

International Commercial Spaceport and International Law, Indonesian Focus

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Abstract:

The era of space commercialization has come, and one of the commercialized aspects of it is the spaceport, where foreign entities can use the space launch facilities and location in another country to conduct space missions (e.g. for launching a satellite). However, there is no legal definition of 'international' commercial spaceport. It is indeed a common term in media, yet still an unexplored topic under international law. In the context of Indonesia, Through the Aeronautics and Space Agency named "Lapan", Indonesian government is committed to construct a space infrastructure called "Spaceport" or "Cosmodrome", translated into Indonesian as "Bandar Antariksa" or "Bandar Luar Angkasa". The realization of Lapan's plan has reached the stage of assessment and determination of the area to be used as the location of the spaceport. The 'international' elements of the international commercial spaceport can also be present in the stage of construction. Under Indonesian municipal law, The Public-Private Partnership (PPP) arrangement is available to building spaceports, and the foreign element of it is the private partner can be an entity operating abroad and established under other countries law.

Keywords: *Commercial spaceport, Indonesia, international law, international spaceport, Public Private Partnership (PPP).*

1. INTRODUCTION

Countries around the world pay great attention in the field of space in the era of very rapid technological development in this century. Space can be an abundant source of economic potential and one of the obstacles that stand between that source and a country is the technology itself. For non-space faring countries, such as Indonesia, space

technology and infrastructure still needs to develop before space resources can be fully commercialized. One important technology that the government is striving for (Perpres, 2017) is the construction of space infrastructure called 'Spaceport' or 'Cosmodrome', translated into Indonesian as 'Bandar Antariksa' or 'Bandar Ruang Angkasa'. Another obstacle for countries like Indonesia, is the lack of law that is

compatible or even can catalyse space commercialization. Space law is still a relatively unpopular field in Indonesia as community in Indonesia sometimes frowns to it.

Indonesia through its agency responsible for national space activities called 'Lembaga Penerbangan dan Antariksa' (Lapan), to initiate the construction of a national spaceport. Lapan's plan has so far reached the stage of assessment and determination of the area to be used as a location for the construction of the Spaceport. The development at this stage had to go through a bumpy road as the local community protested it. In Biak, Papua, the indigenous people there protested against the planned development of the Lapan's spaceport intended to be used for satellite launches in North Biak, because the launch station was using local indigenous and sacred land (Santhika, Eka, 2018). In addition to Biak, other locations that were become candidates for the construction of Indonesia's spaceports are Morotai, North Maluku, Nias and Enggano (Hananto, Akhyari, 2017). Indonesian spaceport will be located under the equator line so that launching space missions will be cheaper and easier given the small launch costs, time and risks (Globus, Al et al, 2017; Boniface, 2016), since equatorial orbit demand relatively small amounts of propellant (explosive propulsion power). This is an advantage of launching space missions from the equatorial are, especially in the highlands because it has a closer actual (orthometric) distance to the Low Earth Orbit to operate (Daidzic, Nihad E., 2016). So, Indonesia's

position in the equatorial has the economic potential to commercialize the use of the spaceport abroad.

Since the plan and study of the location of the spaceport commenced in the early 2012, Indonesia's dream of having a spaceport adequate to Baikonur Cosmodrome in Russia, Cape Canaveral and the Kennedy Space Center in the United States, has not yet been achieved. For this, Eric Seedhouse's (2017) concern seems relevant, for which he stated that: "Indonesia relies on a Space System rather than a space act to regulate its space activities. This space system includes services, ground stations, infrastructure and spaceports". From his analysis, it is highlighted that Indonesia does not have a reliable national law regarding space. Indonesia ultimately relied on the development of a space system consisting of the service of land control stations, infrastructure and spaceports, without the existence of a strong national policy. Indonesia already has a space master plan set out in Presidential Regulation No. 45 of 2017, as a guide in the development of the Space System until 2040, yet it still lacking of commercial aspects. Compared with the United States, the country has had Commercial Space Launch Acts that were amended in 1989 and 1998. Based on these laws, the United States Federal Aviation Administration/ FAA as responsible agency for ensuring the security of the launch and re-entry of commercial space missions, is tasked to encourage commercialization of space. This includes ensuring security and public access to space and encouraging the development of the private sector, granting,

withdrawing and transferring launch and re-entry licenses, promoting security, strengthening and developing space transportation infrastructure, mitigating space debris ensuring compliance with the Registration Convention and determining flight crew qualifications. If the commercial space industry in a country is desired to be developed, the state needs a legal basis like the United States Commercial Space Launch Act.

A funding scheme used by United States through their national space agency, the National Aeronautics and Space Administration (NASA) which began in 2006, can also be a lesson learned on the benefits of incorporating private entities in government space program. NASA entered into cooperation contracts with several private companies in the country for developing its commercial space mission technology and infrastructures. Strong interest was shown by dozens of industry players in the United States to enter the cooperation contract, meaning that NASA effort to encourage the development of competitive commercial space industry has a desired result. Competitiveness between private companies raised and of new affordable businesses in space bloomed (Tkatchova, Stella, 2011; Ambikai., & Ishan, 2016).

There are two models of development and management of spaceports, namely development and independent management by the government with funds from the public, and the second type is the model of Public-Private Partnership/PPP (Tkatchova,

Stella, 2018). In the later scheme, the development of technology and the global economy makes space not only used by the state for its economic and political purposes, but has also become a destination for private entities, in this case private companies (Subandi, Agit Yogi, 2017; Barkatullah & Djumadi, 2018).

Erik Seedhouse (2017) shows the use of PPP scheme as government cooperation with business entity in the construction of various spaceports. Spaceport America, located in New Mexico, was built from scratch in a remote location approximately 50 km from the nearest town. The spaceport was funded by the state of New Mexico. Virgin Galactic has taken place as the main tenant of this spaceport, owned by Sir Richard Branson, the company that developed the world's first commercial space vehicle, a project worth more than 200 million dollars that has attracted worldwide attention. Designed, built and operated by the New Mexico Spaceport Authority (NMSA), Spaceport America's operational infrastructure includes airfields, launch pads, terminal / hangar facilities, emergency response capabilities, and highways. This spaceport can accommodate vertical and horizontal take-off activities from space vehicles, serve as a place for astronaut training, and provide tourism experience in its facilities for public visitors. The spaceport is also a base for UP Aerospace, the first company to launch commercial cargo from the said spaceport. Another important presence in the spaceport is the Lockheed Martin, which has used the spaceport as a place for launch test and develop new space technology (Seedhouse,

Erik, 2017). The next lesson come from the Mojave Air and Space Port. Mojave Spaceport is the starting point for commercial sub-orbital space flights and the home for well-known companies in the space industry such as Scaled Composites, XCOR Aerospace, Masten, and The Spaceship Company. Located two hours drive from north of Los Angeles, Mojave Air and Space Port has become one of the most iconic locations in the commercial sub-orbital industry. The place is home to 14 space companies that carry out thousands of rocket tests on vast expanses of the desert. From the same area there is the Mid-Atlantic Regional Spaceport which is operated commercially by the Virginia Commercial Spaceflight Authority (VCSFA). VCSFA started leasing on Wallops Island in 1997 and gradually built the facility over the years. VCSFA currently has one middle class launch facility and one small class along with vehicle and payload processing integration facilities through an agreement with NASA. This spaceport has handled at least more than 16,000 launches over 55 years and is one of the few spaceports that has an orbital launch license from the United States FAA Office of Commercial Space Transportation.

The key of successful PPP is the potential benefits of the construction and operation of the spaceport. The most obvious potential is that a spaceport can boost the development of space technology as well as human resource training in the spaceport facilities. Thus countries like Indonesia will be able to design their own satellites and launch satellites from their own country. Not to

mention the advantage if the spaceport in Indonesia is leased to foreign investors as a test and development facility for the commercialization of space. Indonesia can also provide a launching place for other state entities commercially.

Erik Seedhouse revealed the concept of 'Alternative Revenue Streams' of spaceports, which shows how spaceport operators carry out the monetization of its existing services and facilities. Research has shown that space ports that only provide specialized space launch services are at risk of failing to operate economically, effectively and efficiently. That is why it is important to diversify and create alternative income streams. More than 41% of revenue for an airport for airplane operations comes from parking revenues, rental car agency, ground transportation services and terminal concessions. Although spaceports may not follow the airport model precisely, developing other sources of revenue will help the sustainability of spaceports. Erik took the example of the Houston Spaceport. The spaceport is used for astronaut training and building spacecraft among several other alternative sources related to space. One source of income comes from providing paid visitor services to enjoy new experiences by participating in several training activities, namely: Space flight simulators, centrifugal rides, Neutral Buoyancy Lab Indoctrinations, Parabolic Flights and Exhibition of space science and technology. Other monetization alternatives are organizing marriages in space, space diving by jumping from sub-orbital heights, making commercial films, and advertising. Media

sponsors can be another source of funding, as proven by commercial coverage conducted by RadioShack carried out on the International Space Station (ISS) project, Pizza Hut which spent USD 1 million to put its logo on the Proton rocket, and USD 65 million paid by the Canadian golf equipment maker to the Russian Space Agency for cosmonauts to take golf shots from the International Space Station/ ISS.

2. RESEARCH MATERIALS AND METHOD

2.1. Method

The research method used in this study is the normative juridical method. The study was conducted by analyzing international and municipal legal norms related to construction and operation of spaceports, including the Republic of Indonesia's Presidential Regulation No. 38 of 2015 concerning Government Cooperation with Business Entities in the Procurement of Infrastructure, Law Number 21 Year 2013 about Space, and other laws and regulations that implement the provisions therein. This research uses data as well as materials contained in various books, journals and other sources. In this research, the writer will compile PPP policy model that can be applied by states to encourage the realization of the construction of the spaceport and in the end can stimulate the development of the national space industry.

2.2. Research Type

The research was conducted in the form of 'desk studies' where all the data used and analysed is obtained from the secondary sources: books, journals, news, report, etc.

The research object of this article is the 'lex lata' which means the law in condition as it currently exists. This form of law will be criticized and reviewed in order to find better regulation.

3. RESULTS AND DISCUSSION:

3.1. PPP Regulation in the Development and Management of Space Port

Private companies have a decisive role in realizing the construction of spaceports nowadays. Since spaceport is very important for developing space exploration, the construction of it abolish more and more distance between the current phase and the dream of reaching further space civilization. In addition, the construction of spaceports makes private space company productive and survive. Various spaceports in the United States (Texas, Florida, Oklahoma, Alaska and Virginia), Sweden and Curaçao are places for various private space companies that carry out various research and development of new space technologies. The initial discussion about spaceports opens with the history of Virgin Galactic's sub-orbital system called the 'SpaceShipOne'. The system offers commercial flights into space for public, thus this marks the beginning of the new era of space commercialization. The spacecraft was successfully flown for the first time at the Mojave Airport facility, New Mexico in 2004. A market studies showed that by 2021 the said business will create billions of US dollars revenue. The role of technological development is inseparable from the existence of spaceport, which is a place of trial and development of SpaceShipOne

technology. For the foreseeable future spaceports promises connectivity between planets, where people will come to spaceports to travel to spaceports on other planets. This looks like a science fiction story, but in reality, the trend towards that direction has started now.

Most of the existing spaceports are infrastructures owned by the government to launch rockets into space. But since 2011, the US space agency (NASA) has launched a program that provides access to private companies to open up space businesses, such as launching and manufacturing satellites using rockets. Facilities in the spaceport can vary according to their designation (Matula, Thomas L., 2010), if the spaceport is only used for launching small rockets, then concrete foundation is sufficient as the main facility. It is different in the event that the spaceport will be utilized for launching space exploration missions with large rockets such as the Apollo 11 or Atlas V rockets, the facilities within the spaceport will be more complex. Likewise for the future spaceports that are suspected to be more emphasized for commercial use, the minimum available facilities will also be different.

In addition to discussing the development of spaceports in the United States, discussions about the development of spaceport in Russia, China, France and India are also interesting to be observed. In the context of Indonesia, it turns out that the BRI, a national bank corporation, in carrying out the process of launching satellites, was using spaceport in Kourou, French Guiana.

Kourou itself was appointed by Arianespace as a launch vehicle manufacturer, because its location was a strategic place to carry out the BRI satellite launch mission into space. One of the advantages of launching from Kourou is that it is located at 5 degrees North Latitude, placing Korou's facility closer to the equator.

Development is the focus of the Government of Indonesia. With infrastructure development, it is believed that it can increase the country's economic growth. (Prita, Danrivanto, 2018) Government cooperation with the private sector has actually been known for a long time in Indonesia in several areas, such as in the construction of toll roads, electricity, and airport infrastructures. But in the space industry PPP mechanism is rarely implemented in Indonesia even though the PPP scheme is needed in the construction of space airports. The limitations of the National Budget in financing infrastructure development led to funding problem, the limitation can be solved by involving private companies to become alternative sources of funding and financing. By using PPP, the government can determine the specifications and risk sharing before the cooperation is carried out with the resources of the Business Entity. This is part of the PPP project cycle consisting of four stages, namely planning, project preparation, transactions, and contract management. As a legal basis for PPP, Indonesia has enacted Presidential Regulation No. 38 of 2015 concerning Infrastructure cooperation between government and business entities.

The Indonesian National Development Planning Agency (Bappenas) publishes Indonesian PPP Book every year to show the list of projects open for private partnership, (Bappenas, 2017, 2018, 2019) yet in 2017, 2018 and 2019 editions no spaceport project was enlisted. So far, the space related industry offered is multifunctional satellite development project, which is also a good sign that Indonesia is willing to move to space commercialization phase. Presidential Regulation No. 38/2015 allows two types of infrastructures open for PPP: economic infrastructure and social infrastructure. The latter includes, among others: transportation infrastructure, telecommunications and information technology infrastructure, and education infrastructure. Space industry can be included in the said category, especially spaceport as commercial facilities. Based on Perpres No. 38 of 2015 Lapan as Indonesian space agency is in charge to cooperate spaceport development project using PPP. Land acquisition for PPP is carried out by the Government in accordance with statutory provisions concerning land acquisition for development in the public interest. Funding for land acquisition for PPP is sourced from the State Revenue and Expenditure Budget and / or Regional Revenue and Expenditure Budget.

The Minister who carries out government affairs in the field of finance and state assets has power to approve the financial support and / or tax incentives, in accordance with statutory regulations. The government can also provide Government Guarantees for PPP, by taking into account the principles of

financial risk management and control in the state budget. Risk control and management of Government Guarantees is carried out by the minister who in charge in state finances and assets.

The spaceport is the entrance to open opportunities to conduct space research, remote sensing, space technology mastery, launch, and commercial space activities, as highlighted in Article 7, Law No. 21 of 2013 Without spaceport, space activities are difficult to develop. Related to the mandate of Article 11 Indonesian Space Act, spaceport has to be the centre of Space Science which encourages research on space weather, the space environment and astrophysics. The facilities to support these activities should be standard airport facilities, including satellite facilities, space stations and earth segment observation facilities. Spaceport can also be the centre of mastery and development of space technology which includes, but is not limited to the mastery and development of Rocket technology; mastery and development of satellite technology; mastery and development of aeronautical technology; and technological propagation.

The legal basis for the development of space airports with the PPP scheme contained in Article 26 paragraph (1) of the Space Act, stipulated that the development and construction of facilities and infrastructure for the mastery and development of space technology activities opens for national or foreign companies. In implementing the acquisition and development of Lantern technology as mentioned above, national

companies may include foreign entities as subcontractors/ PPP has received a lot of attention, including in national policy, as a potential solution to the challenges of developing the space industry that are known for having high costs, high risks, and long periods of break-even point. But PPP is not a tool that can eliminate this challenge. Instead, PPP provides a way to better manage the challenges so that they get the best quality. Successful results depend on implementing PPP effectively and consistently. The following planning steps proposed by Karen L. Jones (2018) can contribute to a successful PPP structure:

Steps	Plan
1	Determine how partnerships can increase costs, schedules or performance the space industry.
2	Clear identification of the scope and role of partners in the PPP scheme.
3	Introducing a decision framework supported by lessons learned from similar collaborative experiences including the risks that arise, the possibility of making a profit, and the demands of stakeholders.
4	Optimizing benefits and allocating risk equitably to all PPP partners.
5	Drafting a PPP agreement / contract that benefits all parties.

Table 1. Planning steps proposed by Karen L. Jones to a successful PPP

Although each PPP scheme is different in each sector, there are lessons to be learned from the collective experience of PPP in

other sectors besides the aviation industry infrastructure sector. In implementing the PPP scheme, the government must pay attention to three principles, namely: Neutrality, Transparency- Accountability, and Governance. Based on the first principle, the Project must be honestly offered without bias that the profit potential can cover the value of the project spending (Value for Money), without exaggerating or reducing it. The next principle is that the government is obliged to make a comprehensive test system for the PPP mechanism to be carried out, a profit analysis and management mechanism that will be carried out and present the results in a transparent and accountable manner. Finally, the principle of governance requires a check and balances mechanism in the implementation of the PPP, so as to avoid conflicts of interest. (Karen L. Jones, 2018)

3.2 International Commercial Spaceport Under International Law

There are only some basic principles can be applied regarding the development and operation of spaceports. Among them are principles regarding astronaut safety, responsibility, liability, ground safety, and the registration of outer space objects. In national level, The United States, for example operates its space port based on the National Space Policy which came into force in 2016. The policy includes two principles that are applied specifically to the spaceport, namely onshore segmentation of space capability as a vital national interest for the country and the commitment of the United States to facilitate entrepreneurs in the space sector. Spaceports in the United

States must have a launch license and re-entry license to earth.

Erik Seedhouse (2017) described that the development of international law is not in line with the development of spaceports around the world. He said that the existing international legal system still not specifically regulate spaceports operations. At present time, there are many different national and regional legal mechanisms. Among them, Seedhouse concluded that the United States has the most advanced mechanism for regulating the operation of spaceports (Seedhouse, Erik, 2017). It is not surprising because the United States as a country has a long list of carrying out space missions. The jurisdiction for conducting spaceport policy in the United States belongs to the Federal Aviation Administration of Commercial Space Transport (FAA-AST), which develops a spaceport ecosystem by first considering civil aviation policies and the legal regime of international treaties under the United Nations (UN) which regulates activities in space. In the international order itself, there is no legal definition of "spaceport", there are only a few basic principles that apply in the development and operation of spaceports, concerning to the safety of astronauts as ambassadors of humanity, responsibility, compensation (liability), ground safety, and registration of space objects.

In respect of international commercial spaceports as explained, there is still a lack of legal definition regarding spaceports in

the international order. Erik Seedhouse (2017) defines spaceport in several senses: Facilities where commercial scientists funded by parties who wish to travel to space for conducting research in order to realize the wishes of the prospective passengers who have invested.

Facilities those are open for everyone to visit and observe space flights. The manager or owner of the aerospace will provide accommodation, food, drinks or souvenirs that the community can buy. It is like the concept of a commercial airport terminal.

Training facilities for future space flight actors with centrifugal devices, hypobaric chambers, spatial disorientation trainers, classrooms, medical facilities and so on. The space airport facility is also a place for certification for people who will participate in space flights.

The Outer Space Treaty of 1967, in article 12, also have not utilized the term spaceport, but instead still use the term "stations" (Weidaw, Kenneth. M, 2006). Seeing that the growth of space technology is incredibly fast nowadays, it can be said that the current policies and regulations used today is not adequate to effectively regulate commercial space activities, and the need to review current space policies and regulations is present. The need to have new space law regulations, according to Tronchetti, is driven by four main factors, namely: (1) the technological developments, (2) the increased capabilities of specifically launching satellites into orbit, (3) the rise of new commercial space activities, and (4) the

emergence of new legal and technical issues that were not foreseen or considered relevant at the time of the drafting of the UN space treaties (Dionysia-Theodora Avgerinopoulou, Katerina Stolis, 2017).

In respect of commercial space activities, Dionysia further explains that with the emergence and increasing role of private sectors in space, there is a need for a new regulation regarding the commercialization of space. Among them is a clear universal definition and threshold of what can be called as commercial spaceport. By providing this definition, the regulation of commercial spaceport and commercial use of space can be achieved more easily, and also providing the difference of which spaceports can be used for commercial and non-commercial purposes.

As to provide a concrete example, The Outer Space Treaty of 1967 has set out in its article 1 that the use and exploration of space, including the Moon and other Celestial Bodies, shall be free for all States without discrimination. In respect of the growth of private sector in space exploration, this article is not yet adequate to regulate the activities of private sectors in space. This article has not yet definitively explained the involvement of private sectors, whether a corporation must be under the supervision of the state or can independently carry out its own space related activities. Furthermore, The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (Rescue Agreement) has set out in article 2 regarding the responsibility of State

Parties in this convention to help distributing information and to carry out rescue operations for astronauts and/or space objects that has fallen within their territory or other area beyond their jurisdiction. This convention has not yet explained, regarding the subject of international spaceport, about space objects belonging to companies such as Virgin Galactic or astronauts that works for such private companies. In relation to liability and compensation, The Convention on International Liability for Damage Caused by Space Objects (Liability Convention) has set out in article 2 that launching states has full responsibility to pay compensation for damages caused by their space objects. In respect of what Tronchetti has said above, the involvement of private sectors in space activities will result in new legal issues that was not considered relevant at the time this convention is drafted. This condition will result in the uncertainty of private companies' standing in space activities. This problem is not yet accommodated by said article 2 that only regulates states as the party that can be responsible for damages caused by space objects. The same thing also happened in The Convention on Registration of Objects Launched into Outer Space (Registration Convention). In regards of registration, article 1 of this convention has only given the definition on launching state, whether it is the state that executes the launching or the territory of the state that is as the launching site. This begs the question, what is the status and the registration mechanism of space objects belonging to private companies that carries out space object launching from a certain state or from

the state the company originate from. Lastly, The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Agreement) has regulated the procedure of space activities carried out by states. Article 3 of this agreement says that the Moon as a celestial body is used by state parties for peaceful purposes. Bearing in mind the growth and development of private sectors in space activities, said article can be questioned, are private companies allowed to carry out activities in space.

Regarding the need of international regulation for commercial spaceports, there some articles that can be used to help forming said regulation. For example, The Outer Space Treaty of 1967 in article 9 regulates the use and exploration of space guided by the principle of co-operation and mutual assistance, with due regard to the corresponding interests of all state parties to the treaty. This article can be utilized to base the regulation for building and operation of commercial spaceports, guided by the principle of international co-operation with due regard to the corresponding interests of parties involved.

The Rescue Agreement has set out the responsibility of state parties in this agreement to help in spreading information and carrying out rescue operation for astronauts and space objects that has fallen to Earth. The articles provided in this agreement can also be used for space objects belonging to private companies and the astronauts that are working for said companies, so long as the international definition on commercial spaceport and the

position of private sectors in space activities has been clearly regulated. Furthermore article 6 of this agreement also regulates regarding launching authority, which is the state or intergovernmental organizations that is responsible for holding launch mission. This article can be utilized to ensure private companies' responsibility in carrying out space launch missions, by adding private companies as subject to this agreement.

Regarding liability, The Liability Convention regulates on the responsibility of state parties in this convention to pay for damages caused by space objects owned by states. When the definition and position of private companies as subject in this convention has been established, then the responsibility of said companies can be ensured, as has been regulated in article 2. Article 2 regulates that state parties has the responsibility to compensate the damages caused by their space object. This article can be used to regulate the mechanism of how private company must bear responsibility in the event of damage caused by their space objects.

The Registration Convention regulates the registration of objects that are launched into space by states in this convention. Article 2 of this convention says that all forms of objects that are launched into space by states must be registered by the launching state, and in the event of two or more state carrying out the launch mission, then one of the states must register the object launched. In respect of private company's activity in in the launching of space objects that owns its own spaceport or launching site, this

convention needs to pay attention to said private company's position in the registration of the space object launched, whether said company can independently register its space object, or must it register to the state that the company originated from.

The Agreement Governing the Activities of States on the Moon and other Celestial Bodies, in article 2, regulates that activities on the Moon are carried out based on international law. Article 3 strengthens the above article by regulating that such activities are carried out for peaceful purposes. Both of these articles can be utilized to regulate private company's activities on the Moon or in space, by detailing what kind of commercial activities are allowed, and where in the Moon does spaceports are allowed to be build. By doing so, clarity on the role of private companies on space activities can be achieved. Regulations of the 4 conventions mentioned above basically can be utilized to regulate private company's activities in space, including the construction of spaceports on Earth and the Moon. All of this can be achieved by defining commercial spaceport and the assignment of private companies as subject in international space law clearly.

4. CONCLUSION

Indonesia has already made a space master plan set out in Presidential Regulation No. 45 year 2017. The Presidential Regulation can be utilized as a guideline in developing Indonesia's Space System until the year 2040, including the construction of spaceports in Indonesia. Evidently Indonesia has not yet entered the era of space

commercialization. The KPBU scheme has been used in various spaceport construction in other countries. KBPU, as a guideline and policy model in the development of spaceport in Indonesia, has a few principles that can be used, namely: Neutrality, Transparency and Accountability, and Governance. Projects must be proposed honestly and without bias, transparent and accountable, and also free of conflict of interests. In respect of determining location, the making of design, planning, and construction of spaceport, including the area surrounding said spaceport, must pay attention to national interests, security and safety of space launch, along with the sustainability of environment surrounding the spaceport area. Indonesia can also look to use principles set out in Outer Space Treaty of 1967 and relating agreements to help the formulation of national legislation regarding commercial spaceports.

Indonesia as a country still needs to pay much attention to space, in which the first step towards that goal is to build spaceports as a main facility for this particular industry. Indonesia's position in the equator have the economic potential to commercialize the use of spaceport abroad. Lapan, as the main and foremost institution in this particular field, has the task to build spaceports in Indonesia and needs assistance in the form of adequate funding. Enhancing funding for air and space institution proves to be beneficial in developing technologies and market for space that is independent with effective technology development funding, as other countries have shown. When increasing funding could not be a government priority

then the KPBU scheme can be the solution that could be catalyst to realize the construction of spaceports in Indonesia.

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