100 (2014): 4.

[56] John, *op.cit.*, 480.

[57] Ruman Sudradjat, "Ruang Angkasa dan Pengaturan Hukumnya," *Warta Lapan,* no. 3 (1984): 56.

[58] Title 14: Aeronautics and Space Chapter 1 Subchapter A Part 1, para1.

"*Aircraft* means a device that is used or intended to be used for flight in the air.

[59] U.S. Code on National Aeronautics and Space Act 20103, Art.1 51 - Definitions.

[60] Transport and Tourism, Ministry of Land, Infrastructure, "Civil Aeronautics Act - English - Japanese Law Translation," Civil Aeronautics Act, https://www.japaneselawtranslation.go.jp/en/laws/view/4039/en

[61] Anggoro K. Widiawan and Rahim Tafazolli, "High Altitude Platform Station (HAPS): A Review of New Infrastructure Development for Future Wireless Communications," *Wireless Personal Communications* 42, no. 3 (2007): 387-404.

[62] *Ibid.*

It can be concluded that HAPS does not fit in any definition, therefore those regulations do not apply for HAPS, except for the US definition as it includes manned and unmanned, aircraft or satellite so it could be included under such US definition. HAPS is still under development thus there is no urgency to do any changes until the US-China balloon incident in early 2023.[63] However, regulatory preparation for HAPS is imperative so when it is ready, the regulations do not fall behind, keeping in mind how fast technology advances these days.

2.5. The Legal Issues Pertaining to Implementation of HAPS in Indonesia

The provisions related to HAPS in Indonesia, indeed, should be able to accommodate the nature of HAPS itself. On one hand, HAPS operated as floating airplanes for a limited period of time while simultaneously have satellite-like capabilities.[64] It is therefore necessary for Indonesia to take a sensible approach to determine the applicable regime of law for HAPS. Without thorough monitoring, national security could be threatened through HAPS hijacking, or harmful interference through radio frequency.

HAPS' ability to provide internet for people in rural and remote areas suggests the involvement of the radio spectrum in its operation. Aside from assigning a specific frequency to HAPS in accordance with ITU Radio Regulation, the Indonesian government should also be aware of the security threat emanated from HAPS utilization. Moreover, liability issues concerning accidents caused by HAPS should also be taken into account. Ergo, the safety, security, and liability issues on HAPS will be discussed.

1 . Safety Issue

Loon's project in Indonesia is cancelled due to several considerations, such as the national security and aviation safety that still requires further research.[65] Furthermore, the Loon trajectory could potentially be a threat to the Indonesian sovereignty. [66] It should be highlighted that the establishment of HAPS technology in Indonesia has the aim of ensuring telecommunication systems penetration into rural areas while still upholding sovereignty in national airspace.[67]

The elucidation of Indonesian Space Act of 2013 mentiones that outer space starts from 100-110 km above the Earth's surface.[68] Hence it is safe to postulate that the presence of HAPS in the stratosphere will intersect with sovereignty. Furthermore, when specifically discussing Google Loon,

[63] Ridha Aditya Nugraha and Taufik Rachmat Nugraha, "Chinese Balloon Row: Time to Determine Vertical Delimitation in ASEAN," *The Jakarta Post*, https://www.thejakartapost.com/opinion/2023/02/14/chinese-balloon-row-time-to-determine-vertical-delimitation-in-asean.html

[64] John, *op. cit.*, 478.

[65] Budiyanto, Jamil, and Rahayu, *loc.cit.*

[66] Ridha Aditya Nugraha, Konrardus Elias Liat Tedemaking, and Vicia Sacharissa, "Penguatan Kedaulatan Negara di Udara dan Urgensi Sinkronisasi Hukum," *Kertha Patrika* 43, no. 1 (2021): 65.

[67] Budiyanto, Jamil, and Rahayu, *loc.cit.*

[68] Mardianis. *Hukum Antariksa* (Jakarta: Rajawali Pers, 2016), 15.

Indonesia regulates it under the Ministry of Transportation Regulation Civil Aviation Safety Regulation No. 9 of 2009 section 101 on Moored Hot Air Balloons, Kites, Unmanned Rockets, and Unmanned Free Balloons, sub part D-Unmanned Free Balloons. The classification of Loon as part of Unmanned Free Balloon was ordered by the Secretary General of the International Civil Aviation Organization (ICAO) through a warrant.[69]

On the other hand, by taking into account its working principle, the Loon can also be classified as an unmanned aircraft. This is because in the early Unmanned Aircraft Systems (UAS) standards, Unmanned Free Balloons were excluded from the uncontrollable aircraft based on actual time category. Although, in reality, Loon can be controlled through the ground handle. The Federal Aviation Administration (FAA) is of the opinion that unmanned aircraft are operated without the possibility of direct human intervention either on board or from the outside. In other words, Loons can be classified as an unmanned aircraft. Therefore, if Loon is regulated under the Annex of Ministry of Transportation Regulation No. 180 of 2015, Unmanned Aircraft, such as Loons itself, may not be operated in the airspace at an altitude of more than 150 m above the surface. The vague classification of Loons resulted in the failure of the implementation of the technology. Even though HAPS operates above 20 up to 50 km above sea level, where commercial aircraft can only fly up to 18 im, it is important to remember that MiG-25 and MiG-29 aircraft can fly up to 23 km above sea level.[70] Considering that aviation technology has reached the stratosphere, the operation of HAPS at certain altitudes poses a threat to flight safety.[71] The operation of HAPS requires coordination with air navigation service providers to ensure flight safety and operation. This coordination is not only with civil air navigation service providers, but also with the military.

The Indonesian Air Force must also be involved in the process of exploring cooperation in the operation of HAPS in Indonesia, bearing in mind that HAPS utilization in Indonesian airspace will have significant implications on sovereignty. It is in line with the duty if the Indonesian Air Force which mandated in Article 10 of Law No. 34 of 2004 concerning Indonesian National Army. Despite the fact that the operation of HAPS in Indonesia is carried out based on an agreement between the two parties, it is undeniable that the potential for HAPS to be misused for other purposes is significant.

1. Security Issue

Personal data breach has been a great issue in the cyber world for a long time. Recent cyber attacks against Tokopedia have exposed millions of

[69] International Civil Aviation Organization, "Regulation of Unmanned Free Balloons" (International Civil Aviation Organization, August 4, 2017), 3.

[70] Atilla Horvath, "Possible Applications of High Altitude Platform Systems for the Security of South America and South Europe," *Academic and Applied Research in Military and Public Management Science* 20, (2021): 88.

[71] Ridha Aditya Nugraha, "Improving Aviation Safety in Indonesia: How Many More Accidents?," *Hasanuddin Law Review* 2, no. 3 (2016): 328.

its user personal data.[72] The same thing can happen to the broadband communication utilized from HAPS. These communications could be carrying sensitive information, such as bank details, passwords, or important documents. If such information is acquired by an unauthorized third party, obviously there will be legal consequences.[73] That is why HAPS needs to be equipped with a proper and adequate information security system before it is to be used commercially.

ITU has made a recommendation which can be followed and should be considered for establishing an information security system based on Recommendation ITU-T X.1056 (01/2009). Meanwhile, the Indonesian Government has enacted Law No. 27 of 2022 concerning Personal Data Protection that covers numerous scope, including the obligation of data controller. Based on the regulation, data controller is required to record their activities, but the provision stops there and it does not specify whether the report must be admissible or not.[74] This might be a problem if a data breach case is brought to court and the evidence is inadmissible. The controllers are obligated to inform data owners of how their personal data will be processed and the purpose of processing in order to get their written consent.[75]

The controller would have to refer to Regulation of Minister of Communications and Informatics of the Republic of Indonesia No. 4 of 2016 on Information Security System Management which is the Indonesian regulation for information security system management. An electronic system is divided into three levels:[76] strategic level for national interest, upper level for regional interest, and lower level for anything else not included in the first two levels according to the regulation.[77] HAPS is likely to fall either in strategic level or the upper level. Information security systems at strategic level or upper level must be built based on SNI ISO/IEC 27001 for standard reference.[78] ISO/IEC 27001 is the internationally recognized standard for information security. Strategic or upper information security systems must have an Information Security System Certification issued by an official certification institution.[79] In order to gain such certification, the institution will send a team to perform an audit.[80] If the system fulfils the standards specified in SNI ISO/IEC 27001, the security

[72] Ridha Aditya Nugraha and Eisya A. Eloksari, "Tokopedia Data Breach Exposes Vulnerability of Personal Data," https://www.thejakartapost.com/news/2020/05/04/tokopedia-data-breach-exposes-vulnerability-of-personal-data.html

[73] Sudradjat, *loc.cit.*

[74] Law No. 27 of 2022 concerning Personal Data Protection, Art. 31.

[75] *Ibid*, Art. 24.

[76] Anindhita Firdani, "Perencanaan Pengelolaan Keamanan Informasi Berbasis ISO 27001 menggunakan Indeks KAMI Studi Kasus: Dinas Komunikasi dan Informatika Kabupaten Rembang," *Jurnal Pengembangan Teknologi Informasi dan Ilmu Komputer* 3, no. 6 (2019): 6009-15.

[77] Regulation of Minister of Communications and Informatics No. 4 of 2016 on Information Security System Management, Art. 4.

[78] *Ibid.*, Art 7.

[79] *Ibid.*, Art. 10.

[80] *Ibid.*, Art. 17 (1).

system operator will receive their certification.[81] This is followed up by a yearly surveillance audit for certified operators.[82]

Indonesia has the basic legal foundation for data protection and information security. Following some of the suggestions made by ITU and choosing ISO/IEC 27001 as the standard reference for information security will greatly contribute towards HAPS security, however there are a few aspects that need redefining such as the admissibility of report in court.

2. Liability Issue

If an aircraft causes any damage to any third party, the airline is held liable. If a space object causes any damage to any third party, the launching state is also held responsible.[83] This is the current rule of liability according to air law and space law respectively. HAPS has been described as a craft that can fly at an altitude of 20-50 km, which is well above the highest-flying plane at 18 km but relatively low for a space object to fly in.[84] HAPS technology is more similar to space engineering and the environment in which it operates is considered to be more space-like.[85] The questions arising are where does HAPS fit in between those two different law regimes; and thus which law regime shall apply.

There are two approaches to determine which law regime applies to HAPS. The functionalist approach determines which regime is applicable based on the object, purpose, design, and collision risk. Functionalism would mean that air law applies to HAPS during Earth-to-Earth flight and space law applies during Earth-to-space flight. But what if the HAPS is a combination of aircraft and space engineering which is also known as an aerospace vehicle.[86] Consequently, the problem is uncertainty because two law regimes alternating depending on four factors is confusing and determining it in a real-time situation would be troublesome.

Spatialism determines the law regime according to the object's location.[87] The delimitation between airspace and outer space has not been defined until now. Experts have been trying to solve this through numerous theories, and two theories stand out among the rest. The Karman Line Theory sets the line at 100 km above the Earth's surface where both aircraft and space objects cannot operate, meanwhile the Aerodynamics-lift Theory separates air space and outer space at 83 km, or roughly between 80-90 km above the Earth's surface because this is where aircraft can no longer function properly.[88] Either way, HAPS would fall under air law because typically it flies at 20-50 km in altitude. However, the implementation of

[81] *Ibid.*, Art 17 (4).
[82] *Ibid.*, Art 19.
[83] Annelie Schoenmaker, *loc.cit.*
[84] *Ibid.*, 2.
[85] Abbas Mohammed et al, "The Role of High-Altitude Platforms (HAPs) in the Global Wireless Connectivity," *Proceedings of the IEEE* 99, no. 11 (2011): 1939-53.
[86] Paul Stephen Dempsey and Maria Manoli, "Suborbital Flights and the Delimitation of Air Space vis-à-vis Outer Space: Functionalism, Spatialism and State Sovereignty," *Annals of Air and Space Law* XLII (2017): 16-19.
[87] *Ibid.*, 20.
[88] *Ibid.*, 17, 21.

spatialism will continuously be problematic as long as the line of delimitation is not established.

In regards to the provision of delimitation in Indonesian legal framework, as stated in the explanation of Indonesian Space Act of 2013, the outer space starts from 100-110 km abovep sea level.[89] However, until today the Indonesian government is unable to explicitly determine the national airspace vertical limit on relevant regulation or statutory. It can be seen from both regulations in Indonesia that intersect with the provision on sovereignty, such as Law No. 43 of 2008 concerning State Territory and Government Regulation No. 4 of 2018 concerning Air Security of the Republic of Indonesia.[90] Both regulations are kept silent in determining the vertical limit of national airspace. The regulation only mentions that the ends of national air space be appointed based on the development of international law.[91]

The more sensible approach would probably be the spatialist approach which would mean that HAPS is regulated under air law. If so, the burden of liability for HAPS works the same way as if it was an aircraft. The HAPS operator (either state-owned or private company) will be liable for any damage caused by it regardless of where it happens. Yet, in order for this concept to work, some changes must be made to the current regulations. First, the definition of aircraft in Annex 7 of the Chicago Convention of 1944 must be redefined to include aerospace vehicles. Second, ICAO has to readjust safety and navigation regulations to accommodate aerospace vehicles. Third, experts must decide where the line of delimitation of airspace and outer space lies.

3. CONCLUSION

HAPS is the right technology for the development of the Indonesian National Broadband Plan since it is able to cover the rural areas in the archipelago. As HAPS is located at an altitude of 20-50 km from the Earth's surface, as well as the infrastructure shall change the terrestrial or satellite communication system to some extent, it is necessary to regulate HAPS with reference to aviation safety, security, and liability issues. Definitely HAPS operations should not interfere airways. Furthermore, personal data (including sensitive images) within HAPS should be well protected. Lastly, the liability aspect to aircraft in flight as well as third party must not be left behind.

BIBLIOGRAPHY

Book

Aragon-Zavala, Alejandro et al. *High-Altitude Platforms for Wireless Communications.* Canada: John Wiley & Sons, 2018.

[89] Ridha Aditya Nugraha and Kartika Paramita, "Mempererat Regional ASEAN Melalui Tatanan Hukum Keantariksaan: Peluang dan Tantangan bagi Indonesia," *Jurnal Hukum & Pembangunan* 49, no. 3 (2019): 639.

[90] Government Regulation No. 4 of 2018 concerning Air Security of the Republic of Indonesia., Art. 3.

[91] Law No.43 of 2008 concerning State Territory, Art. 6.

Haanappel, Peter. *Aerial Sovereignty: From Paris 1919, Through Chicago 1944, to Today, in Behind and Beyond the Chicago Convention The Evolution Aerial Sovereignty, Ed. Pablo Mendes de Leon and Niall Buissing*. Netherland: Kluwer Law International, 2019.

Mardianis. *Hukum Antariksa.* Jakarta: Rajawali Pers, 2016.

Journal Articles

Arum, Steve Chukwuebuka, David Grace, and Paul Daniel Mitchell. "A Review of Wireless Communication Using High-Altitude Platforms for Extended Coverage and Capacity." *Computer Communications* 157 (2020): 232-56. https://doi.org/10.1016/j.comcom.2020.04.020

Budiyanto, Setiyo, Muhammad Jamil, and Fajar Rahayu. "Feasibility Analysis of the Application of Project Loon as an Equitable Effort for Communication Infrastructure Development in Indonesia." *Jurnal Telekomunikasi dan Komputer* 9, no. 2 (2019): 61-76. https://doi.org/10.22441/incomtech.v9i2.6469

Damanyati, Cholifah and Anjar Supriadhie. "Legal Implication of Placing The Google Balloon in National Air Space." *Jurnal Dinamika Hukum* 16, no. 3 (2016): 325-331. http://dx.doi.org/10.20884/1.jdh.2016.16.3.616

Dempsey, Paul Stephen and Maria Manoli. "Suborbital Flights and the Delimitation of Air Space vis-à-vis Outer Space: Functionalism, Spatialism and State Sovereignty." *Annals of Air and Space Law* XLII (2017): 197-238.

Hase, Y. R. Miura, and S. Ohmori. "A Novel Broadband All-Wireless Access Using Stratospheric Platforms." *Proceeding of VTC,* (1998): 1191-1194. https://doi.org/10.2514/6.1998-1397

Horvath, Atilla. "Possible Applications of High Altitude Platform Systems for the Security of South America and South Europe." *Academic and Applied Research in Military and Public Management Science* 20, (2021): 79-94. https://doi.org/10.32565/aarms.2021.2.ksz.6

Izet-Unsalan, Kunsel, and Deniz Unsalan. "A Low Cost Alternative for Satellites- Tethered Ultra-High Altitude Balloons." In *Proceedings of 5th International Conference on Recent Advances in Space Technologies - RAST2011*, 13–16. Istanbul, Turkey: IEEE, 2011. https://doi.org/10.1109/RAST.2011.5966806

John, George V. "Welcome To The Space Jam: How US Regulators Should Govern Google and Facebook's New Internet Providing High Altitude Platforms." *American University Business Law Review* 4, no. 3 (2015): 471-503.

Kurt, Gunes Karabulut et al. "A Vision and Framework for the High Altitude Platform Station (HAPS) Networks of the Future." *IEEE Communications Surveys & Tutorials* 23, no. 2 (2021): 729-79. https://doi.org/10.1109/COMST.2021.3066905

Lee, Yung Gyo, Dong-Min Kim, and Chan-Hong Yeom. "Development of Korean High Altitude Platform Systems." *International Journal of Wireless Information Networks* 13, no. 1 (2006): 31-42. https://doi.org/10.1007/s10776-005-0018-6

Lee, Yee-Chun, and Huanchun Ye. "Sky Station Stratospheric Telecommunications System, a High Speed Low Latency Switched Wireless Network." In *17th AIAA International Communications Satellite Systems Conference and Exhibit*. Yokohama,Japan: American Institute of Aeronautics and Astronautics, (1998): 25-32. https://doi.org/10.2514/6.1998-1394

Mohammed, Abbas et al. "The Role of High Altitude Platforms (HAPs) in the Global Wireless Connectivity." *Proceedings of the IEEE* 99, no. 11 (2011): 1939-1953. https://doi.org/10.1109/IPROC.2011.2159690

Nugraha, Ridha Aditya and Kartika Paramita. "Mempererat Regional ASEAN Melalui Tatanan Hukum Keantariksaan: Peluang dan Tantangan bagi Indonesia." *Jurnal Hukum & Pembangunan* 49, no. 3 (2019): 636-649. http://dx.doi.org/10.21143/jhp.vol49.no 3.2191

Nugraha, Ridha Aditya. "Improving Aviation Safety in Indonesia: How Many More Accidents?." *Hasanuddin Law Review* 2, no. 3 (2016): 328-348. https://doi.org/10.20956/halrev.v2i3.321

Nugraha, Ridha Aditya, Konrardus Elias Liat Tedemaking, and Vicia Sacharissa. "Penguatan Kedaulatan Negara di Udara dan Urgensi Sinkronisasi Hukum." *Kertha Patrika* 43, no. 1 (2021): 65-81. https://doi.org/10.24843/KP.2021.v43.i01.p05

Putro, Yaries, Ridha Nugraha, and Taufik Rachmat Nugraha. "Geostationary Orbit Slot Reconceptualization in Accommodating the South." *Indonesian Journal of International Law* 19, no. 3 (2022): 373-398.

Reinhardt, Dean N. "The Vertical Limit of State Sovereignty." *Journal of Air Law and Commerce* 72, no. 1 (2007): 65-137.

Schoenmaker, Annelie. "Certification and Safety Aspects relating to the Transport of Passengers on High Altitude Balloons in Europe." *Acta Astronautica* 100 (2014): 1-10. https://doi.org/10.1016/j.actaastro.2014.03.010

Setiawan, Eddy. "The Potential Use of High Altitude Platform Station in Rural Telecommunication Infrastructure." *Indonesia-ITU Concern Forum (IICF)* (2018): 35-37. https://doi.org/10.1109/ICICTR.2018.8706563

Sudrajat, Ruman. "Ruang Angkasa dan Pengaturan Hukumnya." *Warta Lapan* 41 (1984): 17-30.

Widiawan, Anggoro K. and Rahim Tafazolli. "High Altitude Platform Station (HAPS): A Review of New Infrastructure Development for Future Wireless Communication." *Wireless Personal Communications* 42 (2007): 387-404. https://doi.org/10.1007/s11277-006-9184-9

Xu, Yuanming, et al. "Improvement of Endurance Performance for High-Altitude Solar-Powered Airships: A Review." *Acta Astronautica* 167 (2020): 245-59. https://doi.org/10.1016/j.actaastro.2019.11.021

Yuniarti, Diah and Hilarion Hamjen. "Status dan Perkembangan Proyek Loon Terkini." *Buletin Pos dan Telekomunikasi* 15, no. 1 (2017): 13-26. https://doi.org/10.17933/bpostel.2017.150102

Zhou, Dong, et al. "Overview of Development and Regulatory Aspects of High Altitude Platform System." *Intelligent and Converged Networks* 1, no. 1 (2020): 58-78. https://doi.org/10.23919/ICN.2020.0004

Zhu, Xiongfeng, Zheng Guo, and Zhongxi Hou. "Solar-Powered Airplanes: A Historical Perspective and Future Challenges." *Progress in Aerospace Sciences* 71 (2014): 36-53. https://doi.org/10.1016/j.paerosci.2014.06.003

Thesis or Dissertation

Cook, Eric C. "Broad Area Wireless Networking via High Altitude Platforms." Master's Thesis, Naval Postgraduate School, 2013.

Legal Documents

Indonesia. Law No. 27 of 2022 concerning Personal Data Protection.
Indonesia. Law No. 48 of 2008 concerning State Territory.
Indonesia. Government Regulation No. 4 of 2018 concerning Air Security of the Republic of Indonesia.
Indonesia. Presidential Regulation No. 96 of 2014 concerning Indonesia Broadband Plan 2014-2019
Indonesia. Regulation of Minister of Communications and Informatics No. 4 of 2016 on Information Security System Management.
International Civil Aviation Organization (ICAO), Convention on Civil Aviation ("Chicago Convention"), 7 December 1944, (1994) 15 U.N.T.S. 295.
Radio Regulation (RR) 1.66 A ITU (ITU, 2012), *High Altitude Platforms* (HAPs).
International Telecomunication Union. Recommendation ITU-T X.1056 (01/2009).
The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies. 18 U.S.T. 2410 610 U.N.T.S. 205, 61 I.L.M. 386 (1967).
The United States of America. 51 U.S. Code on National Aeronautics and Space Act 20103

Other Documents

Euler, Anthony, Surjit Badesha, and Larry Schroeder. "Very High Altitude Tethered Balloon Feasibility Study." In *11th Lighter-than-Air Systems Technology Conference*. Clearwater Beach, FL, U.S.A.: American Institute of Aeronautics and Astronautics, 1995. https://doi.org/10.2514/6.1995-1612
Fantom, Neil and Umar Serajuddin. "The World Bank's Classification of Countries by Income." https://documents1.worldbank.org/curated/en/408581467988942234/pdf/WPS7528.pdf
Haryadi, Sigit. "Ikhtisar Organisasi Regulasi Telekomunikasi." Preprint. INA-Rxiv, February 28, 2018. https://doi.org/10.31227/osf.io/g9m3k
Marcy, W.L., and R.O. Hookway. "Propulsion Options For The Hi Spot Long Endurance Drone Airship." Final Report. Philadelphia: Naval Air Development Center, September 15, 1979.
Organization, International Civil Aviation. "Regulation of Unmanned Free Balloons." International Civil Aviation Organization, August 4, 2017.

Website Content

Eloksari, Eisya. "Tokopedia Data Breach Exposes Vulnerability of Personal Data." https://www.thejakartapost.com/news/2020/05/04/tokopedia-data-breach-exposes-vulnerability-of-personal-data.html

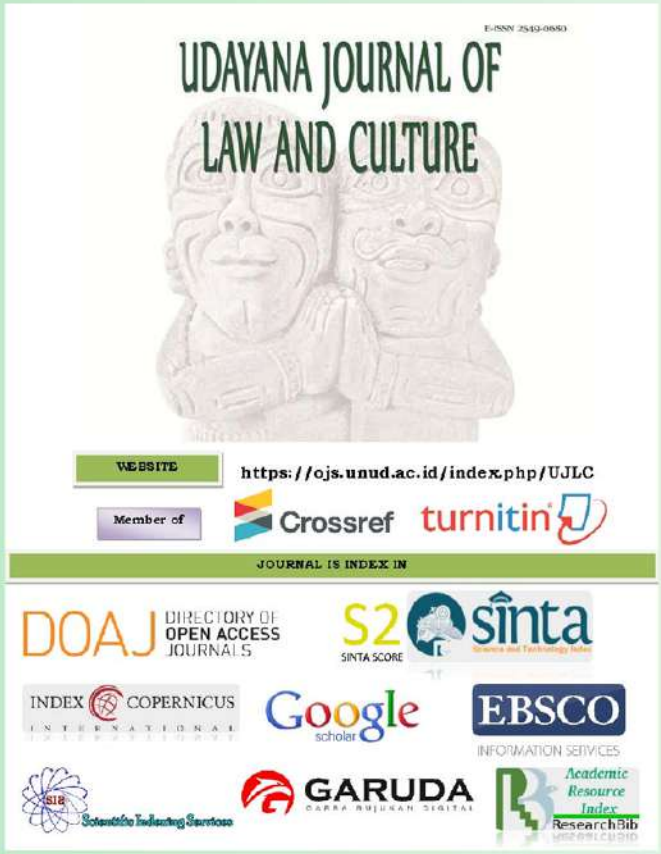
Korean Legislation Research Institute. "Statutes of the Republic of Korea." https://elaw.klri.re.kr/eng_service/lawView.do?hseq=38489&lang=ENG

Nugraha, Ridha Aditya and Taufik Rachmat Nugraha. "Chinese balloon row: Time to determine vertical delimitation in ASEAN." https://www.thejakartapost.com/opinion/2023/02/14/chinese-balloon-row-time-to-determine-vertical-delimitation-in-asean.html

Putro, Yaries Mahardika and Ridha Aditya Nugraha. "Space economy is the future, but how to realize it?." https://www.thejakartapost.com/opinion/2023/03/16/space-economy-is-the-future-but-can-indonesia-realize-it.html

Accredited "Sinta 2" by Ministry of Research-Technology and Higher Education Republic of Indonesia

Initials	: UJLC
DOI prefix	: 10.24843
Citation Analysis	: Google Scholar
Index Services	: DOAJ | Google Scholar | EBSCO | etc
ISSN (online)	: 2549-0680
Publisher	: Faculty of Law Udayana University
Editor in Chief	: I Wayan P. Windia
Managing Editor	: I Made Budi Arsika Nyoman Satyayudha Dananjaya
Frequency	: 2 (two) issues per year (January and July)



E-ISSN 2549 – 0680
Udayana Journal of Law and Culture

EDITORIAL BOARDS

Editorial Assistant:

1. Made Dandy Pranajaya (Faculty of Law, Udayana University, Denpasar, Indonesia) SCOPUS

2. Komang Ayu Nuriasih (Faculty of Law, Udayana University, Denpasar, Indonesia) SCOPUS

3. Jared Ivory (Kelly & Partners Lawyers, Darwin, Australia)

Board of Administration: I Gede Hardi Surya Budiana (Faculty of Law, Udayana University, Denpasar, Indonesia)

MAKE A SUBMISSION

INTERNATIONAL STANDARD SERIAL NUMBER INDONESIA

e-ISSN: 2549-0680

9 772549 068001

Member of

E-ISSN 2549 – 0680
UNIVERSITAS UDAYANA
Udayana Journal of Law and Culture

DOI: https://doi.org/10.24843/UJLC.2023.v07.i02

PUBLISHED: 2023-07-29

ARTICLES

Now and Forward: Customer Deposit Insurance of Sharia Bank in Indonesia

Nun Harrieti, Azlin Alisa Ahmad, Eidy Sandra, Fatmi Utarie

159-177

PDF

DOI : https://doi.org/10.24843/UJLC.2023.v07.i02.p03

Abstract views: 6, PDF downloads: 7

Measuring Corruption Tendency in Exercising Authority of the Proxy of Budget User: A Legal Culture Perspective

I Made Sudarsana, AAA Ngurah Sri Rahayu Gorda

178-199

PDF

DOI : https://doi.org/10.24843/UJLC.2023.v07.i02.p04

Abstract views: 8, PDF downloads: 15

German Environmental Concerns on Carbon Offsetting and Reduction: How it Deals with European and International Rules?

Samuel Corbalán Arévalo

120-143

PDF

DOI : https://doi.org/10.24843/UJLC.2023.v07.i02.p05

Abstract views: 21, PDF downloads: 13

Legal Issues Pertaining to High Altitude Platform Station Implementation in Indonesia as an Archipelagic State

Yaries Mahardika Putro, Ridha Aditya Nugraha, Taufik Rachmat Nugraha, Rio Christiawan, Aldhanti Bodhihanna, Jason Pratama Ong, Muhammad Revaldi Testarosa

144-164

PDF

DOI : https://doi.org/10.24843/UJLC.2023.v07.i02.p06

Abstract views: 14, PDF downloads: 15

MAKE A SUBMISSION

INTERNATIONAL STANDARD SERIAL NUMBER INDONESIA

e-ISSN: 2549-0680

Member of

Crossref

ADDITIONAL MENUS

Editorial Board

Reviewer

Peer Review Process

Focus and Scope

Frequency

Publication Ethics

Statistic Page View

No Author Fee

Author Guidelines

Open Access Policy

Copyright Notice

Indexation

Authorship and Ethics Statement

Citedness in Scopus

JOURNAL TEMPLATE

document

Publisher

Faculty of Law Udayana University

Address

Jalan Pulau Bali No.1 Denpasar-Bali-Indonesia 80114

Phone +62361222666

E-ISSN: 2549-0680

UDAYANA JOURNAL OF LAW AND CULTURE

FAKULTAS HUKUM UNIVERSITAS UDAYANA

P-ISSN : E-ISSN : 25490680 Subject Area : Humanities, Art, Social

0
Impact Factor

165
Google Citations

Sinta 2
Current Acreditation

Google Scholar Garuda Website Editor URL

History Accreditation

2017 2019 2020 2021 2022 2023 2024 2025 2026

Garuda Google Scholar

The Indian Rape Law: Vocabulary of Protest, Reactionary Legislations and Quality of Equality Culture
Faculty of law Udayana University Udayana Journal of Law and Culture Vol 7 No 1 (2023) 1-24
2023 DOI: 10.24843/UJLC.2023.v07.i01.p01 Accred : Sinta 2

Distinguishing German Residential and Commercial Tenancy Law: Are Tenant and Landlord in an Equal Position?
Faculty of law Udayana University Udayana Journal of Law and Culture Vol 7 No 1 (2023) 25-42
2023 DOI: 10.24843/UJLC.2023.v07.i01.p02 Accred : Sinta 2

Towards Quality and Sustainable Tourism in Bali: Should the Regional Master Plan be Adjusted?
Faculty of law Udayana University Udayana Journal of Law and Culture Vol 7 No 1 (2023) 43-58
2023 DOI: 10.24843/UJLC.2023.v07.i01.p03 Accred : Sinta 2

Legal and Ethical Discourse of Saviour Sibling: How Should Indonesia Respond to this New Trend?
Faculty of law Udayana University Udayana Journal of Law and Culture Vol 7 No 1 (2023) 59-79
2023 DOI: 10.24843/UJLC.2023.v07.i01.p04 Accred : Sinta 2

Addressing Crisis in Myanmar: The Role of NGOs in Promoting International Human Rights Standards

Faculty of law Udayana University | Udayana Journal of Law and Culture Vol 7 No 1 (2023) 80-101

2023 | DOI: 10.24843/UJLC.2023.v07.i01.p05 | Accred : Sinta 2

Towards Alternative Energy Sources: Is it Time to Switch to Nyamplung?

Faculty of law Udayana University | Udayana Journal of Law and Culture Vol 7 No 1 (2023) 102-120

2023 | DOI: 10.24843/UJLC.2023.v07.i01.p06 | Accred : Sinta 2

Community Legal Awareness and Customary Sanction to Prevent Littering: How Penglipuran Village in Bali Makes Efforts?â

Faculty of law Udayana University | Udayana Journal of Law and Culture Vol 6 No 1 (2022) 23-41

2022 | DOI: 10.24843/UJLC.2022.v06.i01.p02 | Accred : Sinta 2

Protection for the Rights and Interests of Local Communities Adversely Affected by Multinational Energy Companiesâ Activities

Faculty of law Udayana University | Udayana Journal of Law and Culture Vol 6 No 1 (2022) 1-22

2022 | DOI: 10.24843/UJLC.2022.v06.i01.p01 | Accred : Sinta 2

Peaceful Utilization of Transboundary Reservoir in Continental Shelf of Ambalat

Faculty of law Udayana University | Udayana Journal of Law and Culture Vol 6 No 1 (2022) 108-124

2022 | DOI: 10.24843/UJLC.2022.v06.i01.p06 | Accred : Sinta 2

Prison Overcrowding: Alternative Sentencing in Indonesiaâs Draft Criminal Code and Its Consequences on Correctional System

Faculty of law Udayana University | Udayana Journal of Law and Culture Vol 6 No 1 (2022) 42-61

2022 | DOI: 10.24843/UJLC.2021.v06.i01.p03 | Accred : Sinta 2

View more ...