National space legislation : future perspectives for Malaysian Space Law

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3 THE STUDY OF THE LEGAL FRAMEWORK OF SOME NATIONAL SPACE LEGISLATIONS

3.1. INTRODUCTION

The evolution of space law occurs at both international and national levels. Many countries acknowledge that the enacting of national space law, besides adhering to the United Nations treaties, is a matter of priority, especially for those involved in outer space activities. The development of national space legislation will enable states to provide their nationals with legal certainty and transparency in matters relating to domestic space law, as well as to afford a reliable legal framework, particularly for their private space activities.[1] On top of this, the growth of national space legislation is, in fact, a response to the international legal rules set forth in Article VI of the Outer Space Treaty 1967,[2] which prescribes that a state has an obligation to take responsibility for its national activities in outer space. Moreover, the state is obliged to ensure that its national activities in outer space are carried out in accordance with international law. Such assurance can indeed be achieved, as suggested by Article VI of the Outer Space Treaty 1967, through authorization and continuous supervision by the states through their domestic space legislation.

In proposing and drafting a Malaysian space law, it is worth exploring a number of domestic space laws of other countries. This chapter aims to study the legal frameworks of selected national space legislations of a number of countries. This method is used in the expectation that the legislative experience of those countries will present a useful model for outlining the proposed legal framework for Malaysian space legislation. The seven selected countries are as follows: (1) United Kingdom, (2) Australia, (3) United States of America, (4) India, (5) Singapore, (6) Thailand, and (7) Brunei. These countries have been selected according to various criteria; for instance, some share common constitutional systems, all are involved in space activities, some are Commonwealth countries, and some are neighbours. The United Kingdom, Australia, India, Singapore and Brunei are Commonwealth countries, like Malaysia. The United Kingdom is not only the mother of the Commonwealth but also among

[1] UNGA, Committee on the Peaceful Uses of Outer Space, 'Report on the United Nations/Ukraine Workshop on Space Law on the theme "Status, Application, and Progressive Development of International and National Space Law" (Kyiv, 6-9 November 2006), A/AC.105/880, at 6.
[2] See *infra* note 40.

the first to establish national outer space legislation. Meanwhile, Singapore and Brunei are not only Commonwealth countries but also neighbours of Malaysia.

Like Malaysia, India, Australia, Singapore and Brunei have also inherited the British legal system. It should also be noted that the law of those countries, except Thailand, is based on the common law legal system. As for Thailand, even though the country's law is based on civil law, its legal system has also been influenced by the common law system.[3] Furthermore, Thailand is a neighbouring country of Malaysia that is involved in numerous space activities. Such circumstances might, therefore, to some extent influence the development of Malaysian space legislation and activities. However, Indonesia, although a neighbour of Malaysia, has been excluded from the selection since the law of the country is based on a civil law system combined with customary law, as well as Roman Dutch law. Moreover, Indonesia is not a Commonwealth country. Such circumstances have thus excluded the country from the group selection.[4] Meanwhile, the United States has been chosen mainly because of its advanced and comprehensive domestic space legal framework, which may contribute significantly to the drafting of the Malaysian space legal framework. Furthermore, the United States legal system also follows the common law legal system.

In this chapter, the discussion begins with the United Kingdom, followed by Australia, the United States, India, Thailand, Singapore and, lastly, Brunei. It will begin with an overview of each country with respect to its political and legal systems and its involvement in space activities. Next, the discussion elaborates on the status of the five United Nations outer space conventions for each country. It then proceeds to discuss the state's national space legislation. At this juncture, the nature and scope of the domestic space legislation of each country is analysed, along with its mode of authorization, registration obligation, constant monitoring and supervision, liability and indemnification, safety, peace and security measures and, finally, other provisions in the legislation. However, for states that have yet to enact their domestic space legislation, such as India, Thailand, Singapore, and Brunei, the discussion will then focus on the states' status in relation to five outer space conventions, their outer space activities, and related experiences.

[3] More information is available in Chapter 3 of the thesis (3.6.1. Thailand).
[4] See http://en.wikipedia.org/wiki/Law_of_Indonesia, accessed: 14 May 2014.

3.2. UNITED KINGDOM

3.2.1. An Overview

The United Kingdom consists of Great Britain (England, Wales and Scotland) and Northern Ireland. Its capital city is London and its official language is English. Politically, the country is a unitary parliamentary democracy state[5] with a constitutional monarchy system[6]. The head of the United Kingdom is the Queen[7] and the head of Government is the Prime Minister. The United Kingdom Parliament comprises two houses: the House of Commons and the House of Lords. The United Kingdom legal system is governed by three distinct systems of laws: (1) English and Welsh law, which applies in England and Wales, (2) Northern Ireland law, which applies in Northern Ireland, and (3) Scots law, which applies in Scotland. The English, Welsh and Northern Ireland laws are based on common law principles. However, the Scots law is a pluralistic system based on civil law principles with common law elements.[8] The UK is a member state of European Union, a permanent member of the United Nations Security Council, a member of the Commonwealth of Nations and a member of the World Trade Organization, among many others.[9]

Economically**,** the United Kingdom is the eighth largest economy in the world by purchasing power parity.[10] It is a developed country with traditional industries including iron, steel production, coalmining, shipbuilding, aircraft, and textiles. Other industries include, to name a few, automobile manufacturing, electronic products, food processing, and chemicals. The

[5] The unitary system, in contrast to a federal system, is a system whereby a sovereign state is governed as one single unit in which the central government is supreme and any sub-national units exercise only such powers as the central government chooses to delegate. Around the end of 1997, devolution took place in the United Kingdom Governmental system. This involved transferring a range of powers from the United Kingdom central government to its sub-national units. In this case, the United Kingdom Parliament transferred powers involving matters of education and health, among others, to its national parliament or assemblies: the Scottish Parliament, the National Assembly for Wales, and the Northern Ireland Assembly. However, the scope of those powers differs between each political institution. With respect to the country's national policy on matters such as foreign affairs, defence, social security and trade, they remain the United Kingdom Government's responsibility. For more information refer http://en.wikipedia.org/wiki/Unitary_state; read also Leeke, Matthew, Chris Sear, and others, "An Introduction to Devolution in the UK"*, Research Paper 03/84*, 17 November 2003, House of Commons Library, at http://www.parliament.uk/documents/commons/lib/research/rp2003/rp03-084.pdf, all accessed: 21 January 2013.

[6] A constitutional monarchy system is a form of government in which a monarch acts as a head of state within the parameter of a constitution.

[7] Under the United Kingdom monarchy system, Queen Elizabeth II is the head of the United Kingdom and the Commonwealth countries. See http://en.wikipedia.org/wiki/United_Kingdom, accessed: 1 January 2013.

[8] For more information see http://en.wikipedia.org/wiki/Law_of_United_Kingdom, accessed: 1 January 2013.

[9] For more information see *supra* note 7.

[10] See http://en.wikipedia.org/wiki/United_kingdom_economy, accessed: 1 January 2013.

country is also considered to have a strong and competitive space industry. This is evident as this industry contributes 9.1 billion pounds a year to the United Kingdom economy and directly employs 28,900, with an average growth rate of almost 7.5 per cent.[11] The country has particular expertise in areas such as satellite platforms and payloads, software, components, testing facilities, remote sensing application, antennas and signal simulators, satellite operators, and many others.[12]

Historically, the involvement of the United Kingdom in space activities, especially in developing launch vehicles, and both scientific and technological satellites, was initiated at the beginning of the space age. In the late 1950s, the United Kingdom led Europe in the field of large liquid-fuelled rockets with its Blue Streak ballistic missile, but this programme was halted in 1960.[13] In 1957, the first British scientific rocket was successfully launched from Woomera in Australia by a team of scientists and engineers, led by the late Sir Harrie Massey.[14] In 1959, the United Kingdom accepted the offer of the United States to work on building a series of scientific satellites called the Ariel programme. Ariel-1, the world's first international satellite, launched in 1962, was designed and built by NASA and carried seven experiments conducted by the United Kingdom. It was designed to study the ionosphere and solar radiation. Ariel-2 was launched in 1964, and Ariel-3 in 1967. Ariel-3 was the first spacecraft to be built entirely in the United Kingdom, by the British Aircraft Corporation in Bristol. On 28 October 1971, the Prospero satellite was launched into orbit by a Black Arrow vehicle. This was the first time a British satellite had been launched on a British rocket.[15] Between 1969 and 2010, it was reported that the United Kingdom has had at least 43 objects launched into space. Most of the objects were registered with the United Nations, but a few of

[11] UK Space Agency, "The Size and Health of the UK Space Industry: A Report for the UK Space Agency, Executive Summary November 2010". http://www.bis.gov.uk/assets/ukspaceagency/docs/industry/oxecon%20executive%20summary%20for%20final%20web%20version.pdf; Madeleine Russell, "UK Space Sector Trajectory Rises through the Economic Storm", *UK Space Agency,* 12 July 2012, http://www.bis.gov.uk/ukspaceagency/news-and-events/2012/Jul/uk-space-sector-trajectory-rises-through-the-economic-storm, both accessed: 2 January 2013.

[12] UK Space Agency, "The UK Space Sector", http://www.bis.gov.uk/assets/ukspaceagency/docs/uk-space-sector-technologies-and-capabilities.pdf, accessed: 3 January 2013.

[13] Even though the programme was stopped, the Blue Streak was chosen as the first stage of the international European space launch vehicle being developed by the European Launcher Development Organization (ELDO). Davies, J.K., *Space Exploration*, Chambers Encyclopaedic Guides Series, (Edinburgh: W & R Chambers, 1992), at 16.

[14] It was reported that Sir Harrie Massey, the Head of the Physics Department at University College London (UCL), was the one who initiated space science and its foundation for its development in Britain. See http://www.bis.gov.uk/ukspaceagency/discover-and-learn/discovering-space/space-history/uk-space-history, accessed: 2 January 2013.

[15] See *id*.

them were not.[16] Apart from sending and launching satellites, the United Kingdom is involved in a number of ambitious missions to other planets including Mars, Saturn, Venus, the Moon, and others.[17]

The agency responsible for coordinating the United Kingdom's civil space activity is called the UK Space Agency.[18] The Agency was launched officially on 23 March 2010, and became an executive agency of the Department for Business, Innovation and Skills (BIS) on 1 April 2011.[19] It replaced the British National Space Centre (BNSC), the previous British Government body that coordinated the United Kingdom's civil space activities. It was reported that the UK Space Agency took over responsibility for the United Kingdom Government policy and the key budgets for space.[20] It thus became responsible for all the United Kingdom's space activities. On the UK Space Agency's launch date, the Space Leadership Council was formed. The Council's duty is to advise the Agency on its work plans and future opportunities. It offers advice on what areas of space activities the United Kingdom should develop, as well promoting the United Kingdom's space industry and scientific excellence in space research, technology, and application.[21]

3.2.2. Five Outer Space Conventions: The United Kingdom's Status

In relation to the United Kingdom's status regarding the five major United Nations outer space conventions,[22] it is noted that the United Kingdom is a state party to all major outer space conventions except the Moon Agreement.[23] The first outer space treaty to be signed by

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[16] See online index of objects launched into space at http://www.oosa.unvienna.org/oosa/osoindex.html, accessed: 2 January 2013.
[17] See http://www.bis.gov.uk/ukspaceagency/discover-and-learn/discovering-space/uk-space-activity, accessed: 2 January 2013.
[18] The UK Space Agency website is available at http://www.bis.gov.uk/ukspaceagency, accessed: 3 January 2013.
[19] The official website of BIS is available at http://www.gov.uk/bis/, accessed: 3 January 2013.
[20] The Agency's other tasks include: supporting academic research, nurturing the country's space industry, working to increase understanding of space science and its practical benefits. See Mosteshar, Sa'id, "Regulation of Space Activities in the United Kingdom", in *National Regulation of Space Activities,* ed., Jakhu, Ram S., (Dordrecht: Springer, 2010), at 357; Amos, Jonathan, "Muscular' UK Space Agency Launched", *BBC News,* 23 March 2010, http://news.bbc.co.uk/2/hi/science/nature/8579270.stm; see also http://en.wikipedia.org/wiki/British_National_Space_Centre#cite_note-bbc-2, both accessed: 1 January 2013.
[21] See http://www.bis.gov.uk/ukspaceagency/who-we-are/how-we-work/space-leadership-council, accessed: 1 January 2013.
[22] The conventions refer to the Outer Space Treaty 1967, the Rescue Agreement 1968, the Liability Convention 1972, the Registration Convention 1975, and the Moon Agreement 1979.
[23] The United Kingdom is a party to the Outer Space Treaty 1967, the Rescue Agreement 1968, the Liability Convention 1972, and the Registration Convention 1975. See United Nations, *United Nations Treaties and*

the country was the Outer Space Treaty 1967.[24] It was signed on 27 January 1967, the same date the Treaty was opened for signature to all states. Nine months later, on 10 October 1967, the United Kingdom then ratified[25] it, indicating that it was ready to be bound by the legal obligations stipulated therein.[26] On this date, the Outer Space Treaty 1967 entered into force.

The second agreement was the Rescue Agreement 1968[27]. The United Kingdom expressed its consent to become a party to the Agreement when it signed it on 22 April 1968, the date that the Agreement was opened for signature to all states. Then, on 3 December in the same year, the country ratified the Agreement.[28] This was the date when the Agreement entered into force. The third was the Liability Convention 1972.[29] This Convention was also signed on the date when it was opened for signature to all states, i.e. 29 March 1972. The ratification took place in the subsequent year on 10 October 1973.[30] The fourth convention was the Registration Convention 1975,[31] which the United Kingdom signed on 6 May 1975. This was executed four months after it was opened for signature to all states on 14 January 1975.[32] Only three years later, on 30 March 1978, the United Kingdom then ratified this Convention.[33] Such circumstances indicate that the country took approximately three years to consider ratifying the Registration Convention 1975. However, with respect to the Moon

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Principles on Outer Space and Related General Assembly Resolutions: Status of International Agreements Relating to Activities in Outer Space as at 1 January 2010, Addendum, Ref.: Sales No. E.08.1.10, ST/SPACE/11/Rev.2/Add.3, (Vienna: United Nations, 2009).

[24] Treaty on Principles Governing the Activities of States in the Exploration and Use of the Outer Space, Including the Moon and Other Celestial Bodies (1967) (Resolution 2222 (XXI)), adopted on 19 December 1966, opened for signature on 27 January 1967, entered into force on 10 October 1967. (1967) 610 UNTS 205, 18 UST 2410, TIAS 6347; (1967) 6 ILM 386; (1967) 61 AJIL 644.

[25] Ratification refers to the act undertaken whereby a state establishes its consent to be bound by a treaty. Normally it involves two procedural acts: (1) Act of the appropriate state's organ, like the Crown in the United Kingdom, called ratification in the constitutional sense; (2) International procedure, by a formal exchange or deposit of the ratification instruments. For more information read Brownlie, Ian, *Principles of Public International Law,* 5th ed. (Oxford: Oxford University Press, 1999), at 611; see also http://europatientrights.eu/countries/signing_and_ratifying_a_treaty.html, accessed: 5 January 2013.

[26] See http://www.oosa.unvienna.org/oosatdb/showTreatySignatures.do, accessed: 5 January 2013.

[27] Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (1968) (Resolution 2345 (XXII)), adopted on 19 December 1967, opened for signature on 22 April 1968, entered into force on 3 December 1968. 19 UST 7570, 672 UNTS 119, TIAS 6599.

[28] See *supra* note 26.

[29] Convention on International Liability for Damage Caused by Space Objects (1972) (Resolution 2777 (XXVI)), adopted on 29 November 1971, opened for signature on 29 March 1972, entered into force on 1 September 1972. 24 UST 2389, 961 UNTS 187, TIAS 7762.

[30] See *supra* note 26.

[31] Convention on Registration of Objects Launched into Outer Space (1974) (Resolution 3235 (XXIX)), adopted on 12 November 1974, opened for signature on 14 January 1975, entered into force on 15 September 1976. 28 UST 695, 1023 UNTS 15, TIAS 8480.

[32] See *id*., and *supra* note 23.

[33] See *supra* note 26.

Agreement 1979,[34] the United Kingdom has neither signed nor ratified the Agreement. Thus, it is not a party to the Agreement.

In summary, the United Kingdom is a state party to four United Nations outer space conventions: the Outer Space Treaty 1967, the Rescue Agreement 1968, the Liability Convention 1972 and, lastly, the Registration Convention 1975. However, the country is a non-party state to the Moon Agreement 1979, as it has neither signed nor acceded to the Agreement. The United Kingdom became a party to all four conventions by means of ratification only. No mode of accession was used to signify its consent to be bound by the treaties. Being a state party to the four treaties, the United Kingdom is bound under the international obligation to abide by the legal rules set forth in treaties in regulating its outer space activities. The legal effects will then commence from the date of the state's ratification of the treaties.

3.2.3. National Space Legislation: The Outer Space Act 1986

The birth of the Outer Space Act 1986[35] was related to the growth of the United Kingdom's outer space-related activities. Prior to the late 1980s, the United Kingdom's outer space activities were conducted by the United Kingdom Government or Government-controlled organizations only.[36] However, when the commercialization of outer space activities commenced, it resulted in various UK companies procuring the launch of satellites as well as operating them. This scenario then led to the enactment of the first United Kingdom domestic outer space legislation in 1986, namely the Outer Space Act 1986. This then became the legal basis for regulating their outer space-related activities.

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[34] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (1979) (Resolution 34/68), adopted on 5 December 1979, opened for signature on 18 December 1979, entered into force on 11 July 1984. 18 ILM 1434, 1363 UNTS 3.

[35] The United Kingdom Outer Space Act 1986, 1986 Chapter 38; the full text is available at, http://www.bis.gov.uk/assets/ukspaceagency/docs/osa/outer-space-act-1986.pdf; see also http://www.bis.gov.uk/ukspaceagency/what-we-do/space-and-the-growth-agenda/uk-capabilities-for-overseas-markets/the-outer-space-act-1986, accessed: 6 January 2013.

[36] Tremayne-Smith, Richard J, "The Outer Space Act 1986: UK Experience", *Berlin Workshop, January 2004, Project 2001+*, http://www.docstoc.com/docs/34413827/OUTER-SPACE-ACT-1986, accessed: 5 January 2013.

(a) Nature and Scope

On 18 July 1986, the United Kingdom adopted the Outer Space Act for its outer space-related activities.[37] The enactment of the Act was in fact a response to the United Kingdom's constitutional requirements by which the state is bound by the international treaties it has ratified.[38] However, the treaties have no legal effect at the United Kingdom national level unless the rules are domesticated into United Kingdom law either by Act of Parliament or by United Kingdom subordinate legislation.[39] The Act's scope was set out in the light of Article VI of the Outer Space Treaty 1967.[40] The Outer Space Act 1986 encompasses fifteen articles that deal principally with the application of the Act, licensing activities, licensing procedure, registration of space object, and offences against the Act. The main purpose of passing the Act is to grant licensing and other powers to the United Kingdom Secretary of State. Such authorization was in turn delegated to the British National Space Centre (BNSC),[41] which was then replaced by the United Kingdom Space Agency on 1 April 2010**.** At present, the United Kingdom Space Agency administers the licensing regime of the Outer Space Act 1986 on behalf of the Secretary of State.[42] Apart from that, the Outer Space Act 1986 is designed to ensure that the United Kingdom Government complies with its obligations under

[37] See Preamble of the Outer Space Act 1986. See also *supra* note 35.

[38] In the United Kingdom, the Crown has the power to negotiate, sign and ratify international treaties. But, in actual practice, the treaty-making power falls to the Executive Branch of the United Kingdom Government. It has a practice of submitting the treaty to Parliament for a certain period before it is ratified. See Hermida, Julian, *Legal Basis for a National Space Legislation,* Space Regulations Library Series, vol. 3, (Dordrecht: Kluwer Academic Publisher, 2004), at 123; Lord Templeman, "Treaty Making and the British Parliament", *Parliamentary Participation in the Making and Operation of Treaties: A Comparative Study,* Eds., S.A. Riesenfeld, F.M.Abbott, (Dordrecht: Martinus Nijhoff Publishers, 1994), at 159.

[39] International agreements reached by the Crown in the exercise of its treaty-making power are not part of the law of England unless they are embodied in laws enacted by Parliament. The United Kingdom court held that the Bermuda Agreement did not form part of the law of England; thus, it could not restrict any powers of the United Kingdom Secretary of State to impose conditions when granting Pan American's operating permit. For details, read *Pan American World Airways v. Department of Trade*, [1976] 1 Lloyd's L.R. 257 (C.A.) (U.K.). See also Hermida, Julian, *id*,

[40] Refer to Article VI, Outer Space Treaty 1967, which states:

'*States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty. When activities are carried on in outer space, including the Moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization*. See also Tremayne-Smith, Richard J, *supra* note 36.

[41] Lyall, F., "UK Space Law", (1992) 35 *IISL* 386, as cited in Hermida, Julian, *supra* note 38, at 124.

[42] The UK Space Agency is the United Kingdom Government agency responsible for its civil space programme. It replaced the BNSC and took over responsibility for government policy and key budgets for space; it represents the United Kingdom in all negotiations on space matters. For official website of UK Space Agency refer *supra* note 18. See also http://en.wikipedia.org/wiki/UK_Space_Agency, accessed: 14 May 2014.

the international treaties and principles predominantly on the use of outer space regarding the launch and operation of space objects as well as other outer space activities carried out by persons connected with the country.[43]

In term of its application, the Act mainly covers launch activities, procurement,[44] and operation of space objects whether carried out in the United Kingdom or elsewhere. It also includes any other activities carried out in outer space.[45] The Act, as a matter of fact, applies specifically to United Kingdom nationals, Scottish firms, and bodies incorporated under the law of any part of the United Kingdom.[46] At this juncture, a United Kingdom national refers to an individual who is: (a) a British citizen, a British Dependent Territories citizen, a British National (Overseas), or a British Overseas citizen; (b) a person covered by the British Nationality Act 1981; and (c) a British protected person within the meaning of the Act.[47] The Act, in other words, is relevant to all activities in space carried out by United Kingdom nationals including companies, and also to any nationals of Overseas Territories and Crown Dependencies to which the Act has been extended through Orders in Council.[48]

The Outer Space Act 1986 also conferred on the Secretary of State the authority to make regulations prescribing anything required or authorized to be prescribed under this Act, and

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[43] *Id*.

[44] The word 'procurement' is noted as relevant in relation to the international space law liability. Such inclusion resulted in the insertion that any entity who might be 'involved anywhere down the chain of causation or responsibility could find himself included in the scope of the Act'. See Dunk, Frans von der, "Heeding the Public-Private Paradigm: Overview of National Space Legislation around the World", *2004 Space Law Conference Paper Assemble,* (Beijing: China Institute of Space Law, 2004), at 25.

[45] Article 1, Outer Space Act 1986.

[46] Article 2(1), Outer Space Act 1986.

[47] It is noted that only United Kingdom nationals would be subject to the provisions of the Outer Space Act 1986. Foreign nationals conducting space activities in the United Kingdom would not be subject to the regulation under this Act. Thus, such a situation may give the impression that the United Kingdom is not being adequately protected should any foreign national conduct launch activities from the United Kingdom and cause damage to third parties outside the United Kingdom. In such circumstances, the United Kingdom Government might be held liable not only under the Liability Convention 1972 as a launching state, but also internationally responsible under Article VI of the Outer Space Treaty 1967. Refer to Article 2(2), Outer Space Act 1986. See also Lee, Ricky J. and Felicity K. Eylward "Article II of the Outer Space Treaty and Human Presence on Celestial Bodies: Prohibition of State Sovereignty, Exclusive Property Rights, or Both?" (2006) 48 *IISL Colloquium on the Law of Outer Space* 222.

[48] British Overseas Territories (formerly known as British Dependent Territories) are 14 territories of the United Kingdom that fall under its jurisdiction but do not form part of the United Kingdom. They are remnants of the British Empire that have not acquired independence or have voted to remain British Territories. They include Falkland Islands, Gibraltar, Cayman Islands, Montserrat, Anguilla and Bermuda. Crown Dependencies are British possessions or under the sovereignty of the British Crown that have a different constitutional relationship or have independently administered jurisdiction with the United Kingdom. They do not form part of the United Kingdom either. They are the Channel Island Bailiwicks of Jersey and Guernsey, and the Isle of Man. Refer to Article 2(3), Outer Space Act 1986. Read also http://en.wikipedia.org/wiki/Crown_Dependencies; and http://en.wikipedia.org/wiki/British_Overseas_Territories, all accessed: 7 January 2013.

also for putting this Act into effect. Such regulations shall be made by statutory instrument which shall be subject to annulment in pursuance of a resolution of either House of Parliament.[49] In May 1989, a special committee known as the Parliamentary Space Committee of the United Kingdom was established in order to support and strengthen the growth of the United Kingdom's outer space activities.[50] The Committee acts as a forum of discussion for parliamentarians and industrialists to promote a better understanding of the United Kingdom's space activity and its economic, technological and scientific benefits. The Committee is also involved in the formulation of the United Kingdom's space policy.[51]

(b) Authorization: Licensing and Procedure

A requirement to obtain a licence to conduct space activities is a mode of authorization emphasized in the United Kingdom Outer Space Act 1986.[52] Under the United Kingdom licensing system of the Outer Space Act 1986, the general rule is that every person under this Act must acquire a licence for carrying on activities to which the Act applies.[53] In a strict sense, this means that no one is permitted to perform such activities except under the authority of a licence granted to him/her. Nevertheless, there is an exception to the general rule whereby certain persons and activities have been exempted from such obligation. This situation applies when it involves a person acting as an employee or agent of another.[54] Moreover, it also applies to activities where certain arrangements have been made between the United Kingdom and other countries to secure compliance with the United Kingdom's international obligations. This must be then certified by the United Kingdom Order in Council.[55] Apart from this, the exemption also applies when the Secretary of State exercises his/her power by order, which shall be made by statutory instrument, to exempt any other

[49] See Article 11(1) and (2), Outer Space Act 1986.
[50] It is formed by Members of Parliament of all political parties and representatives of the United Kingdom Industrial Space Committee and the British Association of Remote Sensing Companies. See Williamson, Mark, "The UK Parliamentary Space Committee: The Emergence of A Space Lobby?" (May, 1992) 8 *Space Policy* 159. Cited also in Hermida, Julian, *supra* note 38, at 126. The official website of Parliamentary Space Committee is available at http://www.parliamentaryspacecommittee.com/index.htm, accessed: 7 January 2013.
[51] Williamson, Mark, *id.*, at 159. Cited also in Hermida, Julian, *supra* note 38, at 125.
[52] Article VI, Outer Space Treaty 1967. See *supra* note 40.
[53] Article 3(1), Outer Space Act 1986 states: '*A person to whom this Act applies shall not, … carry on an activity to which this Act applies except under the authority of a licence granted by the Secretary of State*'. See also Article 1, Outer Space Act 1986.
[54] Article 3(2), Outer Space Act 1986 states: '*A licence is not required – (a) by a person acting as employee or agent of another; or (b) for activities in respect of which it is certified by Order in Council that arrangements have been made between the United Kingdom and another country to secure compliance with the international obligations of the United Kingdom*'.
[55] *Id*.

persons and activities from the requirement to obtain a licence provided that he/she is satisfied that the requirement is unnecessary to secure compliance with the United Kingdom's international obligation.[56]

The power to grant a licence lies in the hands of the Secretary of State, who may grant the licence only when he/she thinks fit.[57] In such circumstances, before granting the licence, the Secretary of State must be satisfied that the activities are categorized under the three conditions prescribed by the Act. Those conditions are as follows: First, the activities must not jeopardize public health and the safety of persons and property; second, the activities must also be consistent with the international obligations of the United Kingdom; finally, the activities must not impair the United Kingdom's national security.[58]

In terms of procedure for granting the licence, the Act does not specifically provide a mode. However, the Act in fact gives the Secretary of State power to make regulations regarding the procedure to follow. Apart from that, the Secretary of State has the power to prescribe the form and contents of the licensing application, as well as other documents. The Secretary of State may also impose a requirement for the payment of prescribed fees. Furthermore, the Secretary of State may formulate a time limit for anything done in connection with the application, and provide an extension of any period so prescribed.[59] In the event of the licence application being granted, such licence shall describe the authorised activities that are granted for a stipulated period, which is then subject to any prescribed conditions as the Secretary of State thinks fit.[60]

(c) Registration Obligation

Apart from the licensing system, the Outer Space Act 1986 imposes an obligation of registration of the space object.[61] Any licensee who obtains a licence under the Outer Space Act 1986 is obliged to register the space object in compliance with the United Kingdom's international obligation.[62] The registration is executed by providing particulars of the space

[56] See Article 3(3), and also Article 3(4), Outer Space Act 1986.
[57] Article 4(1), Outer Space Act 1986 states: *'The Secretary of State may grant a licence if he thinks fit'.*
[58] See Article 4(2), Outer Space Act 1986.
[59] See Article 4(3), Outer Space Act 1986.
[60] See Article 5(1), Outer Space Act 1986, and also *supra* note 58.
[61] See Article 7, Outer Space Act 1986.
[62] See also Article IV, Registration Convention 1975.

object to the Secretary of State, including information on its date of construction, launch location, orbital parameters (such as apogee and perigee), its general function, and other information considered necessary, particularly in relation to its nature and conduct and the results of the licensee's activities.[63] Such particulars must be provided as soon as possible[64] and must be entered in the United Kingdom registry of space objects. It is the Secretary of State's duty to maintain the registry of space objects.[65] Regarding the inspection of the information in the registry, the Outer Space Act 1986 indeed allows the public to inspect a copy of the registry provided that a prescribed fee is paid to the Secretary of State.[66]

In addition to the above, the United Kingdom Government initiated a supplementary registry of space objects. This supplementary system is a result of the United Kingdom Government policy that allows transparency on all licences issued under the Outer Space Act 1986. It also aims to provide visibility to the United Kingdom Government and international authorities of the objects launched into orbit.[67] This applies in situations where a United Kingdom satellite supplier has procured the launch of a space object, but the object appears on the registry of another state party to the Registration Convention 1975. In such circumstances, the United Kingdom supplementary registry of space objects will then record the object. Apart from that, the supplementary registry will record the circumstances in which the title and control of the space object, such as a satellite, was transferred to a United Kingdom satellite operator after its launch provided that the Secretary of State has licensed that company to operate such a satellite.[68]

(d) Constant Monitoring and Supervision

The Outer Space Act 1986 also institutes a comprehensive monitoring and supervision system. Under the system, the Secretary of State can constantly monitor, supervise and control the space-related activities registered under this Act. The licensee, having been granted a licence under this Act, must allow the Secretary of State to inspect the licensee's

[63] See Article 7(2) and Article 5(2)(b), Outer Space Act 1986.
[64] See Article 5(2)(b), Outer Space Act 1986.
[65] See Article 7(1), Outer Space Act 1986.
[66] See Article 7(3), Outer Space Act 1986.
[67] See http://www.bis.gov.uk/ukspaceagency/what-we-do/space-and-the-growth-agenda/uk-capabilities-for-overseas-markets/the-outer-space-act-1986/registry-of-space-objects, accessed: 14 May 2014; see also Hermida, Julian, *supra* note 38, at 134.
[68] See *Id*.

facilities, and indeed authorize the Secretary of State to test the related equipment.[69] Such a task is admissible when the licensee provides the information required by the Secretary of State regarding his activities.[70] Moreover, the Secretary of State is entitled to inspect and take copies of documents related to the information given.[71] Another controlling measure imposed under the Outer Space Act 1986 is the requirement for the licensee to obtain approval in advance from the Secretary of State for any intended deviation by a space object from its orbital parameter. The Secretary of State must also be informed immediately of any unintended deviation of the object.[72] With regard to the disposal of a payload in outer space, the licensee is required to notify the Secretary of State as soon as is practicable of such final disposal.[73]

The possibility of monitoring and controlling outer space activities also occurs when the Act grants the Secretary of State power to give direction to any person carrying on activities in contravention of the licensing requirements and condition. This also occurs when the Secretary of State finds it necessary to secure compliance with the United Kingdom's international obligations.[74] In addition, the Secretary of State may give directions in order to secure the cessation of the activity and the disposal of the space object.[75] Moreover, a warrant can be issued by a Justice of the Peace, who may authorize a person, acting on behalf of the Secretary of State, to do anything necessary to secure compliance with the United Kingdom's international obligations and the licensing conditions. This can be executed if the Justice of the Peace is satisfied that there are reasonable grounds for believing that outer space-related activities are being carried out in violation of the licensing conditions and are not complying with the directions issued.[76] Apart from that, the licence is subject to variation, suspension and termination in the event of the licensing conditions not being complied with, or in the interests of public health, national security or compliance with the United Kingdom's

[69] See Article 5(2)(a), Outer Space Act 1986.
[70] See *supra* note 62.
[71] See Article 5(2)(c), Outer Space Act 1986.
[72] See Article 5(2)(d), Outer Space Act 1986.
[73] See Article 5(2)(e) and (g), Outer Space Act 1986.
[74] See Article 8(1)(a) and (b), Outer Space Act 1986.
[75] Compliance with such direction may be enforced on the application of the Secretary of State by injunction, interdict, or by order. For details, read Article 8(2) and Article 8(3), Outer Space Act 1986.
[76] The warrant will specify the action authorized, such as entry onto specified premises at any reasonable hour. It also may include power to use force, if necessary. See Article 9(1), 9(2), 9(3), 9(4), Outer Space Act 1986.

international obligations.[77] In fact, the licence may only be transferred with the written consent of the Secretary of State.[78]

(e) Liability and Indemnification

Under the international rule of liability,[79] a state is internationally liable for any damage caused by a space object, regardless of whether the object is owned, operated, launched or paid for by any private entity, as long as such state qualifies as a launching state of the space object concerned.[80] Thus, bound by such rule of liability, the United Kingdom Government can be held internationally liable for damage caused by a space object in circumstances where the state is a launching state.[81] Founded on this fact, the Outer Space Act 1986 therefore initiates a rule of obligation for the licensee to indemnify the United Kingdom Government against any claim brought under this Act. In other words, the Outer Space Act 1986 establishes a statutory indemnification rule prescribing that the licensee shall indemnify the United Kingdom Government against any claim brought against the Government in respect of damage or loss arising out of the space-related activities carried on by the licensee.[82] This indemnification rule applies even if the licensee is not the actual perpetrator of the damage.[83] It is noted that the rule was designed to pass the risk of international liability to the licensee,

[77] See Article 6(2) and 6(3), Outer Space Act 1986.
[78] See Article 6(1), Outer Space Act 1986.
[79] See Article VII of the Outer Space Treaty 1967 and the Liability Convention 1972. The Article VII of the Treaty 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"*.
[80] Dunk, F.G. von der, "Fundamental Provisions for National Space Laws", *Proceedings of United Nations/Nigeria Workshop on Space Law, in Abuja, Nigeria, 21-24 November 2005* (Vienna: United Nations, 2006), at 264. See also *id*.
[81] See Article I(c), Liability Convention 1972.
[82] Article 10(1), Outer Space Act 1986 stipulates, "*A person to whom this Act applies shall indemnify Her Majesty's government in the United Kingdom against any claims brought against the government in respect of damage or loss arising out of activities carried on by him to which this Act applies*".
[83] For instance, the licensee might be a satellite telecommunications operator licensed under the United Kingdom law. Its satellite, carried by a launch vehicle of another state, causes damage to a third state (Here, the actual wrongdoer is the launch services provider). In such circumstances, the third state may claim compensation from the United Kingdom Government in accordance with the Liability Convention 1972. This happens under the joint and several liabilities for damages when the object is jointly launched by two or more states. However, under the United Kingdom Outer Space Act 1986, the United Kingdom Government may, in return, seek the reimbursement of this compensation from the satellite telecommunications operator licensed under its law. See Hermida, Julian, *supra* note 38, at 127.

which is done without limit.[84] In such a situation, the Outer Space Act 1986, in return, prescribes the requirement of the licensee to insure him/herself against liability incurred in respect of damage or loss suffered by a third party as a consequence of the activities authorized by the licence.[85] This is done in order to secure the availability of funds in confronting the obligations arising from such statutory indemnity rule.[86]

On the other hand, the Act prescribes two exceptions to the general rule of indemnification. These exceptions reflect the two circumstances in which the indemnification does not apply: (1) to a person acting as employee or agent of another; and (2) to damage, or loss resulting from anything done on the instruction of the Secretary of State.[87]

(f) Safety, Peace and Security Measurement

In view of spirit of safety and peace introduced by the international law[88] with respect to conducting outer space-related activities, the Outer Space Act 1986 establishes an explicit condition on the technical safety assessment.[89] The Act strictly requires the licensee to conduct his operations in a manner that will prevent the contamination of outer space or adverse changes to the Earth's environment.[90] The Act further stresses the requirement for the licensee to conduct such activities in a way that avoids interference with other activities in the peaceful exploration and use of outer space.[91] In addition, the related activities must not jeopardize public health and the safety of persons and property; this forms part of the conditions for granting a licence to the licensee.[92] The licensing terms also contain conditions governing the actual disposal of a payload in outer space on the termination of the operations

[84] Ballard, Tony, "National Space Laws: United Kingdom Outer Space Act", *Proceedings of the United Nations/International Institute of Air and Space Law Workshop on Capacity Building in Space Law, The Hague, Netherlands, 18-21 November 2002, ST/SPACE/14,* (New York: United Nations, 2003), at 206.
[85] Article 5(2)(f), Outer Space Act 1986.
[86] Hermida, Julian, *supra* note 38, at 128.
[87] See Article 10(2), Outer Space Act 1986.
[88] Read Article IX, Outer Space Treaty 1967.
[89] Close, Roger, "Outer Space Act 1986: Scope and Implementation", *Proceedings of the Project 2001 – Workshop on National Space Legislation, 'Need and Prospects for National Space Legislation', at Munich, Germany, 5-6 Dec. 2000.* Ed. Institute of Air and Space Law, Cologne University and Deutsches Zentrum fur Luft- und Raumfahrt (DLR), (Cologne: Institute of Air and Space Law & Chair of International Business Law of the University of Cologne, 2001), at 141-147.
[90] See Article 5(2)(e)(i), Outer Space Act 1986.
[91] See Article 5(2)(e)(ii), Outer Space Act 1986.
[92] See Article 4(2)(a), Outer Space Act 1986.

specified under the licence. They also include a requirement for the licensee to notify the Secretary of State as soon as is practicable of the payload final disposal.[93]

With respect to the security aspect, the Outer Space Act 1986 prescribes that the licence shall contain conditions requiring the licensee to conduct his/her operations in such a way as to preserve the national security of the United Kingdom.[94] Therefore, the licence will not be granted by the Secretary of State unless he/she is satisfied that the activities authorized by the licence will not impair the national security of the United Kingdom.[95] The Act also grants the Secretary of State power to revoke, vary or suspend a licence if it appears to the Secretary of State that revocation, variation or suspension of the licence is required in the interests of the public health or national security of the country.[96]

(g) Other Provisions

Among other provisions set forth in the Outer Space Act 1986 are those dealing with offences.[97] The Act sets out a list of criminal offences that will be deemed to have been committed by any persons carrying out activities in contravention of the licensing requirements.[98] The Act also prescribes that it is an offence to make a false statement knowingly or recklessly for the purpose of obtaining a licence.[99] Besides that, other actions classified as offences under this Act include the following: failure to comply with the direction issued; intentionally obstructing a person in the exercise of powers conferred by an issued warrant; and failure to comply with the conditions and regulations as prescribed under the Outer Space Act 1986.[100] The Act confers the liability of the offender by stipulating that he/she is liable on conviction or indictment to a fine, and on summary conviction to a fine not exceeding the statutory maximum.[101] In the event of an offence being committed by a

[93] See Article 5(2)(g), Outer Space Act 1986. See also, Dunk, F.G. von der, *Private Enterprise and Public Interest in the European 'Spacecape': Towards Harmonized National Space Legislation for Private Space Activities in Europe,* (Leiden: International Institute of Air and Space Law, Faculty of Law, Leiden University, 1998), at 139.
[94] See Article 5(2)(e)(iv), Outer Space Act 1986.
[95] See Article 4(2)(c), Outer Space Act 1986.
[96] See Article 6(2)(b), Outer Space Act 1986.
[97] See Article 12, Outer Space Act 1986.
[98] See Article 12(1)(a), Outer Space Act 1986. See also Brisibe, T.C. and M.E. Davies, "The Regulation of Commercial Space Launches: The Differences between the National Systems", (2002) 44 *IISL Colloquium on the Law of Outer Space* 46.
[99] See Article 12(1)(b), Outer Space Act 1986.
[100] See Articles 12(1)(c), (d), (e), and (f), Outer Space Act 1986.
[101] See Article 12(1)(2), Outer Space Act 1986.

corporate body, with the consent or involvement of a director, secretary, or other similar officer, or a person purporting to act in any such capacity, he/she and the corporate body will be guilty of the offence.[102]

Regarding the proceedings for an offence committed outside the United Kingdom, it may be taken and treated as having been committed in any place in the United Kingdom.[103] The Act also prescribes that the accused is allowed to defend him/herself by proving that he/she used all due diligence and took all reasonable precautions to avoid the commission of the offence.[104]

The Outer Space Act 1986 also provides several definition clauses to elaborate the meanings of certain words, including the terms 'dependent territory', 'outer space', and 'space object'.[105] Other articles dealt with in this Act include the short title of the Act, its commencement, and its extent.[106]

3.2.4. Concluding Remarks

The United Kingdom is a party to all United Nations outer space treaties except the Moon Agreement 1979. This situation indicates that the United Kingdom is ready to be bound by the international legal rules and obligations stipulated in the United Nations outer space treaties. The enactment of the United Kingdom's Outer Space Act 1986 is, in fact, a response to the United Kingdom's constitutional requirement by which the state is bound by the international treaties it has ratified. However, such treaties do not bind their nationals and incorporated companies unless the rules are domesticated by a United Kingdom Act of Parliament or its subordinate legislation. In such circumstances, it is noted that among the purposes of establishing the Outer Space 1986 is to realise the matter.

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[102] See Article 12(3), Outer Space Act 1986.
[103] See Article 12(4), Outer Space Act 1986.
[104] See Article 12(5), Outer Space Act 1986.
[105] Article 13(1), Outer Space Act 1986 states: "*dependent territory', means – (a) a colony, or (b) a country outside Her Majesty's dominions in which Her Majesty has jurisdiction in right of Her Government in the United Kingdom; "outer space" includes the moon and other celestial bodies; and "space object" includes the component parts of a space object, its launch vehicle and the component parts of that".*
[106] See Article 15, Outer Space Act 1986.

The Outer Space Act 1986 establishes a comprehensive licensing regime as a mode of authorization, accompanied by a set of regulations and conditions that control the United Kingdom's outer space activities. In terms of issuing a licence, the Act grants power to the United Kingdom Secretary of State to issue licences, impose conditions, regulate procedures, and supervise outer space-related activities. Such power was then delegated to the British National Space Centre (BNSC**),** which was replaced by the United Kingdom Space Agency. Apart from that, the United Kingdom Government established a United Kingdom Parliamentary Space Committee to support and sustain the growth of the United Kingdom's outer space activities.

With regard to the registration obligation, the United Kingdom has two systems of registration. These systems, a main and supplementary registration system, are designed to complement each other. The Act also introduced a statutory indemnification rule to safeguard the United Kingdom Government against any claims brought against it. It is also noted that the United Kingdom Government instils the spirit of safety, peace and security with respect to conducting its outer space-related activities in some clauses of its Outer Space Act 1986.

3.3. AUSTRALIA

3.3.1. An Overview

Australia, officially known as the Commonwealth of Australia, comprises the mainland of the Australian continent,[107] the island of Tasmania, and numerous smaller islands in the Indian and Pacific Oceans. Its capital city is Canberra, and its national language is English. Politically, Australia is a federal parliamentary democracy state[108] with a constitutional monarchy system.[109] Its federal government has three separate branches: (1) Legislative; (2) Executive; and (3) Judiciary.[110] At the Australian Commonwealth Government level, the

[107] The continent of Australia is the world's smallest continent. See http://en.wikipedia.org/wiki/Australia#Geography_and_climate, accessed: 15 January 2013.
[108] A federal state, in contrast to a unitary state, is a type of sovereign state characterized by a union of partially self-governing states united by a federal or central government. See http://en.wikipedia.org/wiki/Federal_state, accessed: 15 January 2013.
[109] A constitutional monarchy system is a form of government in which a monarch acts as a head of state within the parameter of a constitution.
[110] The legislative branch is a body with the legislative power to make law. The executive branch is a body to administer the law. And the judiciary branch is a body to interpret and apply the law. For more details read

Parliament encompasses the House of Representatives and the Senate. At the State Government level, it comprises the Lower House and Upper House. Under the Australian constitutional monarchy system, Queen Elizabeth II[111] is the head of state. In practice, the Queen has no role within the Australian political system beyond a ceremonial one. The Queen is represented at the national level by a Governor General, who is appointed on the recommendation of the Australian Prime Minister. The Governor General acts only on the advice of Ministers in virtually all matters. At the state level, six State Governors perform the same roles in their respective states.[112] With respect to the country's legal system, Australia follows the common law legal system with its main sources of constitutional law, statute, common law, equity, and international law.

Economically, Australia is the thirteenth largest national economy in the world by nominal gross domestic product (GDP).[113]. Australia is a prosperous developed country with an economy dominated by its services sector, including tourism, media, education, and financial services. Agriculture and natural resources are reported to contribute substantially to the state's export performance.[114] The same is true for its space sector, which is a major contributor to the Australian economy. It was reported that 'space-enabled services and applications' were categorized as the major category of Australian space-related activities. This category is regarded as the largest area of Australian space-related activities; it includes telecommunications and broadcasting services, Earth observation services including satellite imagery and positioning, navigation, and timing services.[115] As a matter of fact, Australia's involvement in space activities started as early as 1949 in Woomera. The place was chosen by the European Launcher Development Organization (ELDO) as the launch site for test vehicles. Australia was granted the status of the only non-European member of ELDO in return for providing the launch facility. A series of launches was conducted in Woomera from

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"Australia's Political System", http://www.abc.net.au/ra/federasi/tema1/aus_pol_chart_e.pdf, accessed: 15 January 2013.

[111] The Queen of the United Kingdom.

[112] See *supra* note 110.

[113] This data is as of 2011. Refer http://en.wikipedia.org/wiki/Economy_of_Australia, accessed: 15 January 2013.

[114] See *id*.

[115] Asia Pacific Aerospace Consultants Pty Ltd, *A Review of Current Australian Space Activities: Executive Summary, April 2010*, A Report to the Space Policy Unit, Department of Innovation, Industry, Science & Research, available at http://www.space.gov.au/Documents/APAC%20Final%20Report%20-%20Current%20Space%20Activities%20April%202010%20-%20Executive%20Summary.pdf, accessed: 15 January 2013.

1964 to 1970.[116] In 1961, it was evident that Australia had entered into bilateral arrangements with the United States regarding its satellite programme. These arrangements resulted in the establishment of a number of space tracking stations in Australia.[117] It is noted that such circumstances contributed significantly to the evolution of the Australia's early involvement in space activities. It was reported that, from 1967 until 2009, 13 objects were launched into space by Australia. All those objects were registered with the United Nations as prescribed by the UN space treaties.[118]

Around the late1990s, the Australian Government began to seriously consider the potential of their commercial space launch industry with the implementation of the Australian Space Activities Act 1998.[119] In mid-2001, it established the 'Space Licensing and Safety Office' (SLASO) to regulate the space activities undertaken under the Space Activities Act 1998.[120] However, in 2003 Australian space activities experienced a major shock. This occurred when the Australian Space Engagement and Policy Framework,[121] with its numerous revisions, indicated that there was no pressing necessity and support for its space programme. Indeed, 2005 saw the termination of Australian Government funding for its Cooperative Research Centre for Satellite Systems (CRCSS).[122] However, in May 2009, the Australian Government announced its support for the establishment of an Australian Space Science Programme to coordinate its national and international civil space activities, as well as its space research, innovation and skills development. Under this programme, a Space Policy Unit and a Space Industry Innovation Council (Space Council) were established. [123] All those significant steps,

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[116] http://en.wikipedia.org/wiki/Australian_Space_Research_Institute#History_of_space_activities_in_Australia accessed: 15 January 2013.

[117] The arrangement was made through 'Exchange of Notes constituting an Agreement between the Government of Australia and the Government of the United States of America for Cooperation in a Transit Navigational Satellite Program', 5 June 1961, [1961] ATS 10, as cited in Freeland, Steven, "The Australian Regulatory Regime for Space Launch Activities: Out to Launch?", (2005), 47 *IISL Colloquium on the Law of Outer Space* 57.

[118] See http://www.oosa.unvienna.org/oosa/search.do, accessed: 15 January 2013.

[119] Siemon, Noel, and Steven Freeland, "Regulation of Space Activities in Australia", *National Regulation of Space Activities,* ed., Jakhu, Ram S., (Dordrecht: Springer, 2010), at 38. See also *infra* note 141.

[120] See http://www.space.gov.au/SpaceLicensingSafetyOffice/Pages/default.aspx, accessed: 15 January 2013.

[121] Australian Government Space Engagement: Policy Framework and Overview at 10, as cited in Siemon, Noel, and Steven Freeland, *supra* note 119, at 41.

[122] The CRCSS built and operated the Australian research satellite FedSat, launched in December 2002. See "Milestone for Australian Satellite as Space Effort Hits Wall", *Space Daily*, 15 December 2004 (accessed at www.spacedaily.com, on 20 January 2005), as cited in Siemon, Noel, and Steven Freeland, *supra* note 119, at 41.

[123] The Space Policy Unit was established in July 2009 in the Australian Department of Innovation, Industry, Science and Research. However, on December 2011, it became part of the Department of Industry, Innovation, Science, Research and Tertiary Education. For the Space Industry Innovation Council (Space Council), an announcement was made on 19 November 2009 on the establishment of Australian Industry Innovation

in fact, were executed after the Australian Senate Standing Committee on Economics issued its final report in November 2008. Thus, such circumstances provide a possible platform upon which Australia might develop a revised national space strategy for the future.[124]

The Space Policy Unit was established on 1 July 2009. However, on 15 December 2011, the Unit became part of the the newly established Department of Industry, Innovation, Science, Research and Tertiary Education. Among its responsibilities is to bring forward a National Space Policy for consideration by the Australian Government. The Policy focuses on three main areas: (1) satellite communications; (2) Earth observations and remote sensing; and (3) position navigation and timing applications. It will address, among other things, how the country utilizes space to tackle climate change, weather forecasting, natural resource management, forestry and agriculture, disaster management, and national security.[125] Meanwhile, the establishment of the Space Industry Innovation Council recognizes the importance of the space sector to Australia. Among the Council's responsibilities are the provision of strategic advice on innovation priorities in the space sector to the Minister and the forging of links with other organizations.[126] At this point, it is perhaps worth mentioning the Australian Space Research Institute (ASRI).[127] This is a non-profit research organization that contributes to the growth of Australian space activities. The Institute was created to provide opportunities for space-related industries and technological development for the Australian technical community.[128]

3.3.2. Five Outer Space Conventions: Australia's Status

Australia is a party to all five United Nations outer space conventions.[129] Australia signed the first outer space convention, the Outer Space Treaty 1967,[130] on 27 January 1967, the date it

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Councils which included the Space Council. See http://www.space.gov.au/SPACEPOLICYUNIT/NATIONALSPACEPOLICY/Pages/default.aspx; and http://www.space.gov.au/SPACEINDUSTRYINNOVATIONCOUNCIL/Pages/default.aspx, both accessed: 16 January 2013.

[124] See Siemon, Noel, and Steven Freeland, *supra* note 119, at 44.

[125] See http://www.space.gov.au/SPACEPOLICYUNIT/NATIONALSPACEPOLICY/Pages/default.aspx, accessed: 15 January 2013.

[126] See http://www.space.gov.au/SpaceIndustryInnovationCouncil/Pages/default.aspx, accessed: 15 January 2013.

[127] Its website is available at http://www.asri.org.au/About, accessed: 15 January 2013.

[128] See *supra* note 116.

[129] These conventions are: the Outer Space Treaty 1967, the Rescue Agreement 1968, the Liability Convention 1972, the Registration Convention 1975, and the Moon Agreement 1979. See United Nations, *supra* note 23.

[130] Outer Space Treaty 1967, *supra* note 24.

was opened for signature for all states. On 10 October the same year, the date when the Outer Space Treaty 1967 entered into force, Australia ratified the Treaty.[131] From this date, Australia has been bound by its international obligation to observe and comply with the legal rules set forth in the Outer Space Treaty 1967.

The second agreement was the Rescue Agreement 1968.[132] Australia indicated its early interest in becoming a party to the Rescue Agreement 1968 by signing the Agreement on 22 April 1968. This was the date when the Rescue Agreement 1968 was opened to signature for all states. However, Australia ratified this Agreement only on 18 March 1986, approximately 18 years after the date of its entry into force, on 3 December 1968.[133] This shows that Australia took about 18 years to consider becoming a party to the Agreement after its signature date. The third was the Liability Convention 1972,[134] to which became a party by accession[135]. The state acceded to the Liability Convention 1972 on 20 January 1975, about three years after its date of entry into force on, 1 September 1972.[136]

The fourth United Nations outer space convention was the Registration Convention 1975,[137] to which Australia became a party by accession. The accession date was 11 March 1986. Such accession took place only 10 years after the Convention entered into force, 15 September 1976.[138] The last Agreement was the Moon Agreement 1979,[139] to which the country acceded on 7 July 1986.[140] This accession was executed about four months after Australia's accession to the Registration Convention 1975. It is noted that the country took around just two years to accede to the Agreement after the Agreement had entered into force, on 11 July 1984.

To sum up, Australia is a state party to all five United Nations outer space conventions: the Outer Space Treaty 1967, the Rescue Agreement 1968, the Liability Convention 1972, the

[131] See *supra* note 26.
[132] Rescue Agreement 1968, *supra* note 27.
[133] See *id*., and *supra* note 26.
[134] Liability Convention 1972, *supra* note 29.
[135] Accession occurs when a state that has not signed a treaty already signed by other states formally accepts its provisions. Accession may occur before of after the treaty has entered into force. The procedure involved depends on the provisions of the treaty. See Brownlie, Ian, *supra* note 25, at 611.
[136] See *supra* note 26.
[137] Registration Convention 1975, *supra* note 31.
[138] See *id*., and *supra* note 26.
[139] Moon Agreement 1979, *supra* note 34.
[140] See *supra* note 26.

Registration Convention 1975 and, lastly, the Moon Agreement 1979. Australia expressed its consent to be bound by the treaties in two ways: ratification and accession. The state became a party to two treaties - the Outer Space Treaty 1967 and the Rescue Agreement 1968 - via ratification. It became a party to the other three treaties - the Liability Convention 1972, the Registration Agreement 1975, and the Moon Agreement 1978 - through accession. Since Australia is a party to all five UN outer space treaties, the state is bound by the legal rules stipulated in all United Nations outer space treaties. Such binding effect commenced from the moment Australia ratified or acceded to the treaties.

3.3.3. National Space Legislation: Space Activities Act 1998

The birth of the Space Activities Act 1998[141] was closely related to the Australian Government policy in the late 1990s. Around this period, the Australian Government started to seriously consider the potential of its space launch industry. This was in response to the interests of various private sectors in the development of the space launch industry in Australia. For example, Kistler Aerospace submitted a proposal in 1997 to develop and operate a commercial launch facility at Woomera.[142] Other private commercial launch operators also showed the same interest.[143] At this point, it is noted that the interest of space-faring nations in conducting launch activities in Australia is, in fact, based on certain criteria. The country is regarded as a suitable place to conduct launch activities not only because of its highly suitable geographical features such as its proximity to the equator, but also because of its extensive sparsely-populated land areas. Such a location reduces the risk of human injury. Moreover, the country offers numerous other advantages including a stable political history, technical expertise, and well developed and sophisticated infrastructure such as telecommunications and transport facilities.[144] Acknowledging its great potential in the space

[141] The Space Activities Act 1998 refers to 'Act No. 123 of 1998 as amended, taking into account amendments up to Act No. 8 of 2010'. It was prepared by the Office of Legislative Drafting, Attorney-General Department, Canberra. The full text is available at http://www.comlaw.gov.au/Details/C2010C00193, accessed: 17 January 2013.

[142] In April 1997, the American corporation Kistler Aerospace Corporation signed an Operations Agreement with the Australian Government, to allow the company to develop and operate a commercial launch facility at Woomeera. Even though this project has not proceeded due to funding difficulties, the Australian Government still describes it as 'under development'. For more information see Freeland, Steven, *supra* note 117, at 57-58; Siemon, Noel, and Steven Freeland, *supra* note 119, at 46.

[143] To name a few, they are: the United Launch Systems International, and the Asia Pacific Space Centre Pty Ltd (ASPC). For more information read Freeland, Steven, *supra* note 117, at 57-58; Siemon, Noel, and Steven Freeland, *supra* note 119, at 46.

[144] Davies, Michael, "Space Legislation: The Australian Experience", *Proceedings of the Project 2001 – Workshop on National Space Legislation, 'Need and Prospects for National Space Legislation', at Munich,*

launch industry, by the end of 1998 the Australian Government had introduced its first domestic space legislation, namely the Space Activities Act 1998.[145] Such legislation, together with the Australian Space Activities Regulation 2001[146], aims to provide a regulatory framework for Australian space activities. The laws outline, in particular, the operation of launch facilities, the launching of space objects, and the return of space objects in fulfilment of Australia's international obligations under the United Nations space treaties.[147]

(a) Nature and Scope

The Space Activities Act came into force on 21 December 1998,[148] the day on which the Act received the Royal Assent.[149] The passing of the Act was actually, *inter alia*, for the implementation of a number of Australia's obligations under the United Nations space treaties.[150] As mentioned earlier, Australia is a party to all five United Nations space treaties. Of these five treaties, two - the Outer Space Treaty 1967 and the Liability Convention 1972 - reflect most of the provisions of the Australian Space Activities Act 1998. This is because these two treaties are the most relevant to commercial and private space activities.[151] It is noted that, under Australian law, similarly to the United Kingdom, the international treaties ratified will only bind the state. However, such treaties have no legal effect at the national level. This is because mere ratification does not make treaties operate domestically. Hence, in such circumstances, the treaties will not impose any legal obligation on nationals unless the rules are incorporated into Australian domestic law.[152]

Germany, 5-6 Dec. 2000. Ed. Institute of Air and Space Law, Cologne University and Deutsches Zentrum für Luft- und Raumfahrt (DLR), (Cologne: Institute of Air and Space Law & Chair of International Business Law of the University of Cologne, 2001), at 165. See also Freeland, Steven, *supra* note 117, at 58.

[145] See *supra* note 141.

[146] The full text of the Australian Space Activities Regulation 2001 is available at http://www.comlaw.gov.au/Details/F2004C00906, accessed: 17 January 2013.

[147] Siemon, Noel, and Steven Freeland, *supra* note 119, at 47.

[148] See *supra* note 141.

[149] Section 2, Space Activities Act 1998.

[150] Section 3(c), Space Activities Act 1998.

[151] Lee, Ricky J., "The Australian Space Activities Act: Creating a Regulatory Regime for Space Activities", (2000) XXV (No.2) *AIR & Space Law* 57.

[152] In Australia, the federal executive, through the Crown's representative, has an exclusive treaty-making power. The federal power, nominally vested in the Queen, is exercisable by the Governor-General. In practice, treaty-making is carried out by the Federal Executive Council. They will negotiate, conclude, and even ratify the treaties. And, like the United Kingdom, the treaty will be tabled before Parliament for a certain period, for the members to give comments. Hermida, Julian, *supra* note 38, at 11. See also http://www.dfat.gov.au/treaties/making/ , accessed: 17 January 2013.

Based on the above scenario, the Space Activities Act 1998 then materialized. The Act constitutes a fairly comprehensive piece of domestic space legislation.[153] It was designed to meet certain purposes. Aside from the implementation of obligations prescribed by the United Nations treaties, its other objectives include the establishment of a system for regulating space activities carried on either from Australia or by Australian nationals outside Australia.[154] Its other purposes are to provide payment of compensation for damage caused by the space activities and to implement Australia's obligations under the space cooperation agreements.[155] Considering the historical background of the state's early involvement in space activities and the fact that Australia herself does not have a space launch carrier industry, it is observed that the process of drafting the Act was done with the mind-set of attracting and encouraging foreign companies to establish space launch facilities in Australia and its territorial waters.[156] In view of that, the Act was indeed designed for the purpose of facilitating a commercial space launch industry in Australia, as well as launching Australian payloads from overseas site[157] within the context of ensuring the preservation of public safety.[158] In terms of space-related activities, the Act deals only with launch activities and the return of space objects. No other specific space-related activities, including satellite communication, are mentioned in the Act.

In general, the Space Activities Act 1998 comprises 8 parts and 110 sections.[159] Those parts are as follows: Introduction (Part 1); Definitions (Part 2); Regulation of space activities (Part 3); Liability (Part 4); Registration (Part 5); Space cooperation agreements (Part 5A); Civil penalties (Part 6); Investigation of accidents (Part 7); and Miscellaneous (Part 8). In relation to the application of the Act, the provisions apply to space activities conducted either in

[153] Hermida, Julian, *supra* note 38, at 112.
[154] See *infra* note 160.
[155] The last objective was subsequently added to the Act under the Space Activities Amendment (Bilateral Agreement) Act 2001 (Cth). It takes into account the implementation of intergovernmental agreement between Australia and Russia. See Section 3, Space Activities Act 1998; Freeland, Steven, "Australian National Space Legislation and Policy", *2004 Space Law Conference Paper Assemble,* (Beijing: China Institute of Space Law, 2004), at 104; see also Siemon, Noel, and Steven Freeland, *supra* note 119, at 48.
[156] Hermida, Julian, *supra* note 38, at 112.
[157] Dunk, Frans von der, "Launching From 'Down Under': The New Australian Space Activities Act of 1998", (2001) *43 IISL Colloquium on the Law of Outer Space* 136.
[158] It is reported that Australian law draws greatly on the United States experience with the United States Commercial Space Launch Act. Larsen, Paul B. "Commercial Space Launches", *Proceedings of The Space Law Conference 2006: Asian Cooperation in Space Activities, A Common Approach to Legal Matters' in Bangkok, Thailand, 2-3 August 2006,* (Montreal: Institute and Centre for Research of Air and Space Law, McGill University, 2007); Siemon, Noel, and Steven Freeland, *supra* note 119, at 48.
[159] See *supra* note 141.

Australia, or undertaken by the Australian nationals abroad.[160] At this juncture, it should be noted that 'Australian national' may mean either an Australian citizen, or a body incorporated by or under Australian law or the Commonwealth, a State or a Territory.[161] Specifically, the Space Activities Act 1998 applies only to space activities conducted, or attempts to conduct them, beyond the distance of 100 km above sea level.[162] It was acknowledged that this was the first example of domestic space legislation that provides a specific 'demarcation point' for regulation of space activities.[163]

For the implementation of the Space Activities Act 1998, the Australian Government established a Space Licensing and Safety Office (SLASO) in June 2001 to administer the Act and other regulations and agreements related to the Australian space launch activities.[164] The SLASO is headed by a director who is advised by expert assessors. Under the delegation of the Minister, the Office is responsible for the licensing approval of space launch facilities, space launches and other related activities. The Office also has responsibility for enforcing the provisions of the Space Activities Act, the Space Activities Regulations, and other related Agreements. Apart from that, the Office has to ensure that space activities do not jeopardize public safety, property, the environment, national and foreign policy, and international obligations. It should also ensure that there is adequate third-party insurance coverage and that any accidents that might occur are investigated.[165]

(b) Authorization: Licensing and Procedure

The Australian Space Activities Act 1998 provides modes of authorization and supervision through the issuance of licences, permits and certificates. Five licensing regimes were introduced under the Act:[166] (1) Space licences; (2) Launch permits; (3) Overseas launch certificates; (4) Authorization of return; and (5) Exemption certificates. These licensing regimes are required for the approval of certain space activities. The first mode of authorization is through space licences.[167] A space licence is required specifically for

[160] Section 3(a), Space Activities Act 1998.
[161] Section 8 (Definition of Australian National), Space Activities Act 1998.
[162] Read Section 8 (Definition of launch and launch vehicle), Space Activities Act 1998; see also Siemon, Noel, and Steven Freeland, *supra* note 119, at 51; Larsen, Paul B., *supra* note 158.
[163] Siemon, Noel, and Steven Freeland, *supra* note 119, at 52.
[164] See *supra* note 120.
[165] Siemon, Noel, and Steven Freeland, *supra* note 119, at 53.
[166] See Sections 11 – 46B, Part 3 (Regulation of space activities), Space Activities Act 1998.
[167] See Division 2, Space Activities Act 1998.

operating a launch facility in Australia, or doing anything directly connected with the operation of such launch facility.[168] The granting of a space licence is subject to nine conditions. These include the following:[169] the Minister must be satisfied that the person is competent to operate the launch facility and vehicle; the 'person' must be a corporation and have sufficient funding to construct and operate such facility; the Minister must be satisfied with the evidence of environmental approval under Australian law and evidence of a low probability that the construction and the operation of the launch facility will cause substantial harm to public health, safety and property. The licence is issued for a specified term of not more than 20 years.[170]

The second mode of authorization is launch permits.[171] A launch permit is required for conducting a launch or launches of space objects from launch facilities located in Australia.[172] In other words, the launch facility operator, after obtaining a space licence for the launch facility and launch vehicle, also needs to apply for a launch permit in order to conduct a launch or launches. Such a launch permit may also authorize the return of a space object to a specified area in Australia.[173] The launch permit is granted only when the Minister is satisfied with certain conditions. For example, the person seeking a permit, who holds a space licence, must be a corporation, be competent and satisfy the insurance or financial requirements.[174] Other conditions are, for example, that the Minister is satisfied that the probability of the launch causing substantial damage is low, and that the space object does not contain a nuclear weapon or other weapon of mass destruction.[175] The launches permit is granted for a specified period, started from the day on which it comes into force until the day it expires. It may also end on the occurrence of a particular event prescribed in the permit.[176] However, the Minister has power to extend, by written notice, the validity period of the permit.[177]

[168] For detail read Section 15, Space Activities Act 1998.
[169] Section 18, Space Activities Act 1998.
[170] Section 19, Space Activities Act 1998.
[171] See Division 3, Space Activities Act 1998.
[172] For detail refer to Section 11 and Section 26(1), Space Activities Act 1998.
[173] Section 26(2), see also Section 13, Space Activities Act 1998.
[174] Division 7, Space Activities Act 1998.
[175] Section 26(3), Space Activities Act 1998.
[176] Section 28(2), Space Activities Act 1998.
[177] Section 28(3), Space Activities Act 1998.

The third mode of authorization is through overseas launch certificates.[178] An overseas launch certificate is needed for a launch or launches of space objects operated by an Australian national from a launch facility located outside Australia.[179] Certain conditions need to be satisfied before an overseas launch certificate can be issued; for example the applicant must either provide evidence of insurance or financial competency, or demonstrate that such requirements are unnecessary in view of the nature and purpose of the space object.[180] Other requirements include proof that threats to public safety and health are low, and that the country's national security, foreign policy or international obligations do not require the certificate to be withheld.[181] The validity period granted for this certificate, like the launch permit, starts from the date when it comes into force until the end of a particular event, as approved.[182] In such circumstances, however, the Minister has the power to extend, by written notice, the period of the certificate.[183]

The fourth mode is authorization of return.[184] Such authorization of return is required for space objects launched from outside Australia but being brought back to Australia.[185] Some proofs are required before an authorization of return can be granted. The Minister needs to be satisfied, among other things, of the competence of the applicant to carry out the return, the presence of insurance or financial competency regarding the return, and a low probability of the return causing substantial damage to public health and safety. Other requirements include the following: the space object must not contain a nuclear weapon or weapon of mass destruction, and Australia's national security, foreign policy and international obligations should not preclude the authorization from being granted.[186] It should also be noted that, under the Act, an offence will be deemed to have been committed if it is proved that the return of the space object has been conducted in a manner that causes substantial harm. The same applies if the space object contains a nuclear weapon or any other weapon of mass destruction, or if the applicant cannot demonstrate insurance provision or financial competence for the return.[187]

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[178] See Division 4, Space Activities Act 1998.
[179] Section 12 and Section 35(1), Space Activities Act 1998.
[180] Division 7, Space Activities Act 1998.
[181] Section 35(2), Space Activities Act 1998.
[182] Section 36(2), Space Activities Act 1998.
[183] Section 36(3), Space Activities Act 1998.
[184] See Division 5, Space Activities Act 1998.
[185] Section 14 and Section 42, Space Activities Act 1998.
[186] Section 43(3), Space Activities Act 1998.
[187] Section 44 and Division 7, Space Activities Act 1998.

The fifth mode is exemption certificate.[188] This particular exemption is granted by the Minister at his discretion. It may exempt an entity from the licensing requirements under the Acts, and is also intended for emergency situations.[189] The validity period for the exemption certificate starts from the date when it comes into force and ends on the occurrence of the specified event.[190]

(c) Registration Obligation

Australia also prescribes registration obligation in the Space Activities Act 1998.[191] The Act requires the Minister to maintain a Register of Space Objects.[192] For the purpose of registration of the space object, certain information must be disclosed under the Act. This includes[193] information on the registration number given by the Minister to the space object when it was granted a launch permit. On this point, it is noted that, when the Minister issues a launch permit authorizing the launch of the space object from a launch facility, the Minister must then allocate a specific registration number to the space object. This is done, indeed, for the purpose of identifying the space object.[194] Other information required for registration includes information regarding the launch facility of the object, the date of the launch of the object into space, the space object's general function, and the space object's orbital parameters including its nodal period, inclination, apogee, and perigee. There is also a requirement to disclose the name of other launching state(s), if there are more than one launching state for the space object. The Space Activities Act 1998 also prescribes that this Register must be kept by the Minister on computer.[195] It is clearly mentioned in the Act that the information in the Register must be available for inspection by any person. This could be achieved by providing reasonable access to a computer terminal, with the inspector either reading the information on the screen or obtaining a printed copy of the entry.[196]

[188] See Division 6, Space Activities Act 1998.
[189] Sections 11, 13 and 46, Space Activities Act 1998. See also Freeland, Steven, "Australian National Space Legislation and Policy", *supra* note 155, at 104.
[190] Section 46A, Space Activities Act 1998.
[191] See Part 5, Space Activities Act 1998.
[192] See Section 76, Space Activities Act 1998.
[193] *Id*.
[194] Section 77, Space Activities Act 1998.
[195] Section 78, Space Activities Act 1998.
[196] Section 79, Space Activities Act 1998.

(d) Constant Monitoring and Supervision

The Space Activities Act 1998 also instituted a regime aimed at implementing a constant monitoring and supervision obligation. For such purpose, the Act requires the Minister to appoint a Launch Safety Officer (hereinafter 'the LSO') for every licensed launch facility.[197] The LSO is issued with an identity card, which must be returned after the person has ceased to be the LSO.[198] The main duty of the LSO is to monitor the compliance of the launch operator with the terms and conditions of the space licence. Apart from that, the LSO has a duty to ensure that no persons or property are endangered by any launch or return. Moreover, the LSO has a responsibility to ensure that notice is given, in accordance with the regulations, with respect to launches and returns of space objects.[199]

Beside the aforementioned duties, there is also a wide range of powers available to the LSO. The possibility of constant monitoring and controlling of space activities occurs when the Act prescribes that the LSO may do anything reasonable that is necessary to perform his/her function. Furthermore, the LSO has been granted powers, among others, to enter and inspect the launch facility, the space object, and other equipment at the facility, provided such inspection is executed with the consent of the licence or permit holder. The LSO can require the licensee or permit holder to provide necessary information or assistance, as well as give the necessary direction with respect to the launch or return of the space object.[200] However, in exercising the power prescribed under this Act, the LSO must comply with the instructions given by the Minister. In such cases, the Minister may give different instructions for the different licensed launch facilities in order to monitor the activities, if necessary.[201] With respect to the aforementioned obligations, the LSO also has the power to appoint an assistant to help him/her in the performance of his/her duties under the Space Activities Act 1998.[202]

Apart from the above, it is noted that space activities are also controlled by the imposition of a rule that the holder of a space licence, launch permit, and other certificates must not

[197] Sections 50 and 8 (Meaning of Launch Safety Officer), Space Activities Act 1998.
[198] Section 58, Space Activities Act 1998.
[199] Section 51, Space Activities Act 1998.
[200] Section 52, Space Activities Act 1998.
[201] Section 55, Space Activities Act 1998.
[202] Section 57, Space Activities Act 1998.

contravene the conditions of the licence. Should this occur the holder will be liable to a civil penalty.[203]

(e) Liability and Indemnification

The Space Activities Act 1998 establishes a comprehensive liability regime to regulate Australian space activities.[204] The Act specifies the scope of the damage covered.[205] It applies to damage caused by a space object if: [206] (1) the object is launched from a launch facility in Australia; or (2) Australia is a launching state for the object; or (3) the object is returned to a place in Australia; or (4) the object is returned to a place outside Australia. Apart from that, the Act mentions, in general, that this also applies to damage occurring on earth, in the air, or in space. It further states that it applies to loss occurring either in or outside Australia. The same applies to the launch or return of the space object regardless of whether or not it was authorized under this Act and covered by an exemption certificate. It should be noted at this juncture that all losses must occur during a specified liability period, which will be mentioned later.

It is well understood that a state herself, including Australia, can be internationally liable under Article VII of the Outer Space Treaty and Article II of the Liability Convention 1972[207] for damage done as a result of space-related activities conducted by the state under the definition of launching state. Apart from that, pursuant to Article VI of the Outer Space Treaty 1967,[208] a state must also take responsibility for its national activities in outer space. In view of this, under the Space Activities Act 1998, the Australian Government has sought to pass on the Government's liability for its national activities to the responsible party.[209]

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[203] Sections 21, 30, 37, 45, 46B, and Part 6, Space Activities Act 1998.
[204] See Part 4(Liability for damage by space objects), Space Activities Act 1998.
[205] Section 63, Space Activities Act 1998.
[206] *Id*.
[207] Read Article II, Liability Convention 1972 stipulates, '*A launching state shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the Earth or to aircraft in flight'*. See also Article VII, Outer Space Treaty 1967, *supra* note 79.
[208] Article VI, Outer Space Treaty 1967, *supra* note 40.
[209] The 'responsible party' may mean 'the holder of the permit, or the holder of the permission, or the holder of the exemption certificate, or the holder of an overseas launch certificate'. However, in the event of the permit, permission, or certificate not being obtained, the responsible party may refer to the person who carried out the launch or return of the space object, or the person who owns the payload form part of the space object, or any other person specified in the regulations provided that they are Australian nationals if the launch was conducted outside Australia. For details, see Section 8 (Definition) and Section 74, Space Activities Act 1998. See also Lee, Ricky J., "The Liability Convention and Private Space Launch Service – Domestic Regulatory Responses", (2006) XXXI *Annals of Air and Space Law,* at 371.

There are two types of liability prescribed by the Act in relation to liability for third-party damage[210]. They are absolute or strict liability,[211] and fault liability.[212] This division of liability in fact reflects the liability rules establish in the Liability Convention 1972.[213] The rule of absolute or strict liability applies to damage or loss occurring on earth and in the air. The rule is that the responsible party is strictly liable for loss and damage caused by the space object to the third party on earth, or as a result of damage to aircraft in flight, unless it is proved that the third party is guilty of gross negligence or intentional conduct, in which case the responsible party is not liable to that extent.[214] However, the fault liability rule applies to damage or loss occurring in outer space. Thus, in the event of damage caused by the space object to another space object in outer space, the party responsible for the launch or return of the space object is liable according to that person's degree of fault for damage done to another space object. The same applies to damage to property of the third party on board a space object.[215]

It should be remembered that such a liability regime is only applicable during the specific 'liability period' of the launch and return of the space object. For the launch, the Space Activities Act 1998 establishes a fixed liability period of 30 days, commencing at the time of launch and continuing for 30 days after the launch. For the return, the period commences when the re-entry manoeuvre begins and ends when space object has come to rest on earth.[216] Therefore, claims are limited to these liability periods. With respect to insurance and financial requirements, the Act requires the holder of a launch permit, an overseas launch certificate, or a permit to return an object to Australia to either satisfy the insurance requirement or show direct financial responsibility for the launch and return.[217] If the person chooses the insurance requirement option, the holder must be insured against: (1) any liability

[210] 'Third party' for the launch or return of a space object means, '*a person who is not a responsible party for the launch or return and who is not a related party or any responsible party for the launch or return*'. See Section 8 (Definition), Space Activities Act 1998.
[211] Section 67, Space Activities Act 1998.
[212] Section 68, Space Activities Act 1998.
[213] See Articles II, and III, Liability Convention 1972.
[214] See Article VI, Outer Space Treaty 1967, *supra* note 40. Davies, Michael, *supra* note 144, at 172. See also Lee, Ricky J., *supra* note 151.
[215] See *supra* note 209.
[216] Section 8 (Definition of liability period), Sections 63(1)(b), 63(2)(b), and 63(2A)(c), Space Activities Act 1998. See also Davies, Michael, *supra* note 144, at 171.
[217] Division 7 (Insurance/financial requirements) of Part 3, Space Activities Act 1998. See also Davies, Michael, *supra* note 144, at 175.

to pay compensation for damage to a third party caused by the launch and return; and, (2) any Government liability under international law (including the Liability Convention 1972).[218]

The Space Activities Act 1998 also introduces a concept of monetary limit on liability. In such a situation, the responsible party is not liable to pay compensation in excess of the amount of insurance required under the legislation.[219] In the event of the responsible party being liable to pay further compensation to Australian nationals of an amount in excess of the insured amount, the Australian Government is liable to pay for the compensation up to an amount not exceeding three billion dollars.[220] However, this monetary limit on liability does not apply to a responsible party who did not hold or was in breach of the relevant space licence and launch permit.[221]

The Act provides the Australian Federal Court the power to hear and determine the action for compensation of damage caused by a space object.[222] The Act prescribes that such action may only be brought within one year after the day on which the damage occurred. However, if the claimant is not immediately aware that damage has occurred, he/she can bring an action within one year after the day he/she becomes aware of the damage, or would have become aware of the damage, had he/she exercised due diligence.[223]

(f) Safety, Peace, and Security Measurement

In view of the spirit of safety, peace and security introduced by international law,[224] the Space Activities Act 1998 institutes an investigation regime.[225] The regime deals with the investigation of an accident or incident[226] involving a space object that occurs during the

[218] Section 48, Space Activities Act 1998.
[219] The Act prescribes that the total insurance for each launch and return must be for an amount not less than the lesser of the amount of 750 million dollars (as indexed from time to time in accordance with the regulations), and the amount of the 'Maximum Probable Loss' (MPL) that might be incurred by the third party caused by the launch and return, as determined using the method set out in the regulations. Read Sections 48(3) and 69(3), Space Activities Act 1998. Davies, Michael, *supra* note 144, at 173.
[220] Section 69(4), Space Activities Act 1998.
[221] Section 69, Space Activities Act 1998.
[222] Section 72, Space Activities Act 1998.
[223] Section 73(1), Space Activities Act 1998.
[224] Article IX, Outer Space Treaty 1967.
[225] Part 7 (Investigation of accident), Space Activities Act 1998.
[226] An accident means an accident involving a space object when a person dies or suffers serious injury as a result of the space object operation. It also occurs when the object is destroyed, seriously damaged or causes damage to property. An incident means an occurrence associated with the operation of a space object that affects

liability period of its launch from Australia or its return.[227] By establishing a system of investigation, it is hoped that the occurrence of accidents or incidents can be prevented.[228] In such circumstances, among the rules imposed by the Act is the automatic suspension of the launch permit or other certificates, taking effect immediately after the occurrence of the accident.[229] Apart from that, in the investigation process, the procedure is that the Minister will appoint an investigator who is qualified and sufficiently experience for the task.[230] The investigator will then investigate the surrounding circumstances of the accident or incident. He may appoint assists to help him perform his functions.[231] During the investigation period, the investigator may, by written notice, require a person to attend an inquiry session and to provide him/her with any relevant documents and records.[232] A person who fails to attend the session is guilty of a criminal offence.[233] Upon completion of the investigation, the report shall be submitted to the Minister.[234] However, for the purpose of security and safety, the Act emphasizes that the record shall not be directly or indirectly disclosed to any person or court. A person contravening this rule shall be guilty of a criminal offence.[235] There are also specific rules regarding accidents occurring at the site. For instance, the Act gives the investigator the power to enter the site; it also prescribes various procedures to be observed before entering the site, the availability of assistance and the use of force in entering the site.[236]

The spirit of safety and peace is clearly revealed in the provisions for granting the space licence, space permit, overseas launch certificate, and authorization of return. On this point, it is noted that the element of environmental approval is required by the authority to approve the application. In addition, the applicant must demonstrate that the space activities would cause only a minimal amount of damage, if any, to public health, safety, and property.

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or could affect the safety of the space object operation, or that involves situations indicating that an accident nearly occurred. See Sections 85 and 86, Space Activities Act 1998.

[227] Section 84, Space Activities Act 1998.

[228] Section 87, Space Activities Act 1998.

[229] Section 95, Space Activities Act 1998.

[230] Section 88, Space Activities Act 1998.

[231] Sections 89 and 90, Space Activities Act 1998.

[232] For further information refer Section 91, Space Activities Act 1998.

[233] Section 92, Space Activities Act 1998.

[234] Section 94, Space Activities Act 1998.

[235] Safety record may mean: (a) all oral or written statements taken by the investigator during the investigation; (b) all communications between persons involved in the investigation; (c) medical and personal information about the persons involved in the investigation, including the deceased person. Section 96, Space Activities Act 1998.

[236] See Division 3 (Accidents site power) of Part 7, Space Activities Act 1998.

Moreover, the space object must not contain any nuclear weapon or other weapon of mass destruction.[237]

The spirit of safety is also reflected in the Act in that the Launch Safety Officer has been awarded power to assign any direction in relation to the launch or return of the space object that is executed in order to avoid any danger either to public health, persons, or property. Such direction may include, for instance, instructions to stop the launch or return of the space object, and even to destroy such objects.[238] A person who fails to comply with such direction is guilty of a criminal offence.[239] Apart from that, in an emergency situation the Launch Safety Officer, if finding reasonable grounds, has the power, among others, to search the facility or seize items at the launch facility.[240]

The Act also grants power to the Minister to suspend the licence, permit, and other certificates if the holder contravenes the conditions stipulated in the licence. Such action can also be taken in furtherance of Australia's national security, foreign policy, or the country's international obligations.[241]

(g) Other Provisions

Among other provisions set forth in the Space Activities Act 1998 are the implementation of space cooperation agreements and miscellaneous provisions. The implementation of space cooperation agreement deals with the implementation of the intergovernmental agreement with Russia.[242] The miscellaneous part deals with delegation provisions, operation of other laws, immunity, and others.[243]

[237] Read Sections 18, 26, 35, and 44, Space Activities Act 1998.
[238] Section 52, Space Activities Act 1998.
[239] Section 53, Space Activities Act 1998.
[240] Section 56, Space Activities Act 1998.
[241] Sections 25, 34, 41, and 45C, Space Activities Act 1998.
[242] See Part 5A (Implementation of space cooperation agreement), Section 8 (Definition of 'intergovernmental agreement with Russia'), Space Activities Act 1998.
[243] See Part 8 (Miscellaneous), Space Activities Act 1998.

3.3.4. Concluding Remarks

Australia is a party to all five United Nations outer space treaties. In such circumstances, it is concluded that Australia has agreed to be bound by the international obligations set forth in the United Nations space treaties. As in the United Kingdom, the international legal obligations imposed by the treaties only bind the state at the international level. They have no legal effect at the domestic level, unless the rules are incorporated into the Australian domestic law. This situation, among others, led to the establishment of the Australian Space Activities Act 1998. Besides these facts, it is also noted that the passing of the Act is in response to the evolution of the Australian commercial space launch industry.

The Space Activities Act 1998 establishes a comprehensive licensing regime accompanied by a set of rules that provide clarity, especially on the launch operators' legal rights and obligations. Apart from that, the Act establishes the liability regime called strict and fault liability, which mirrors the liability rules established by the United Nations treaties. It also introduces a fixed liability period and a monetary limit concept on liability. Most importantly, this regime was designed to ensure the Australian Government is indemnified against international claims.

With respect to the registration of space objects, the Act prescribes the duty of the Minister to allocate a specific registration number to a space object when granting a launch permit. The Minister must also maintain a Register of Space Objects. In terms of government-related bodies responsible for dealing with space-related matters, Australia has the Launch Safety Officer, the Space Policy Unit, and the Space Industry Innovation Council. Following the United Nations space treaties, it is noted that the Australian Space Activities Act 1998 instils some of its rules, the spirit of safety, peace, and security.

3.4. UNITED STATES OF AMERICA

3.4.1. An Overview

The United States of America (hereinafter, 'the United States') is made up of fifty states and a federal district. Politically, the United States is a federal constitutional republic state[244] with a written constitution. The federal government comprises three branches, each of which has its own power and influence. These branches are: (1) Legislative; (2) Executive; and (3) Judiciary. The Legislative branch consists of Congress, which comprises two houses: the Senate and the House of Representatives. The Executive is headed by a President who is the commander-in-chief of the military and has the power to appoint the members of the Cabinet, subject to the Senate's approval. The President of the United States is also the head of the state and the United States Government. The Judiciary consists of the Supreme Court and federal courts, whose judges are appointed by the President with the Senate's approval.[245] The United States legal system, apart from Louisiana,[246] is based on the common law legal system, which is derived from the common law system of English law. Its judicial sources of law are constitutional law, statutory law, administrative regulations, and the common law.

Economically, the United States has the world's largest national economy. Its nominal gross domestic product (GDP) was estimated at $15.8 trillion in 2012.[247] It has been the world's largest national economy since the 1890s, and the world's largest manufacturer.[248] It is also home to the world's largest stock exchange, the New York Stock Exchange, a home to 133 of the world's 500 largest companies.[249] The state is the third largest producer of oil in the

[244] A constitutional republic is a state where the head of state and other officials are representatives of the people. The republic has a constitution that limits its power with an elected head of state. See http://en.wikipedia.org/wiki/Constitutional_republic; see also Peterson, Daneen G., "America is a Constitutional Republic … NOT a Democracy", Speech Given in Salt Lake City, Utah, 9 September 2006, http://www.stopthenorthamericanunion.com/NotDemocracy.html, both accessed: 14 May 2014.

[245] The Legislative branch is responsible for making federal laws. The Executive is responsible for executing, enforcing, and administering the laws and policies. The Judiciary is responsible for interpreting the laws and applying them through the cases brought before them. Kelly, Martin "Overview of United States Government and Politics: Foundation and Principles", http://americanhistory.about.com/od/governmentandpolitics/a/amgovoverview.htm. See also http://en.wikipedia.org/wiki/Politics_of_the_United_States, both accessed: 23 January 2013.

[246] The legal system of the state of Louisiana is based upon French and Spanish civil law. See http://en.wikipedia.org/wiki/List_of_national_legal_systems, accessed: 23 January 2013.

[247] http://en.wikipedia.org/wiki/US_economy#cite_note-GDP-1, accessed: 23 January 2013.

[248] It represents close to 21 per cent of the world's manufacturing output. See Vargo, Frank, "U.S. Manufacturing Remains World's Largest", 14 March 2011, http://shopfloor.org/2011/03/u-s-manufacturing-remains-worlds-largest/18756, accessed: 23 January 2013.

[249] See http://money.cnn.com/magazines/fortune/global500/2010/countries/US.html, accessed: 23 January 2013.

world, as well as electrical and nuclear energy, liquid natural gas, sulphur, and phosphates. Aerospace and telecommunications are its main industries besides steel, motors, vehicles, chemicals, creative industries, food processing, and others.

The space industry is an essential dimension of the United States economy. Apart from the United States aeronautic industry, the aerospace industry is viewed as a significant contributor to the United States' economic wellbeing. Furthermore, it is a symbol of the international prestige, influence and competitiveness of the country. The United States Space Report 2011 reveals that its Global Positioning System (GPS) and satellite television revenues continue to fuel overall growth in the country's space sector, helping the industry to overcome the challenging economic conditions.[250] Moreover, the commercial activities of private sectors are observed as potential contributors that play important roles in strengthening the United States economy.[251] Reacting to this, the United States Government declared, under the principles of its National Space Policy 2010,[252] that it is committed to encouraging and facilitating the growth of its commercial space sector. The Government has indeed signalled its goal of energizing the country's domestic space industries by participating in global markets and advancing the development of its satellite manufacturing, satellite-based services, space launches, terrestrial applications and increasing entrepreneurship.[253]

As a matter of fact, the evolution of the United States' space activities started from the beginning of the space rivalry between the country and the Soviet Union, which occurred between 1957 and 1975.[254] Such intense competition began when the Soviet Union successfully launched its Sputnik, the world's first artificial satellite, on 4 October, 1957. Driven by this success, about four months later on 31 January 1958, the United States successfully launched its first satellite named Explorer 1. In the 1960s, the United States continued its space programme and, on 5 May 1961, the state managed to send the first

[250] "The Space Report 2011 Reveals Continued Space Sector Growth Driven by Commercial Businesses", *27th National Space Symposium Press Releases,* 6 April 2011, http://2011.nationalspacesymposium.org/media/press-releases/space-report-2011-reveals-continued-space-sector-growth-driven-commercial-busin, accessed: 23 January 2013.
[251] Dempsey, Paul Stephen, "Overview of the United States Space Policy and Law", *National Regulation of Space Activities,* ed., Jakhu, Ram S., (Dordrecht: Springer, 2010), at 389.
[252] National Space Policy of the United States of America (June 28, 2010), at 3. The full text is available at http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf, accessed: 23 January 2013.
[253] See *id*., at 4.
[254] See http://en.wikipedia.org/wiki/Space_Race, accessed: 23 January 2013

American, Alan Shepard, into space.[255] On the United States first manned Mercury mission, Alan Shepard was launched by a Redstone rocket on a sub-orbital flight.[256] Other United States space programmes include the Gemini Programme, Apollo Programme, Apollo-Soyuz Test Project, and Skylab. The Gemini Programme was aimed at studying the biological effect of a long flight in orbit, developing techniques for rendezvousing and docking with another spacecraft.[257] It bridged the gap between the Mercury and Apollo programmes. It was also intended as a stepping stone to Apollo. The Gemini spacecraft carried two astronauts. It was the first to use a hydrogen fuel cell to generate electricity.[258] The Apollo programme's aim was to land a man on the moon and return him safely to the Earth, and also to gather lunar rocks and soil samples. On 20 July 1969, the first moon landing was accomplished by the Apollo 11 crew when Neil Armstrong became the first human to set foot on the moon.[259] The Apollo-Soyuz Test Project was the last Apollo mission. It was the first international partnership in space and involved the United States and the Soviet Union in a space flight in July 1975.[260] Skylab was the first United States space station; it was launched on 14 May 1973 and became a manned orbiting workshop. It was occupied by three crews for 171 days and 13 hours. It was the site of nearly 300 scientific and technical experiments.[261] Other programmes included the Space Shuttle programme[262] and the International Space Station (ISS).[263] According to records, the United States has launched 2127 objects into outer space

[255] Alan Shepard was the first person in space to exercise manual control over his spacecraft's altitude and retro-rocket firing. This event happened three weeks after the Soviet Union sent its cosmonaut, Yuri Gagarin, into space on 12 April 196; he was the first to orbit the Earth. The first American to orbit the Earth was astronaut John Glenn, on 20 February 1962. See *id*.

[256] Several other missions were accomplished under the Mercury Project. For details, see Davies, J.K., *Space Exploration*, Chambers Encyclopaedic Guides Series, (Edinburgh: W & R Chambers, 1992), at 123-125. See also http://www.thespacerace.com/encyclopedia/programs/american/mercury/, accessed: 23 January 2013.

[257] Davies, J.K., *id.,* at 65.

[258] For details of the Gemini Programme, see Davies, J.K., *supra* note 256, at 63–67. See also http://www.thespacerace.com/encyclopedia/programs/american/gemini/, accessed: 25 January 2013.

[259] For details of the Apollo Programme, see Davies, J.K., *supra* note 256, at 6–9; see also, http://www.thespacerace.com/encyclopedia/programs/american/apollo/, accessed: 25 January 2013.

[260] See Davies, J.K., *supra* note 256, at 10–12; see also http://www.nasa.gov/mission_pages/apollo-soyuz/index.html, accessed: 25 January 2013.

[261] For more information on the skylab, see Davies, J.K., *supra* note 256, at 171–175.

[262] The Space Shuttle Programme, or Space Transportation System (STS), made its first flight on 12 April 1981. It was mankind's first reusable spacecraft. It carried people into orbit repeatedly. It also launched, recovered and repaired satellites, conducted cutting-edge research, and built the International Space Station (ISS). See Davies, J.K., *supra* note 256, at 209–213; Refer also http://www.nasa.gov/mission_pages/shuttle/flyout/index.html, accessed: 25 January 2013.

[263] The ISS is an internationally developed research facility being assembled in the low earth orbit. The United States, through NASA, is one of the countries contributing significantly to the project besides the European Space Centre (ESA), the Russian Federal Space Agency (RKA), the Japan Aerospace Exploration Agency (JAXA), and the Canadian Space Agency (CSA). Under President Obama's administration, and with the new budget announcement on 1 February 2010, the administration aims to extend the ISS lifetime through to 2020 despite the earlier plan to de-orbit the ISS in the first quarter of 2016 (as determined in 2004 by President George W. Bush). See Achenbach, Joel, "Space Station is Near Completion, May be the End", *The Washington*

between 1958 and December 2012. Most of the objects were registered with the United Nations, as prescribed by the United Nations treaties, but some of them were not registered.[264]

In relation to the United States space agency, six months after launching Explorer 1, the United States Government established 'National Aeronautics and Space Administration' (NASA)[265] on 29 July 1958. NASA is the United States Government's leading agency responsible for the state's civilian space programme and also for aeronautics and aerospace research.[266] It was established by the National Aeronautics and Space Act 1958[267] and its functions, among others, were to plan, direct, and conduct aeronautical and space activities.[268] It also deals with research and development in certain technologies such as ground propulsion, solar heating and cooling technologies.[269] NASA has led the United States Government's exploration of space since 1958. Considering NASA's numerous past, present, and future operations and missions,[270] the Agency has clearly contributed extensively to the evolution of the United States space programmes. Therefore, the United States Government decided to retain it as a multi-mission agency with a balanced and robust set of core missions in science, aeronautics, and human space flight and exploration.[271]

There are several others agencies involved in outer space activities. One of the most important is the Federal Aviation Administration (FAA).[272] This is a division of the United States Department of Transportation (DOT).[273] The FAA is authorized to regulate and oversee all aspects of civil aviation in the United States. One of its headquarters is the Office

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Post, 13 July 2009, http://www.washingtonpost.com/wp-dyn/content/article/2009/07/12/AR2009071201977.html; see also http://www.nasa.gov/pdf/420994main_2011_Budget_Administrator_Remarks.pdf, and http://en.wikipedia.org/wiki/International_Space_Station#End_of_mission_and_deorbit_plans, all accessed: 25 January 2013.

[264] See http://www.oosa.unvienna.org/oosa/osoindex.html, accessed: 25 January 2013.

[265] NASA official website is available at http://www.nasa.gov/home/index.html, accessed: 25 January 2013.

[266] See http://en.wikipedia.org/wiki/NASA, accessed: 25 January 2013.

[267] National Aeronautics and Space Act of 1958, Pub. L. 85-568, 72 Stat. 426 (July 29, 1958). The full text is available at NASA official website at http://history.nasa.gov/spaceact.html, accessed: 25 January 2013.

[268] Section 203(a), National Aeronautics and Space Act of 1958, *id*. See also Section 20112(a)(1), National Aeronautics and Space Act 2010, *infra* note 326.

[269] Section 20112(b), National Aeronautics and Space Act 2010, *infra* note 326.

[270] For information on its mission, refer to http://www.nasa.gov/missions/index.html, accessed: 25 January 2013.

[271] Section 2(3), National Aeronautics and Space Administration Authorization Act of 2010, *infra* note 310.

[272] The FAA official website is available at http://www.faa.gov/, accessed: 27 January 2013.

[273] The DOT official website is available at http://www.dot.gov/, accessed: 27 January 2013.

of Commercial Space Transportation (AST).[274] It was established particularly to regulate, encourage, facilitate, and promote the country's commercial space transportation industry and also to ensure the USA's compliance with international obligations. The Office has a mission to safeguard the protection of the public, property, and national security as well as foreign policy interests of the United States during commercial launch or re-entry activities. Moreover, the Office can recommend appropriate changes to the United States Federal statutes, treaties, regulations, policies, plans, and procedures.[275] It should also be noted that one its main responsibilities is the issuance of licences, including managing the licences of private space vehicles and spaceports within the United States. [276] This distinguishes it from NASA, which is a research and development agency of the United States federal government. The FAA also has an advisory board, the Commercial Space Transportation Advisory Committee (COMSTAC). This provides information, advice and recommendations with respect to the commercial space transportation industry.[277] Other agencies worth mentioning include the Department of State (DOS),[278] Department of Commerce (DOC),[279] Department of Defense (DOD),[280] and Federal Communications Commission (FCC).[281]

[274] The Office of Commercial Space Transportation (AST) was established in 1984 by the Commercial Space Launch Act 1984, as part of the office of the Secretary of Transportation within the Department of Transportation (DOT). In November 1995, it was transferred to the Federal Aviation Administration (FAA). The AST manages its licensing and regulatory works through the Office of the Associate Administrator with five other main divisions: (1) Space Transportation Development Division; (2) Licensing and Evaluation Division; (3) Regulations and Analysis Division; (4) Safety Inspection Division; (5) Operation Integration Division. Its authorising legislation is the Commercial Space Launch Act, 51 USC Chapter 509, Sections 50901-23 (2011). See http://www.faa.gov/about/office_org/headquarters_offices/ast/about/, accessed: 27 January 2013; http://www.faa.gov/about/office_org/headquarters_offices/ast/legislation_policies/; accessed: 14 May 2014.

[275] See *id*.

[276] For more information on licensing, read Chapter 3 of the thesis: (3.4.3(b) Authorization: Licensing and Procedure).

[277] See http://www.faa.gov/about/office_org/headquarters_offices/ast/advisory_committee/, accessed: 14 May 2014.

[278] The DOS has jurisdiction over export controls and negotiates bilateral and multilateral treaties. Its official website is available at http://www.state.gov/, accessed: 14 May 2014. See also Dempsey, Paul Stephen, *supra* note 251, at 373.

[279] The DOC, through one of its commerce bureaux, engages in remote sensing, gathers data, conducts research, and makes predictions about the Earth's environment, among others. Its official website is at http://www.commerce.gov/, accessed: 14 May 2014. See also Dempsey, Paul Stephen, *supra* note 251, at 374.

[280] The DOD uses space for intelligence gathering, communications and, potentially, for missile defence. Its official website is at http://www.defense.gov/, accessed: 14 May 2014. See also Dempsey, Paul Stephen, *supra* note 251, at 374.

[281] The FCC regulates the radio frequencies for telecommunications, broadcasting, and other purposes. Its official website is at http://www.fcc.gov/, accessed: 14 May 2014. See also Dempsey, Paul Stephen, *supra* note 251, at 373.

In parallel with the United States' national space policy goals, the country's leading role in space,[282] in particular, has helped to create the emergence of various United States space launch sites. In brief, there are a number of United States Government-operated launch sites, including the Kennedy Space Centre (Florida)[283] and the Wallops Flight Facility (Coast of Virginia).[284] Other Government launch sites include Cape Canaveral Air Force Station (Florida), [285] Vandenberg Air Force Base (California), and the Ronald Reagan Ballistic Missile Defense Test Site (Kwajalein, Marshall Islands). Apart from these, there are also various privately operated spaceports, including Corn Ranch (West Texas), Kodiak Launch Complex (Alaska), Mojave Spaceport (California), Spaceport America (New Mexico), and Oklahoma Spaceport (Oklahoma).

3.4.2. Five Outer Space Conventions: The United States of America's Status

Overall, the United States is a party to four outer space conventions.[286] In respect of the first convention, the Outer Space Treaty 1967,[287] the United States signed the Treaty on 27 January 1967, the date on which it was opened for signature to all states. When the Outer Space Treaty 1967 came into force on 10 October 1967, the United States Government ratified the Treaty the very same day.[288] Such ratification reflects, under the United States'

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[282] Some information on the United States space policies with respect to its leadership in space is available in, Dempsey, Paul Stephen, *supra* note 251, at 374-377. See also Section 20102(d)(5), National Aeronautics and Space Act 2010, *infra* note 326.

[283] The Kennedy Space Centre is the main launch site operated by NASA. Its headquarters are in Meritt Island, Florida. Its former name was Launch Operation Centre, established in July 1962. In late 1963, it was renamed the John F. Kennedy Space Centre to honour the President who put America on the path to the moon. See http://www.nasa.gov/centers/kennedy/about/history/index.html, accessed: 25 January 2013.

[284] Wallops Flight Facility is NASA's small launch centre. See http://en.wikipedia.org/wiki/Wallops_Flight_Facility, accessed: 26 January 2013.

[285] Cape Canaveral Air Force Station is governed by the United States Department of Defense. It is located at the southeast of NASA's Kennedy Space Centre on the adjacent Merritt Island. It is an installation of the United States Air Force Space Command's 45th Space Wing, and a primary launch head of the United States Eastern Range with several launch pads currently active. A number of major United States early space explorations were launched from this station. These include the first United States satellite (1958), the first United States astronaut (1961), and many others. However, when a gradual decline occurred in most operations, and it could no longer house new rocket facilities, most operations were transferred to the nearby Kennedy Space Centre. See http://www.nps.gov/nr/travel/aviation/cap.htm, and http://en.wikipedia.org/wiki/Cape_Canaveral_Air_Force_Station, both accessed: 25 January 2013.

[286] The conventions are: the Outer Space Treaty 1967, the Rescue Agreement 1968, the Liability Convention 1972, and the Registration Convention 1975, except the Moon Agreement 1979. See United Nations, *United Nations Treaties and Principles on Outer Space and Related General Assembly Resolutions: Status of International Agreements Relating to Activities in Outer Space as at 1 January 2010*, Addendum, Ref.: Sales No. E.08.1.10, ST/SPACE/11/Rev.2/Add.3, (Vienna: United Nations, 2009).

[287] Outer Space Treaty 1967, *supra* note 24.

[288] See http://www.oosa.unvienna.org/oosatdb/showTreatySignatures.do, accessed: 27 January 2013.

international obligation, the state's consent to be bound by the legal rules set forth in the Outer Space Treaty 1967.

The second agreement is the Rescue Agreement 1968.[289] The United States Government signed this Agreement on 22 April 1968, the same date the Agreement was opened for signature to all states. The Agreement was then ratified by the United States on 3 December 1968, the date it came into force.[290] The third convention is the Liability Convention 1972.[291] The Convention was signed by the state on the same date it was opened for signature, on 29 March 1972. However, ratification of the Convention was not executed until 9 October 1973, approximately one year after the Convention came into force on 1 September 1972.[292] The United States thus took about eighteen months, from the signing date, to consider becoming a party to the Liability Convention 1972. The last convention to which the United States became a party was the Registration Convention 1975.[293] It is noted that the United States signed the Convention on 24 January 1975, ten days after it was opened for signature (14 January 1975). One year later, ratification took place, on 15 September 1976, the date it came into force.[294]

As for the last United Nations outer space convention, the Moon Agreement 1979,[295] the United States has not signed, ratified or acceded to this Agreement. Thus, the United States is not a party to the Moon Agreement. Even though the state is not a party to the Agreement, it was observed that, during the early development of the Moon Agreement 1979, the United States Government seemed to be in favour of it. This was evident when, during the early development of the Agreement, the United States Government made a significant contribution, along with other countries, to drafting the Moon Agreement 1979. For instance, in 1970 the United States backed Argentina's proposal entitled 'Draft Agreement on the Principles Governing Activities in the Use of the Natural Resources on the Moon and Other Celestial Bodies'.[296] Moreover, throughout the course of negotiations on the drafting of the Agreement, the United States Government submitted a variety of proposals and working

[289] See Rescue Agreement 1968, *supra* note 27.
[290] See *supra* note 288.
[291] See Liability Convention 1972, *supra* note 29.
[292] See *supra* note 288.
[293] See Registration Convention 1975, *supra* note 31.
[294] See *supra* note 288.
[295] See Moon Agreement 1979, *supra* note 34.
[296] See UN Doc. A/AC. 105/C.2/L.71 and Corr.1, 1970. See Reijnen, G.C.M., "The History of the Draft Treaty on the Moon", (1976) 19 *IISL Colloquium on the Law of Outer Space*, 357.

papers for the UNCOPUOS Legal Subcommittee to consider.[297] Indeed, the United States delegate, Mr. Hosenball, made remarks that were in favour of and supported the formation of the Agreement.[298] It is noted that these positive remarks were made during the presidency of Jimmy Carter, whose administration was in favour of approving the Agreement. However, when a change of presidency occurred in 1981 and Ronald Reagan was elected as the United States President, the Moon Agreement was then considered a 'dead issue'.[299] Reagan was against the Agreement and did not plan to ratify it. Since then, the Moon Agreement has not been considered in the best interests of the United States Government as it claims it would deprive the United States of opportunities for development in space technology and resources.

Regarding the treaty-making process, pursuant to Article II of the United States Constitution, treaty-making power is actually vested in the President, who shall act with the consent and advice of the United States Senate.[300] The President has the power to negotiate and sign international agreements, and the Senate shall give its consent for ratification, for which a two-thirds majority is needed.[301] Such international treaties to which the United States is a party, together with the Constitution itself and the laws of the United States, are then treated as the supreme law of the Land according to Article VI of the Constitution.[302]

In summary, the United States is a state party to four United Nations outer space treaties: the Outer Space Treaty 1967, the Rescue Agreement 1968, the Liability Convention 1972, and the Registration Convention 1975. However, the country is a non-party state to the Moon Agreement 1979, which the country has neither signed nor acceded to. The United States

[297] See (A/A.105/C.2 (XI), (UN Doc. A/AC.105/115 of 27.4.1973); (UN Doc. A/AC.105/C.2/L.91 and Corr.1); see also *id*. at 360.
[298] Mr. Hosenball mentioned that, '… My Government will, … , make every effort to see that such regime is successfully negotiated', (UN Doc. A/AC.105/PV.203, dated: 16.7.1979). He also quoted, '… the Committee agreed that Article VII [Moon Treaty 1979] is not intended to result in prohibiting the exploitation of natural resources … but rather to minimise any disruption of or adverse effects to the existing balance of the environment'. Other statements include, '… Our delegation accepted … the Moon Treaty with the understanding that it in no way derogates from or limits the provisions of the 1967 Outer Space Treaty', (UN Doc. A/AC.105/PV.203). See also Edward R. F., Jr., "1979 United Nations Moon Treaty Encourages Lunar Minning & Space Development", (1979) *22 IISL Colloquium on the Law of Outer Space* 123.
[299] See "UN Moon Treaty Falling to US Opposition Groups", (March 1985), *National Space Society,* at http://www.nss.org/settlement/L5news/1982-opposition.htm, accessed: 27 January 2013.
[300] See Article II, Section 2 (Clause 2), the United States Constitution. The full text is available at http://uscode.house.gov/pdf/Organic%20Laws/const.pdf, accessed: 27 January 2013.
[301] See *id*. See also Hermida, Julian, *Legal Basis for a National Space Legislation,* Space Regulations Library Series, vol. 3, (Dordrecht: Kluwer Academic Publisher, 2004), at 76.
[302] Article VI, Clause 2, the United States Constitution, *supra* note 300.

only became a party to all four conventions by means of ratification. No mode of accession was used in becoming a party to the treaties. Being a party to the four treaties, the United States is bound under its international obligation legally, politically, and morally to respect, abide by and comply with the rules stipulated in those outer space treaties from the moment of their ratification.

3.4.3. The United States National Space Legislations and Regulations

Apart from contributing to scientific and technological achievements, the United States also plays a leading role in the establishment of rules and regulations governing outer space activities.[303] This was proved when the country became the first state to adopt national space legislation to regulate outer space activities. That first law was the National Aeronautics and Space Act 1958.[304] It was signed on 29 July 1958 by President Eisenhower.[305] In this Act, the United States announced that its activities in space would be devoted to peaceful purposes for the benefit of all mankind.[306] It is noted that the rules regulating the United States' national space activities are not contained in a single or primary legislative instrument. However, such activities are regulated by various national laws and regulations of the USA. Such national laws and regulations evolved as the need arose. Some examples of the United States' domestic laws relevant to outer space activities include the Commercial Space Launch Act,[307] the Commercial Space Transportation Regulation,[308] the amended version of the National Aeronautics and Space Act,[309] the National Aeronautics and Space Administration Authorization Act[310], and the Commercial Space Act of 1998.[311] Other related laws include

[303] Gorove, S., "The Growth of Domestic Space Law: A U.S. Example", (1990) 18 (No.2) *Journal of Space Law* 99, at 99.
[304] See *supra* note 267.
[305] Prior to the enactment, the responsibility for space exploration was deemed primarily a military venture. The endorsement of the Act was in fact prompted by a lack of response by the United States military infrastructure, which seemed incapable of keeping up with the space race. As a matter of fact, the President of the United States is the dominant force in directing development of the United States space law. See Goldman, Nathan C., *American Space Law: International and Domestic,* (Ames: Iowa State University Press, 1988), at 124. See also http://en.wikipedia.org/wiki/National_Aeronautics_and_Space_Act, accessed: 28 January 2013.
[306] Section 102(a), National Aeronautics and Space Act 1958, *supra* note 267.
[307] 51 USC Chapter 509, *infra* note 320. See also 49 USC Chapter 701, *infra* note 321.
[308] 14 e-CFR Chapter III, *infra* note 323.
[309] See *infra* note 326.
[310] National Aeronautics and Space Administration Authorization Act of 2010, (hereinafter, 'NASA Authorization Act'), Pub. L. No.111-267, 124 Stat. 2807, 42 USC 18301 (Oct. 11, 2010). The Act aims to authorize the NASA programmes for the fiscal years 2011 to 2013 with the same budget values as requested by the United States President Barack Obama. The full text is available at http://www.gpo.gov/fdsys/pkg/PLAW-111publ267/html/PLAW-111publ267.htm, accessed: 25 January 2013.
[311] See *infra* note 332.

the Communication Act of 1934,[312] the Communication Satellite Act of 1962,[313] and the Land Remote Sensing Policy Act 1992.[314]

(a) Nature and Scope

The United States has various laws and regulations to govern the country's outer space activities. It is recognized that, even though the country is a party to almost all the United Nations space treaties,[315] which are regarded as among the supreme law of the Land pursuant to Article VI of the United States Constitution, the country still has to enact its own national space laws. This is done to regulate its national space activities. The requirement to have domestic laws in the United States, apart from the international space treaties, is considered vital since not all outer space treaties' rules are binding on their nationals. This becomes evident when one refers to the purpose of the treaties' domestic application in the United States where they are actually divided into two categories:[316] (1) non-self-executing agreement, and (2) self-executing agreement. A treaty is non-self-executing when it meets the following criteria: (a) when the treaty manifests an intention that it will only become effective as domestic law with the enactment of implementing legislation; (b) the Senate, in giving consent to a treaty, or Congress, by resolution, requires implementing legislation; or (c) implementing legislation is constitutionally required.[317] In such circumstances, such treaties

[312] The Communication Act was enacted in 1934 in respect of the United States' telecommunications in general. It established a legal base for regulating wired and wireless communications nationwide and worldwide. The Act replaced the Federal Radio Commission with the Federal Communications Commission (FCC). The FCC regulates radio frequencies for telecommunications, broadcasting, and other purposes. On 3 January 1996, the United States Congress amended or repealed sections in the Act with the new Telecommunications Act of 1996. The Act also experienced some other amendments. Pub.L. No. 416, Ch. 652, 48 Stat. 1064 (June 19, 1934), codified as Chapter 5 of the Title 47 of the United States Code, 47 USC, sec.151. See Dunk, F.G. von der, "Future Developments Relating to Outer Space Treaties", (1998) 40 *IISL Colloquium on the Law of Outer Space,* 449; see also http://en.wikipedia.org/wiki/Communications_Act_of_1934, accessed: 2 January 2013.

[313] The Communication Satellite Act was signed on 31 August, 1962. The purpose of its enactment was to establish a commercial communications satellite system as part of an improved global communications network. See Gorove, S., *supra* note 303, at 104.

[314] The Land Remote Sensing Policy Act 1992 repeals the Land Remote Sensing Commercialization Act of 1984. The Act deals with formulating certain changes to the United States Landsat system. See, Pub. L. No. 102-555, 106 Stat. 4163 (October 28, 1992), 15 USC Chap. 82. See Galloway, Jonathan F., "U.S. Space Law: An Overview VIS-A-VIS Commercialization", *2004 Space Law Conference Paper Assemble,* (Beijing: China Institute of Space Law, 2004), at 39-41; see also http://www.fws.gov/laws/lawsdigest/landrs.html, accessed: 3 February 2013.

[315] The United States is a party to four United Nations outer space treaties: the Outer Space Treaty 1967, the Rescue Agreement 1968, the Liability Convention 1972, and the Registration Convention 1975. For more information, read Chapter 3 of the thesis: (3.4.2. Five Outer Space Conventions: The United States of America's Status).

[316] See Hermida, Julian, *supra* note 301, at 77.

[317] Restatement of the Law, Third Foreign Relations Law of the United States, Section 111, as cited in Hermida, Julian, *supra* note 301, at 77.

require domestication in order to have legal effect at the national level. Thus, the United States relies on such reasons to enact various domestic space laws. In contrast to non-self-executing treaties, self-executing treaties are directly applicable and have a binding effect at the national level without the requirement for domestication. However, a treaty may also be partially self-executing. In fact, such practice has long been recognized by the United States courts.[318] Some instances of United Nations treaties' provisions that are treated as self-executing include freedom of exploration of outer space, freedom of use of outer space, prohibition of appropriation of outer space,[319] peaceful use and exploration of outer space, and applicability of international law to outer space activities. Meanwhile, for non-self-executing treaties, the provisions include authorization provision, monitoring and supervision, registration obligation, liability and indemnification. Such provisions thus call for legislative action for domestication. Such circumstances resulted in the enactment and implementation of various United States domestic space laws and regulations.

Since the rules regulating the space activities of United States nationals are not contained in a single legislative instrument, it is worth briefly highlighting some of the related laws and regulations. This is done to gain an idea of the laws and regulations directly or indirectly related to the United States' space activities. The first two that will be highlighted are those most frequently referred to in the subsequent discussion.

The first law is the Commercial Space Launch Act, as set forth in Chapter 509 (Commercial Space Launch Activities) of Title 51 (National and Commercial Space Programs), the United States Code.[320] It is important to note that Chapter 509 (Commercial Space Launch Activities) of Title 51 (National and Commercial Space Programs) was formerly numbered as Chapter 701 (Commercial Space Launch Activities) of Title 49 (Transportation).[321] The law

[318] Hermida, Julian, *supra* note 301, at 77.
[319] *Id*.
[320] 51 USC Chapter 509, Commercial Space Launch Act, Section 50901 – 50923. Title 51 (National and Commercial Space Programs), Subtitle V (Programs Targeting Commercial Opportunities), Chapter 509 (Commercial Space Launch Activities), the United States Code. Title 51 is a code dealing with the compilation of general laws regarding the United States space programme. It was promulgated by President Barack Obama on 18 December 2010 when he signed P.L. 111-314. Previously, no specific single title existed in the United States Code for the space programme. In fact, Title 51 does not modify or repeal existing programmes. However, it restates the existing laws in a manner that adheres to the policy, intent and purpose of the original laws, whilst improving the organizational structure of the law and removing imperfections. The text is available at http://uscode.house.gov/browse/prelim@title51/subtitle5/chapter509&edition=prelim; see also http://en.wikipedia.org/wiki/Title_51_of_the_United_States_Code, both accessed: 4 May 2014.
[321] 49 USC Chapter 701, Sections 70101-70121. Title 49 (Transportation), Subtitle IX (Commercial Space Transportation-Transferred), Chapter 701 (Commercial Space Launch Activities-Transferred), the United States

regulates the United States' commercial space industry, particularly with respect to the United States' private space activities. It authorizes the United States Department of Transportation (DOT), which sub-delegated such authority to the United States Federal Aviation Administration (FAA), to license the launch of launch vehicles, re-entry of vehicles, and operation of launch and re-entry sites, as well as promoting public space travel. Among its significant purposes, the Act aims to encourage the United States private sector to provide launch and re-entry vehicles, and, thus, associated services by: (1) simplifying and expediting the issuance and transfer of commercial licences; (2) facilitating and encouraging the use of Government-developed space technology; and (3) promoting the continuous improvement of the safety of launch vehicles designed to carry humans.[322]

The second law is the Commercial Space Transportation Regulation set forth in Chapter III, Title 14 (Aeronautics and Space), of the electronic Code of Federal Regulations.[323] This is one of the most significant regulations. The Regulation was established based on the Commercial Space Launch Act of 1984 and the applicable treaties and international agreements to which the United States has become a party. In terms of its scope, it sets forth the procedures and requirements applicable to the authorization and supervision of commercial space launch activities and commercial space transportation activities conducted in the United States or by a United States citizen. The Regulation does not, however, apply

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Code. Title 49 is a code that deals with the role of transportation in the United States. Chapter 701 (Commercial Space Launch Activities-Transferred) of Title 49 (Transportation) was renumbered Chapter 509 (Commercial Space Launch Activities) of Title 51 (National and Commercial Space Programs). Thus, former sections 70101-70105a, 70106-70109a, and 70110-70121, Chapter 701 (Commercial Space Launch Activities) of Title 49 (Transportation), were renumbered sections 50901-50923, Chapter 509 (Commercial Space Launch Activities) of Title 51 (National and Commercial Space Programs). The full text of former Chapter 701 (Commercial Space Launch Activities) of Title 49 (Transportation) is available at http://www.gpo.gov/fdsys/granule/USCODE-2009-title49/USCODE-2009-title49-subtitleIX-chap701/content-detail.html; and also http://stage.tksc.jaxa.jp/spacelaw/country/america/date/b_1_syougyouuchiage_hou(eng).pdf; refer also http://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title49-chapter701&num=0&edition=prelim, all accessed: 4 May 2014.

[322] 51 USC Chapter 509, Section 50901(b)(2), *supra* note 320; 49 USC Chapter 701, Section 70101(b)(2), *supra* note 321.

[323] 14 e-CFR Chapter III, Electronic Code of Federal Regulations (Data is updated as of January 30, 2013). The United States Commercial Space Transportation Regulation, Title 14 (Aeronautics and Space), Chapter III (Commercial Space Transportation, Federal Aviation Administration, Department of Transportation). The author refers to a regularly updated editorial compilation of the electronic Code of Federal Regulations (e-CFR) material and Federal Register amendments produced by the National Archives and Record Administration's Office of the Federal Registrar (OFR) and the Government Printing Office. For full text, refer: http://www.ecfr.gov/cgi-bin/ECFR?page=browse; see also http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/media/Part_400_Compilation.pdf, both accessed: 28 January 2013.

to amateur rocket activities[324] or to space activities carried out by or on behalf of the United States Government.[325]

The third is the National Aeronautics and Space Act 2010.[326] It was passed for the purpose of enacting certain laws relating to United States nationals and the country's commercial space programmes.[327] It consists of three subchapters: Subchapter I (Short title, Declaration of policy, and Definitions); Subchapter II (Coordination of aeronautical and space activities); and Subchapter III (General administrative provisions). In this Act, the state declares that NASA will seek and encourage, to the fullest extent, the commercial use of space, to the maximum extent possible.[328] The fourth law is the National Aeronautics and Space Administration Authorization Act of 2010 (hereinafter, 'NASA Authorization Act').[329] It was enacted to authorize the NASA programmes for the fiscal years 2011 to 2013, and for other purposes.[330] The long-term goal of the Act is to expand the permanent human presence beyond low-earth orbit in a manner that involves international partners. Other objectives include sustaining the capability of long-duration presence in low-earth orbit initially through continuation of the International Space Station and full utilization of the United States' segment of the space station. Other objectives are to maximise the role so that human exploration of space can advance the overall knowledge of the universe, and to support the United States' national and economic security and its global competitive posture.[331] The NASA Authorization Act comprises 12 titles: Title I (Authorization and appropriations); Title II (Policy, goals, and objectives for human space flight and exploration); Title III (Expansion of human space flight beyond the international space station and low-earth orbit); Title IV (Development and use of commercial crew and cargo transportation capabilities); Title V

[324] 'Amateur rocket activities' means unmanned rockets that: (1) are propelled by a motor or motors having a combined total impulse of 889,600 Newton-seconds (200,000 pound-seconds) or less; and (2) cannot reach an altitude greater than 150 kilometres (93.2 statute miles) above the Earth's surface. See 14 e-CFR 1.1, Chapter I, Electronic Code of Federal Regulations.
[325] 14 e-CFR 400.1, and 400.2, Chapter III, Electronic Code of Federal Regulations.
[326] See National Aeronautics and Space Act 2010, Pub. L. No. 111–314, 124 Stat. 3328 (December 18, 2010). The full text is available at the NASA official website at http://www.nasa.gov/offices/ogc/about/space_act1.html, accessed: 3 February 2013.
[327] See Preamble, National Aeronautics and Space Act 2010, *id*.; see also Title 51 (National and Commercial Space Program) United States Code, *supra* note 320.
[328] Section 20102(c), National Aeronautics and Space Act 2010, *supra* note 326.
[329] See National Aeronautics and Space Administration Authorization Act of 2010, Pub. L. No.111-267, 124 Stat. 2807, 42 USC 18301 (October 11, 2010). Title 42 (The Public Health and Welfare), Chapter 159 (Space Exploration, Technology, and Science), Section 18301 (Findings). The full text is available at http://www.gpo.gov/fdsys/pkg/PLAW-111publ267/html/PLAW-111publ267.htm, accessed: 4 February 2013.
[330] See the Preamble, National Aeronautics and Space Administration Authorization Act of 2010, *id*.
[331] Section 202, National Aeronautics and Space Administration Authorization Act of 2010, *supra* note 329. Refer also 42 USC 18312.

(Continuation, support, and evolution of the international space station); Title VI (Space shuttle retirement and transition); Title VII (Earth science); Title VIII (Space science); Title IX (Aeronautics and space technology); Title X (Education); Title XI (Re-scoping and revitalizing institutional capabilities); and Title XII (Other matters). The last Act is the Commercial Space Act of 1998.[332] This Act aims to encourage the development of the United States' commercial space industry and other purposes.[333] It consists of only two titles: Title I (Promotion of commercial space opportunities); and Title II (Federal acquisition of space transportation services).

(b) Authorization: Licensing and Procedure

The mode of authorization employed by the United States Government with respect to the United States' space-related activities is through the issuance of licences or experimental permits.[334] When the United States Congress finds that private applications of space technology in the country have achieved a significant level of commercial and economic activity and also offer potential for growth in the future, the United States Government then encourages the private sector to provide launch and re-entry space vehicles, and other associated services. Such efforts are made, among others, by simplifying and expediting the issuance and transfer of licences.[335] In the United States, participation in launch-related activities is prohibited without the appropriate licence issued by the United States Government. A licence or experimental permit is required, as a mode of authorization by the Government, in order to carry out space launches or to operate launch sites. In such circumstances, the United States Government, through the Commercial Space Launch Act,[336] authorizes the Secretary of Transport, who is sub-delegated to the Federal Aviation Administration (hereinafter the 'FAA') under its Office of Commercial Space Transportation,[337] to issue or transfer commercial licences and experimental permits. The Office is headed by an Associate Administrator who has the power to exercise the Secretary

[332] The Commercial Space Act of 1998, Pub. L. No. 105-303, 112 Stat. 2843 (October 28, 1998). The text is available at http://www.nasa.gov/offices/ogc/commercial/CommercialSpaceActof1998.html, accessed: 5 February 2013.
[333] Preamble of the Commercial Space Act 1998, *id*.
[334] 51 USC Chapter 509, Sections 50905 and 50906, *supra* note 320; 49 USC Chapter 701, Sections 70105 and 70105a, *supra* note 321; see also 14 e-CFR 413.1-413.23 and 437.1-437.95, Chapter III, Electronic Code of Federal Regulations, *supra* note 323.
[335] 51 USC Chapter 509, Sections 50901(a)(2) and 50901(b)(2), *supra* note 320; 49 USC Chapter 701, Sections 70101(a)(2) and 70101(b)(2), *supra* note 321.
[336] 51 USC Chapter 509, *supra* note 320; 49 USC Chapter 701, *supra* note 321.
[337] See *supra* note 274.

of Transport's authority to regulate the United States' commercial space transportation industry, including issuance of the relevant licences and experimental permits.[338]

There are at least four situations for which a licence is required. These situations are as follows: (1) for any person, regardless of their nationality, who conducts a launch or re-entry of a space vehicle or operates a launch or re-entry site in the United States;[339] (2) for any United States citizen, or any entities organized under the United States laws or any State, who launches or re-enters a space vehicle or operates a launch or re-entry site outside the United States;[340] (3) for any foreign entity, in which a United States citizen has a controlling interest, who launches or re-enters a space vehicle or operates a launch or re-entry site in any place outside the territory or territorial waters of any nation, unless there is an agreement between the United States and a foreign nation stating that the foreign nation has jurisdiction over the launch or re-entry of the space vehicle or the operation of the launch or re-entry site;[341] and, lastly, (4) for any foreign entity, in which a United States citizen has a controlling interest, who launches or re-enters a space vehicle or operates a launch or re-entry site in the territory of any foreign nation, including its territorial waters, if there is any agreement between the United States and that foreign nation stating that the United States has jurisdiction over the launch or re-entry of the space vehicle or the operation of the launch or re-entry site.[342] It is

[338] 51 USC Chapter 509, Section 50901(b)(3), *supra* note 320; 49 USC Chapter 701, Section 70101(b)(3), *supra* note 321; see also 14 e-CFR 401.3, Chapter III, Electronic Code of Federal Regulations, *supra* note 323 [Doc. No. FAA–2006–24197, 72 FR 17016, Apr. 6, 2007].

[339] 14 e-CFR 413.3(b), Chapter III, Electronic Code of Federal Regulations, *supra* note 323 [Doc. No. FAA–2006–24197, 72 FR 17017, Apr. 6, 2007]. For details of the rules, refer *infra* note 369; see also 51 USC Chapter 509, Section 50904(a)(1), *supra* note 320; 49 USC Chapter 701, Section 70104(a)(1), *supra* note 321.

[340] 14 e-CFR 413.3(c), Chapter III, Electronic Code of Federal Regulations, *supra* note 323 [Doc. No. FAA–2006–24197, 72 FR 17017, Apr. 6, 2007]; for details of the rules, refer *infra* note 370. See also 51 USC Chapter 509, Section 50904(a)(2), *supra* note 320; 49 USC Chapter 701, Section 70104(a)(2), *supra* note 321.

[341] 14 e-CFR 413.3(d)(1), and 413.3(e)(1), Chapter III, Electronic Code of Federal Regulations, *supra* note 323; [Doc. No. FAA–2006–24197, 72 FR 17017, Apr. 6, 2007]; for details of the rules, refer *infra* note 367. Compare also with the rules prescribed in: 51 USC Chapter 509, Sections 50904(a)(3) and 49 USC Chapter 701, Sections 70104(a)(3), which stress that a licence is required by a United States citizen who launches or re-enters a space vehicle or operates a launch or re-entry site, outside the United States and outside the territory of a foreign country, unless there is an agreement between both states that the foreign country has jurisdiction over the said activities. The purpose of this provision is indeed to prevent any entities from setting up a corporation abroad and launching vehicles from the high seas, inner space or even from outer space. See 51 USC Chapter 509, Sections 50904(a)(3), *supra* note 320; 49 USC Chapter 701, Sections 70104(a)(3), *supra* note 321. See also Hermida, Julian, *supra* note 301, at 91.

[342] 14 e-CFR 413.3(d)(2) and 413.3(e)(2), Chapter III, Electronic Code of Federal Regulations, *supra* note 323; [Doc. No. FAA–2006–24197, 72 FR 17017, Apr. 6, 2007]; for details of the rules, refer *infra* note 366. Compare also with rules provided in: 51 USC Chapter 509, Sections 50904(a)(4) and also 49 USC Chapter 701, Sections 70104(a)(4). The rules stress that a licence is required by a United States citizen who launches or re-enters a space vehicle or operates a launch or re-entry site in the territory of a foreign country if there is an agreement between both states that the United States has jurisdiction over the said activities. See 51 USC Chapter 509, Sections 50904(a)(4), *supra* note 320; 49 USC Chapter 701, Sections 70104(a)(4), *supra* note 321.

also noted that a person, otherwise requiring a licence, may instead obtain an experimental permit to launch or re-enter a suborbital rocket.[343] This will be discussed in the subsequent paragraph.

There are two categories of launch or re-entry licences offered by the FAA: (1) specific licence, and (2) operator licence. The launch or re-entry specific licence authorizes the holders to conduct one or more launches or re-entries, having the same operational parameters of one type of launch or re-entry vehicle operating at one launch or re-entry site. Such licence will identify, by name or mission, each activity authorized under the licence. With this licence, its authorization to operate is considered terminated when all launches or re-entries authorized by the licence have been completed, or when the licence validity period has expired. However, the launch or re-entry operator licence authorizes the holder to conduct launches or re-entries from one launch or re-entry site within a range of operational parameters of launch or re-entry vehicles from the same family of vehicles transporting specified classes of payloads or performing specified activities. The main difference between those two licences is that the launch or re-entry specific licence allows only a specific launch or re-entry activity. On the other hand, the launch or re-entry operator licence allows the holder to perform multiple launches or re-entries of a similar type.[344]

Apart from the aforesaid licences, the FAA also offers licences in relation to sites. These are launch site licences and re-entry site licences.[345] These licences are part of the requirements of the United States law for operating a site for launch or re-entry of a space object.

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[343] 14 e-CFR 413.3(f), Chapter III, Electronic Code of Federal Regulations, *supra* note 323; [Doc. No. FAA–2006–24197, 72 FR 17017, Apr. 6, 2007]. See also 14 e-CFR 437.1 – 437.95 (Part 437 – Experimental Permits), Chapter III, Electronic Code of Federal Regulations, *supra* note 323; 51 USC Chapter 509, Sections 50906 (Experimental Permits), *supra* note 320; 49 USC Chapter 701, Section 70105A (Experimental Permits), *supra* note 321.

[344] 14 e-CFR 415.3, Chapter III, Electronic Code of Federal Regulations, *supra* note 323; see also 51 USC Chapter 509, Sections 50904, and 50905, *supra* note 320; 49 USC Chapter 701, Section 70104, and 70105, *supra* note 321. See http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_reentry/, accessed: 13 February 2013.

[345] For more information on application of the launch site licence, refer to 14 e-CFR 420, Chapter III, Electronic Code of Federal Regulations, *supra* note 323. And, for the re-entry site licence, refer to 14 e-CFR 433, Chapter III, Electronic Code of Federal Regulations, *supra* note 323; see also 51 USC Chapter 509, Sections 50904, and 50905, *supra* note 320; 49 USC Chapter 701, Section 70104, and 70105, *supra* note 321. See http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_site/, accessed: 14 February 2013.

As permitted by the United States laws, instead of applying for a licence, a person may apply for an experimental permit.[346] An experimental permit is issued only to a person who wishes to launch or re-enter a reusable suborbital rocket solely for: (1) research and development to test new design concepts, new equipment, or new operating technique; (2) showing compliance with requirements for obtaining a licence; or (3) crew training prior to obtaining a licence for a launch, or re-entry using rocket designed in accordance with the permit issued.[347] In respect of the activities carried out according to such purposes, the permit may be under the United States laws for an unlimited number of launches or re-entries.[348] Such a permit will last for one year from the issuing date, but it can be renewed yearly.[349]

There are various stages in the licensing and experimental permit application procedure. These procedures include[350] (1) pre-application consultation, (2) submission of application, (3) initial screening, (4) review period, (5) complete application, and (6) issuance of licence. Firstly, the pre-application consultation stage shall be executed prior to the formal submission of a licence or permit application. The applicant must consult the FAA before submitting his/her application to discuss the process and possible issues relevant to the licence or permit. This stage allows the applicant to familiarize him/herself with the application process, and acquaint the FAA with the applicant's proposals. This early consultation may, indeed, help the applicant identify possible regulatory issues with regard to his application, thus avoiding delay in processing such application.[351]

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[346] 14 e-CFR 413.3(f), and 437.1 – 437.95, Chapter III, Electronic Code of Federal Regulations, *supra* note 323; [Doc. No. FAA-2006-24197, 72 FR 17017, Apr. 6, 2007]; see also 51 USC Chapter 509, Sections 50906, *supra* note 320; 49 USC Chapter 701, Section 70105A, *supra* note 321. See also Dempsey, Paul Stephen, "United States Space Law: Commercial Space Launches and Facilities", (2007) *49 IISL Colloquium on the Law of Outer Space* 76.

[347] 14 e-CFR 437.5, Chapter III, Electronic Code of Federal Regulations, *supra* note 323; see also 51 USC Chapter 509, Sections 50906(d), *supra* note 320; 49 USC Chapter 701, Section 70105A(d), *supra* note 321.

[348]14 e-CFR 437.9, Chapter III, Electronic Code of Federal Regulations, *supra* note 323; see also 51 USC Chapter 509, Sections 50906(e), *supra* note 321; 49 USC Chapter 701, Section 70105A(e), *supra* note 321.

[349] 14 e-CFR 437.11, and 413.23, Chapter III, Electronic Code of Federal Regulations, *supra* note 323.

[350] The explanation of procedures for application for a licence and experimental permit is enshrined in 14 e-CFR Part 413 (License Application Procedures), Part 420 (License to Operate a Launch Site), Part 433 (license to Operate a Re-entry Site), and Part 437 (Experimental Permits), Chapter III, Electronic Code of Federal Regulations, *supra* note 323; see also 51 USC Chapter 509, Sections 50905 and 50606, *supra* note 320; 49 USC Chapter 701, Sections 70105 and 70105A, *supra* note 321. The complete licence application process for launch and re-entry vehicles can be viewed at http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_reentry/; and for launch sites licence is at http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_site/; for the experimental permit is applicable at http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/sub_orbital_rockets/, all accessed at: 18 February 2013.

[351] See 14 e-CFR 413.5, Chapter III, Electronic Code of Federal Regulations, *supra* note 323; [Doc. No. FAA–2006–24197, 72 FR 17018, Apr. 6, 2007]. See also for expendable launch vehicle pre-application consultation:

Secondly, in the submission application stage, the applicant must submit a written application in English. Information required at this stage includes the applicant's name and address, and the type of licence or permit the applicant wishes to apply for. If an applicant proposes to include the safety element for which the FAA issues a safety approval,[352] the applicant must then identify the safety approval in the application and explain the use of the safety element.[353]

Thirdly, during the initial screening stage, the application will be screened by the FAA in order to determine whether it is sufficiently complete to begin the review. If the application is complete and accepted, the applicant will be notified in writing that the FAA will initiate the review stage. However, if it is rejected for being incomplete, notification will be sent to the applicant, explaining the reason. Thus, the applicant may rectify any deficiencies.[354]

Fourthly, in the review period stage, the FAA will review and make decisions on the application within 180 days of receiving it. In the event of the application failing to provide sufficient information, written notification will be sent to the applicant, requiring him/her to provide the missing information.[355]

Fifthly, when the application is accepted at the complete application stage, this does not mean that the application is entirely complete. The FAA is still allowed to ask for other information

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http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_reentry/expendable/preapp_consult/; for reusable launch vehicle: http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_reentry/reusable/preapp_consult/; for launch site: http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_site/preapp_consult/; for experimental permit see http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/sub_orbital_rockets/, all accessed: 18 February 2013.

[352] A discussion on the safety approval and safety review is provided in Chapter 3 of the thesis, (3.4.3(f) Safety, Peace, and Security Measurement). The guidance is applicable in: US Federal Aviation Administration, *Safety Approval: Guide for Applicants, Version 1.1, (July 20, 2012)*, (Washington D.C., 2012), available at http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/safety_approvals/media/Safety_Approval_Guide_1.1.pdf, accessed: 18 February 2013.

[353] For more information, refer to 14 e-CFR 413.7(d), Chapter III, Electronic Code of Federal Regulations, *supra* note 323. Read also United States Federal Aviation Administration, *Safety Approval: Guide for Applicants, Version 1.1, (July 20, 2012)*, *id*.

[354] 14 e-CFR 413.11 [Doc. No. FAA–2006–24197, 72 FR 17018, Apr. 6, 2007], and 413.21 [Amdt. 413-03, 64 FR 19614, Apr. 21, 1999, as amended by Amdt. 413-9, 72 FR 17019, Apr. 6, 2007], Chapter III, Electronic Code of Federal Regulations, *supra* note 323.

[355] 14 e-CFR 413.15, Chapter III, Electronic Code of Federal Regulations, *supra* note 323, [Doc. No. FAA-2006-24197, 72 FR 17018, Apr. 6, 2007].

necessary for determining whether public health and safety, safety of property, national policy, and the United States foreign policy interests will be protected during the conduct of the activities.[356] The applicant must also ensure that the continuing accuracy and completeness of information is maintained during the process of the licensing application. Failure to observe this will lead to denial of such application.[357]

The sixth and final stage is the issuance of the licence. After the FAA has completed its review and the applicant has satisfied all the requirements, the FAA will then issue a licence or permit to the applicant.[358] Actually, the FAA has the right to make a determination on issuing a licence within 180 days of receiving a complete application. However, for an experimental permit, the process takes only 120 days.[359] The licence issued is eligible for renewal at least 90 days before it expires, and for the experimental permit at least 60 days before it expires.[360]

(c) Registration Obligation

The United States Government implements the registration obligation, as prescribed by Article IV of the Registration Convention 1975,[361] in relation to space objects owned by United States citizens or its entities. Under the registration obligation imposed by United States law, the licensee is required to register all objects placed in outer space in the course of conducting activities authorized by the licence, except for objects owned and registered by the United States Government and any object owned by a foreign entity. The registration should take place no later than thirty days following the licensed launch. Thus, the licensee has to submit to the Office of Commercial Space Transportation[362] data including the

[356] 14 e-CFR 413.13, Chapter III, Electronic Code of Federal Regulations, *supra* note 323, [Doc. No. FAA-2006-24197, 72 FR 17018, Apr. 6, 2007].
[357] 14 e-CFR 413.17, Chapter III, Electronic Code of Federal Regulations, *supra* note 323, [Doc. No. FAA–2006–24197, 72 FR 17018, Apr. 6, 2007].
[358] 14 e-CFR 413.19, Chapter III, Electronic Code of Federal Regulations, *supra* note 323, [Doc. No. FAA-2006-24197, 72 FR 17019, Apr. 6, 2007].
[359] Refer Commercial Space Launch Amendments Act of 2004; and also http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/sub_orbital_rockets/, accessed: 18 February 2013.
[360] 14 e-CFR 413.23, Chapter III, Electronic Code of Federal Regulations, *supra* note 323, [Doc. No. FAA-2006-24197, 72 FR 17019, Apr. 6, 2007].
[361] See Registration Convention 1975, *supra* note 31.
[362] See *supra* note 274.

following: date and location of the launch; general function of the space object; and final orbital parameters including its nodal period and inclination.[363]

With respect to the provision that the licensee does not need to provide registration information for objects placed in space when they were owned by a foreign entity,[364] it has come to the attention of the FAA that this rule needs clarification.[365] Such a situation, in fact, leads to further debate as United States law prescribes that a foreign entity, in which a United States citizen has a controlling interest, that conducts space activities either in the foreign state or its territorial waters,[366] or outside the territory or territorial waters of any state, is required to obtain a licence from the United States (unless certain conditions are satisfied).[367] In other words, the foreign entity, controlled by a United States citizen, must obtain a licence under the United States law in order to conduct space activities. However, in the event of the

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[363] The rule on the registration of space objects was previously prescribed under Section 415.81 (Registration of Space Object), Subpart E of Title 14 e-CFR. However, at the time of writing, Subpart E including Section 415.81, is marked as 'reserved'. Section 415.81 mentioned:
(a) To assist the U.S. Government in implementing Article IV of the 1975 Convention on Registration of Objects Launched into Outer Space, each licensee shall provide to the FAA the information required by paragraph (b) of this section for all objects placed in space by a licensed launch, including a launch vehicle and any components, except: (1) Any object owned and registered by the U.S. Government; and, (2) Any object owned by a foreign entity.
(b) For each object that must be registered in accordance with this section, not later than thirty (30) days following the conduct of a licensed launch, a licensee shall submit the following information:
(1) The international designator of the space object(s); (2) Date and location of launch; (3) General function of the space object; and, (4) Final orbital parameters, including: (i) Nodal period; (ii) Inclination; (iii) Apogee; and (iv) Perigee. See 14 e-CFR Subpart E [Reserved], Chapter III, Electronic Code of Federal Regulations, *supra* note 323. See Hermida, Julian, *supra* note 301, at 98.

[364] Instead of space objects owned by the foreign entity, the registration of information on the object is also not required when the object is owned and registered by the United States Government. See *id*.

[365] See http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/media/14cfr-401-417.pdf, accessed: 15 February 2013.

[366] 14 e-CFR 413.3(d)(2), and 413.3(e)(2), Electronic Code of Federal Regulations, *supra* note 323. Section 413.3 states: *Who must obtain a license or permit: (d) A foreign entity in which a United States citizen has a controlling interest must obtain a license to launch a launch vehicle from or to operate a launch site in – (2) the territory of any foreign nation, including its territorial waters, if there is an agreement in force between the United States and that foreign nation providing that the United States has jurisdiction over the launch or the operation of the launch site. (e) A foreign entity in which a United States citizen has a controlling interest must obtain a license to re-enter a re-entry vehicle or to operate a re-entry site in – (2) the territory of any foreign nation if there is an agreement in force between the United States and that foreign nation providing that the United States has jurisdiction over the re-entry or the operation of the re-entry site.*

[367] 14 e-CFR 413.3(d)(1), and 413.3(e)(1), Electronic Code of Federal Regulations, *supra* note 323. Section 413.3 states: *Who must obtain a license or permit: (d) A foreign entity in which a United States citizen has a controlling interest must obtain a license to launch a launch vehicle from or to operate a launch site in – (1) Any place that is outside the territory or territorial waters of any nation, unless there is an agreement in force between the United States and a foreign nation providing that such foreign nation has jurisdiction over the launch or the operation of the launch site. (e) A foreign entity in which a United States citizen has a controlling interest must obtain a license to re-enter a re-entry vehicle or to operate a re-entry site in – (1) Any place that is outside the territory or territorial waters of any nation, unless there is an agreement in force between the United States and a foreign nation providing that such foreign nation has jurisdiction over the re-entry or the operation of the re-entry site.*

launched object being owned by the foreign entity, it is not required under United States law to register to their authority the information on such an object even though, originally, the licensee was indeed regulated under United States law. For further illustration, consider, for instance, the case of Sea Launch,[368] which operates launch services from international waters. Under United States law, if a United States company, namely the Boeing Commercial Space Company, has a controlling interest over the Sea Launch, the Sea Launch is then required to obtain a United States launch licence to operate its services. Nevertheless, in the event of the object placed by Sea Launch in outer space being owned by a foreign entity, the registration of information on the object is not required. This situation may indeed have legal implications in that the United States authority originally authorizes the licensee to conduct its activities through issuance of a licence under United States law. However, the United States authority is then seen as non-compliant with the registration obligation when there is no legal requirement for the licensee to register all the objects the licensee has placed in space, especially when they are owned by a foreign entity. The same implication also applies in circumstances where the object is owned by a foreign entity but was launched from United States territory by a licensee who was given an authorization under United States law. Such licensee may either be a United States citizen or a foreign entity that conducts the launch within the United States,[369] or a United States citizen who conducts the launch from outside United States territory.[370]

(d) Constant Monitoring and Supervision

The United States Government observes constant monitoring and supervision obligations in their outer space activities. In order to implement this principle, the United States gave the Secretary of Transportation the power to monitor activities of the licensee. For this purpose,

[368] Sea Launch is a spacecraft launch service that uses a mobile sea platform for equatorial launches. It was established in 1995 as a consortium of four companies from the United States, Norway, Russia, and Ukraine. Boeing Commercial Space Company (the United States Company) has a 40 per cent ownership share, RSC Energia (Russia) has 25 per cent, Aker Kvaerner (Norway) owns 20 per cent and SDO Yuzhnoye/PO Yuzhmash (Ukraine) owns 15 per cent. See http://www.sea-launch.com/index.html, and also http://en.wikipedia.org/wiki/Sea_Launch#Launches, accessed: 19 February 2013.

[369] Section 413.3(b), Title 14 of e-CFR, states: *A person must obtain a license to: (1) Launch a launch vehicle from the United States; (2) Operate a launch site within the United States; (3) re-enter a re-entry vehicle in the United States; or (4) Operate a re-entry site within the United States. Refer* 14 CFR 413.3(b), Electronic Code of Federal Regulations, *supra* note 323.

[370] Section 413.3(c), Title 14 of e-CFR, prescribes: *A person who is a United States citizen or an entity organized under the laws of the United States or any State must obtain a license to: (1) Launch a launch vehicle outside the United States; (2) Operate a launch site outside the United States; (3) re-enter a re-entry vehicle outside the United States; or, (4) Operate a re-entry site outside the United States.* Refer 14 e-CFR 413.3(c), Chapter III, Electronic Code of Federal Regulations, *supra* note 323.

an officer will be designated by the Secretary as an observer at the launch or re-entry site. The licensee must allow the designated officer to access the licensed facilities and observe the related activities. These facilities and the related activities may refer to the launch or re-entry sites, as well as manufacturing, production, testing, and training facilities. They may also refer to assembly sites used by any contractor, licensee or permit holder for the purposes of producing, assembling or testing a launch or recovering a vehicle at a site used for crew or space flight participant training or at a site at which the payload is integrated with launch or re-entry vehicles. These observations are conducted to monitor those activities at such times to a reasonable extent. It is observed that this action is necessary in order to determine the licensee's compliance with the licence issued. The licensee, therefore, must cooperate with the officer in charge for fulfilment of such purpose.[371]

(e) Liability and Indemnification

The United States law prescribes the general rule that no person may commence or conduct any launch or re-entry activity that requires a licence or permits unless such person demonstrates compliance with the United States insurance requirements or otherwise demonstrates the required amount of financial responsibility.[372] The Commercial Space Launch Act[373] rules that when a launch or re-entry licence is issued, the licensee shall either obtain liability insurance or demonstrate financial responsibility in amounts sufficient to compensate for maximum probable losses[374] that may arise from two types of claims. These claims might be made by: (1) a third party for death, bodily injury, or property damage, or loss resulting from an activity carried out under the licence; and (2) the United States Government against a person for damage or loss to Government property, resulting from an activity carried out under the licence.[375]

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[371] 14 e-CFR 405.1 (Monitoring of licensed, permitted, and other activities) [Doc. No. FAA–2006–24197, 72 FR 17016, Apr. 6, 2007], and 437.93 (Compliance monitoring), Chapter III, Electronic Code of Federal Regulations, *supra* note 323. See also 51 USC Chapter 509, Sections 50907, *supra* note 320; 49 USC Chapter 701, Section 70106, *supra* note 321.

[372] 14 e-CFR 440.5 [Docket No. FAA-2005-23449, 71 FR 75632, Dec. 15, 2006, as amended by Amdt. 440-3, 77 FR 20533, Apr. 5, 2012], and 440.9, Chapter III, Electronic Code of Federal Regulations, *supra* note 323. See also 51 USC Chapter 509, Sections 50914, *supra* note 320; 49 USC Chapter 701, Section 70112, *supra* note 321.

[373] 51 USC Chapter 509, *supra* note 320; 49 USC Chapter 701, *supra* note 321. Refer also *id*.

[374] Maximum probable loss means the greatest dollar amount of loss for bodily injury or property damage that is reasonably expected to result from a licensed or permitted activity. See 14 e-CFR 440.3, Chapter III, Electronic Code of Federal Regulations, *supra* note 323.

[375] 51 USC Chapter 509, Sections 50914(a)(1), *supra* note 320; 49 USC Chapter 701, Section 70112(a)(1), *supra* note 321.

Regarding the first type of claim, which is made by a third party, the risks of losses are allocated up to the amount of the maximum probable loss, which may not exceed US$500,000,000 (US$500 million) or the maximum liability insurance available on the world market at a reasonable cost, as determined by the FAA.[376] In such circumstances, the licensee is only responsible for compensating losses up to the amount of US$500 million. In the event of the claim made by the third party exceeding the above amount, the licensee will not be accountable for compensation of such amount.[377] In other words, if the claim is in excess of the prescribed amount of the licensee's insurance, and it is a successful claim, the licensee will be liable to pay compensation to the third party up to US$500 million only. In such circumstances, payment of the balance exceeding US$500 million is the responsibility of the United States Government. The rule is, nevertheless, applicable to the licensee with respect to the third-party claim, with the condition that the additional compensation amount is not more than US$1,500,000,000 (US$1,500 million) (as adjusted for inflation occurring after 1 January 1989).[378] Any claim above this upper limit of the Government indemnification is the responsibility of the licensee or legally responsible party. This rule applies to the third-party claim made against a licensee, transferee, contractor, sub-contractor, or customer of the licensee or transferee, or a contractor or sub-contractor of a customer, but not against a space flight participant, resulting from an activity carried out under the licence issued that caused death, bodily injury, property damage, or loss resulting from the activity carried out under the licence.[379] The Secretary of Transportation, however, will not pay a part of the claim for which losses or damage resulted from the wilful misconduct of the licensee.[380]

For the second set of circumstances, in which the licensee conducts space operations from United States Governmental bases, it is a legal requirement that the licensee retain adequate

[376] 14 e-CFR 440.9(c), Chapter III, Electronic Code of Federal Regulations, *supra* note 323. See also 51 USC Chapter 509, Sections 50914(a)(3), *supra* note 320; 49 USC Chapter 701, Section 70112(a)(3), *supra* note 321.
[377] 14 e-CFR 440.5(c)(2) [Docket No. FAA-2005-23449, 71 FR 75632, Dec. 15, 2006, as amended by Amdt. 440-3, 77 FR 20533, Apr. 5, 2012], Chapter III, Electronic Code of Federal Regulations, *supra* note 323; 51 USC Chapter 509, Sections 50915(a)(1)(A), *supra* note 320; 49 USC Chapter 701, Section 70113(a)(1)(A), *supra* note 321.
[378] 14 e-CFR 440.5(c)(2), 440.19(a) and, 440.19(e)(1), Electronic Code of Federal Regulations, *supra* note 323. 51 USC Chapter 509, Sections 50915(a)(1)(B), *supra* note 320; 49 USC Chapter 701, Section 70113(a)(1)(B), *supra* note 321. See also Vorwig, Petra A., "Regulation of Private Launch Services in the United States", *National Regulation of Space Activities,* ed., Jakhu, Ram S., (Dordrecht: Springer, 2010), at 413.
[379] 14 e-CFR 440.19(a), Electronic Code of Federal Regulations, *supra* note 323; 51 USC Chapter 509, Sections 50915(a)(1), *supra* note 320; 49 USC Chapter 701, Section 70113(a)(1), *supra* note 321.
[380] 14 e-CFR 440.19(b), Chapter III, Electronic Code of Federal Regulations, *supra* note 323. 51 USC Chapter 509, Sections 50915(a)(2), *supra* note 320; 49 USC Chapter 701, Section 70113(a)(2), *supra* note 321.

liability insurance to cover all losses and damages that might occur. The main reason for this is to protect the assets of the Government. The laws[381] stipulate that, with respect to Government property, the risk of losses will be assumed up to the amount of the maximum probable loss, which may not exceed US$100,000,000 (US$100 million) or the maximum liability insurance available on the world market at reasonable cost, as determined by the FAA.[382] Therefore, when a claim is successful, the licensee is liable to pay the compensation up to only the aforesaid amount. However, in the event of the claim exceeding the aforesaid amount, the licensee has no responsibility to pay any amount that exceeds the US$100 million. This rule applies only for loss or damage that is not a result of the licensee's wilful misconduct.[383] In contrast, if the loss or damage resulted from the licensee's wilful misconduct, the licensee must then bear responsibility. However, if the loss or damage sustained by the United States Government results from the wilful misconduct of the United States or its agents, the licensee will not be accountable for the liability, loss or damage sustained.[384]

Instead of the insurance requirement, the licensee is alternatively allowed to demonstrate the required amount of financial responsibility. The amount of financial responsibility that the licensee must obtain is determined by the Secretary of Transportation, after consultation with the appropriate agencies.[385]

Apart from the above, as a condition of the issuance of the licence, the licensee is required to enter into reciprocal waivers of claim. The rule requires the licensee to implement such reciprocal waiver of claim with each of its contractors, subcontractors and customers, and the contractors and subcontractors of the customers involved in the launch or re-entry services. Under such waiver of claims, each party will agree to waive and release claims against all other parties to the waiver. Each of them will also agree to assume financial responsibility for any property damage or loss it sustains, and for bodily injury, property damage, or loss sustained by its own employees resulting from the activity conducted under the applicable

[381] See 14 e-CFR, Chapter III, Electronic Code of Federal Regulations, *supra* note 323; 51 USC Chapter 509, *supra* note 320; 49 USC Chapter 701, *supra* note 321.
[382] 14 e-CFR 440.9(e), Chapter III, Electronic Code of Federal Regulations, *supra* note 323; 51 USC Chapter 509, Sections 50914(a)(3)(ii), *supra* note 320; 49 USC Chapter 701, Section 70112(a)(3)(ii), *supra* note 321.
[383] 14 e-CFR 440.5(c)(3), Chapter III, Electronic Code of Federal Regulations, *supra* note 323.
[384] 14 e-CFR 440.5(c)(1), Chapter III, Electronic Code of Federal Regulations, *supra* note 323.
[385] 14 e-CFR 440.5(b), Chapter III, Electronic Code of Federal Regulations, *supra* note 323; 51 USC Chapter 509, Sections 50914(a)(2), *supra* note 320; 49 USC Chapter 701, Section 70112(a)(2), *supra* note 321.

licence, regardless of fault.[386] The Secretary of Transportation, however, shall instate for the Government a reciprocal waiver of claims with the licensee, transferee, contractors, subcontractors, crew, space flight participants, customers of the licensee, contractors and subcontractors of the customers involved in launch or re-entry services, so that each of them will agree to be responsible for property damage or loss sustained by its own employees or by the space flight participants resulting from the conducted activity applicable under the licence. The waiver applies only to the extent to which the claims are greater than the amount of insurance or the financial responsibility required.[387]

The exclusion of liability provided by United States law for the launch service provider under the scheme of the reciprocal waiver of claim is in fact seen as a practical alternative to the emergence of the United States private launch industry.[388]

(f) Safety, Peace and Security Measurement

In view of the spirit of safety, peace and security initiated by the international law,[389] the United States Government has instilled these elements in its domestic space legal frameworks. In the United States National Space Policy, the Government declares that the goal of its national space programme is, among other things, to strengthen stability in space through domestic and international measures for the purpose of promoting safe and responsible operations in space.[390] Furthermore, in the National Aeronautics and Space Act,[391] the United States Government pledges that its activities in space will be devoted to peaceful purposes for the benefit of all mankind.[392] The same Act also stresses that among the objectives of the United States aeronautical and space activities are the improvement of the safety and efficiency of aeronautical and space vehicles.[393]

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[386] 14 e-CFR 440.17(a), and 440.17(b), Chapter III, Electronic Code of Federal Regulations, *supra* note 323; 51 USC Chapter 509, Sections 50914(b)(1), *supra* note 320; 49 USC Chapter 701, Section 70112(b)(1), *supra* note 321.
[387] 51 USC Chapter 509, Sections 50914(b)(2), *supra* note 320; 49 USC Chapter 701, Section 70112(b)(2), *supra* note 321.
[388] Hermida, Julian, *supra* note 301, at 62.
[389] Article IX, Outer Space Treaty 1967.
[390] National Space Policy of the United States of America (June 28, 2010), at 4, http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf, accessed: 22 February 2013.
[391] National Aeronautics and Space Act, *supra* note 326.
[392] Section 20102(a), National Aeronautics and Space Act, *supra* note 326.
[393] Section 20102(d)(2), National Aeronautics and Space Act, *supra* note 326.

The licence application procedure, with respect to the launch or re-entry vehicle or site, involves the process of safety review and approval. The safety review procedure aims at determining whether the applicant is able to safely conduct the proposed application. This is done because the licence applicant should be responsible for the public's safety and property at all times.[394] Therefore, for a successful application, the applicant needs to demonstrate an understanding of the hazards involved and how the operation will be performed safely.[395] Pursuant to this, the Secretary of Transportation may establish procedures for safety approvals for the related activities, including the approval procedures for the purpose of protecting the health and safety of crews and space flight participants.[396] At this point, the Secretary may set up regulations requiring space flight participants to undergo, for instance, appropriate physical and medical examinations and training requirements prior to conducting the activities.[397] The United States law also prescribes that the Secretary has the responsibility to encourage, facilitate and promote the continuous improvement of the safety of launched vehicles designed to carry humans.[398]

Besides the safety review, the United States Government introduced an environmental review. Under the United States National Environmental Policy Act, the Office of Commercial Space Transportation[399] is required to integrate the environmental values into its decision-making process. In such a situation, the Office will analyse the environmental impacts of the proposed licensed and permitted actions, including the launch and re-entry activities and sites.[400] For security reasons, the Secretary of Transportation has the authority to prohibit, suspend or immediately end the launch or re-entry of space vehicles or the

[394] 14 e-CFR 417.7, Chapter III, Electronic Code of Federal Regulations, *supra* note 323.
[395] The procedures regarding the safety review are available as follows: (1) for the expendable launch vehicle (in 14 e-CFR 415.31- 415.43, Chapter III, Electronic Code of Federal Regulations, *supra* note 323); (2) for the reusable launch vehicle (in 14 e-CFR 431.31 - 431.47, Chapter III, Electronic Code of Federal Regulations, *supra* note 323). However, for the launch site safety review (in 14 e-CFR 420.19 - 420.29, Chapter III, Electronic Code of Federal Regulations, *supra* note 323). See also 14 e-CFR 417.9, Chapter III, Electronic Code of Federal Regulations, *supra* note 323, for the launch site responsibility. See Vorwig, Petra A., *supra* note 378, at 409; See also http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_reentry/expendable/safety/, accessed: 22 February 2013.
[396] 51 USC Chapter 509, Sections 50905(a)(2), *supra* note 320; 49 USC Chapter 701, Section 70105(a)(2), *supra* note 321. See also *id*.
[397] 51 USC Chapter 509, Section 50905(a)(6)(B), *supra* note 320; 49 USC Chapter 701, Section 70105(a)(6)(B), *supra* note 321. For more information on safety regulation refer 51 USC Chapter 509, Section 50905(a)(6)(C), *supra* note 320; 49 USC Chapter 701, Section 70105(a)(6)(C), *supra* note 321.
[398] 51 USC Chapter 509, Section 50903(c), *supra* note 320; 49 USC Chapter 701, Section 70103(c), *supra* note 321.
[399] See *supra* note 274.
[400] See http://www.faa.gov/about/office_org/headquarters_offices/ast/environmental/, accessed: 20 February 2013.

operation of sites if it has been decided that the operation is detrimental to public health and safety, safety of property, national policy and the foreign policy interests of the United States.[401]

It is construed that the spirit of safety, peace, and security has been given major consideration by the United States Government. This is evident since commercial space transportation licences or experimental permits will only be granted if the applicant can prove their operations will not jeopardize public health and safety, property, the United States' national security, foreign policy interests and the international obligations of the United States.[402] The Government can, indeed, modify, suspend or revoke the licence if the licensee fails to comply with the aforesaid requirements.[403]

(g) Other Provisions

Various other provisions are prescribed in the United States' national space laws and regulations. These include administrative hearings and judicial reviews, acquiring United States Government property and services, disclosing information, enforcement and penalties,[404] human space flight requirement,[405] and others.

3.4.4. Concluding Remarks

The United States is a party to just four outer space treaties: the Outer Space Treaty 1967; the Rescue Agreement 1968; the Liability Convention 1972; and the Registration Convention 1975. In such circumstances, it is concluded that the United States is willing to be bound by the international obligations set forth in these four treaties only. Article VI of the United States Constitution declares that the international treaties to which the country becomes a party, together with the United States Constitution and the other United States laws, are the supreme law of the land. With respect to the treaties' domestic application, the United States follows a mixed system: the self-executing and non-self-executing. For self-executing, the treaty is directly applicable and has a legally binding effect on United States nationals

[401] 51 USC Chapter 509, Section 50909(a), *supra* note 320; 49 USC Chapter 701, Section 70108(a), *supra* note 321; 14 e-CFR 417.11, Chapter III, Electronic Code of Federal Regulations, *supra* note 323.
[402] See http://www.faa.gov/licenses_certificates/commercial_space_transportation/, accessed: 27 February 2013.
[403] 51 USC Chapter 509, Section 50908, *supra* note 320; 49 USC Chapter 701, Section 70107, *supra* note 321.
[404] 49 USC Chapter 701, *supra* note 321.
[405] 14 e-CFR 460, Chapter III, Electronic Code of Federal Regulations, *supra* note 323.

without the requirement of domestication. However, for non-self-executing, the treaty is not directly applicable and has no legally binding effect on United States nationals unless the rules are domesticated into the States' domestic laws. The United States indeed recognizes that a treaty may be partially self-executing.

The legal rules governing the space activities of United States nationals are not accessible in a single legislative instrument. Nevertheless, they are governed by the United States' national space laws that are made up of a series of laws and regulations. This situation reflects the phenomenon that the United States' space laws developed based on the arising needs which commenced from the country's early involvement in the exploration of outer space activities up to the present day. In the United States, the law prescribes that the mode of authorization of outer space activities for its nationals is through the issuance of licences. Apart from licences, outer space activities can also be legalized by the issuance of experimental permits. In applying licences and experimental permits, various procedures involved. A registration obligation with respect to objects placed in space is also observed, as well as the obligation for constant monitoring and supervision. For the purpose of constant monitoring and supervision, the United States authority will designate and place an officer at the launch or re-entry site to monitor and ensure that the related activities are in compliance with the country's laws.

Regarding liability and indemnification, the United States Government imposes a monetary limit on liability. This is done to encourage the involvement of private sectors in space-related activities. Under such a scheme, a specific amount of the maximum probable loss will be determined by the authority in order to limit the liability of the licensee. In the event of loss or damage occurring, the licensee will only be responsible for compensation up to the amount of the maximum probable loss that is the amount covered by the insurance. This rule is applied with the condition that the loss has not resulted from the licensee's wilful misconduct. However, if the claim is in excess of the prescribed amount, the Government will then bear the responsibility, up to a certain amount as prescribed by United States law. This scheme is applied when the claimant is either the third party who suffers loss and damage or the United States Government that suffers the loss and damage to Government property resulting from the activities carried out under the licence. The United States law also introduces a system of reciprocal waiver of claim by which each party will agree to waive

and release claims against all other parties to the waiver. The success of this system can only be achieved if all participants agree to be bound by the waiver.

Lastly, with regard to the elements of safety, peace and security, it is observed that the United States Government instils these aspects in its national legislative instruments. This was proved when the United States Government implemented various procedures, including safety review and safety approval, in the licensing application process. Such elements have been emphasized in the United States' domestic space laws and regulations as well as in its national space policy, particularly when the activities involve human space flights. In addition, there is a rule prescribing that the issuance of a licence or experimental permit will not be granted to the applicant if it has been proved that the proposed operation will jeopardize public health and safety, and the United States' national security.

3.5. INDIA

3.5.1. An Overview

India, conventionally known as the Republic of India, is made up of twenty-eight states and seven union territories.[406] Its capital city is New Delhi, and the official languages are Hindi and English. Politically, India is a federal constitutional republic state,[407] with a parliamentary democracy system.[408] The state is governed by the Constitution of India which came into force on 26 January 1950. This is the supreme law of the land and has been declared the longest written constitution of any sovereign state in the world.[409] The Indian Government consists of three main branches: executive, legislative and judiciary. The executive branch consists of the President, Vice-President, and the council of ministers led by the Prime Minister. The President of India is the head of the State, whereas the Prime Minister is the head of Government. In the legislative branch, the Parliament of India consists of the upper house called *Rajya Sabha* (Council of States) and lower house called the *Lok Sabha* (House of the People). The Judiciary comprises the Supreme Court, headed by the

[406] For the list of states and union territories of India, refer to http://en.wikipedia.org/wiki/List_of_states_and_union_territories_of_India_by_population, accessed: 28 February 2013.
[407] See *supra* note 244.
[408] See http://en.wikipedia.org/wiki/India, accessed: 28 February 2013.
[409] See http://en.wikipedia.org/wiki/Constitution_of_India, accessed: 28 February 2013.

Chief Justice, and a number of High Courts and trial courts.[410] The country's legal system, except for Goa, is largely based on the English common law legal system.[411]

Economically, India is the tenth largest economy in the world by nominal gross domestic product.[412] India has the world's second largest labour force after China.[413] Its major industries include telecommunications, petroleum, machinery, software, chemicals, transport equipment, and steel. Its telecommunications industry has become the world's most competitive and one of the fastest growing industries. This was evidenced by the fact that there were 227 million additional subscribers during 2010 to 2011.[414] Indeed, India has the world's third largest internet user base, with over 137 million as of June 2012.[415] Its service industry accounts for more than 50 per cent of the country's gross domestic product, followed by the industrial and agricultural sectors.

The Indian space sector is regarded as an emerging sector that contributes significantly to the Indian economy. The importance of the space sector to India is demonstrated by the Indian Government's allocation of budget which was increased every year since the early 2000's rising from $591 million in 2004 to 2005, to $1.3 billion in 2012 to 2013. It was reported that of 2013 budget, 55 percent was allocated to space applications like communication, navigation, and remote sensing, 36 percent to launch vehicles and just 9 percent to science and exploration missions including *Chandrayan-2* project, and lunar exploration missions.[416] This was then verified when India declared its attempt of another ten space missions within

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[410] See *supra* note 408, and, http://www.tradechakra.com/india-political-system.html, both accessed: 29 February 2013.

[411] The state of Goa follows a civil law based on the Portuguese Civil Code. See http://en.wikipedia.org/wiki/Law_of_India, accessed: 17 June 2011.

[412] See http://en.wikipedia.org/wiki/Economy_of_India, accessed: 29 February 2013.

[413] Country Comparison: Labour Force, The World Fact Book, at https://www.cia.gov/library/publications/the-world-factbook/rankorder/2095rank.html, accessed: 29 February 2013.

[414] See http://www.trai.gov.in/WriteReadData/trai/upload/PressReleases/816/Press_release_feb%20-11.pdf, accessed: 23 May 2011.

[415] The Financial Express, "Internet Subscriber Base in India May Reach 150 mn: Report", 5 September 2012, http://www.financialexpress.com/news/internet-subscriber-base-in-india-may-reach-150-mn-report/998389; 'Internet Usage in Asia', 30 June 2012, *Internet World Stats Usage and Population Statistic,* http://www.internetworldstats.com/stats3.htm, both accessed: 27 February 2013.

[416] Jayaraman, K.S., "Indian Space Budget Boost Supports Existing Programs", *Space News*, 1 March 2011, http://www.spacenews.com/civil/110301-indian-space-budget-boost.html, accessed: 28 February 2013; "India Space Ambitions", Asia *Sentinel*, 08 March 2013, http://www.asiasentinel.com/society/indias-space-ambitions/, accessed: 4 May 2013.

one year.[417] Indeed, in terms of the budget and technology capabilities, the country is ranked among the top six spacefaring nations of the world.[418]

3.5.2. Space Bodies, Activities and Programmes

Historically, India's involvement in space dates back to the 1920s. This occurred when the Indian scientist S.K. Mitra conducted a series of experiments to sound the atmosphere using ground-based radio techniques. Shortly after the country's independence in 1950s, the Government of India started to invest in space. Starting from 1950 to 1962, the Government of India has funded space sciences research through its Department of Atomic Energy (DAE).[419] As a matter of fact, the country's space activities were initiated with the formation of the Indian National Committee for Space Research (INCOSPAR) in 1962, under the leadership of Dr. Vikram Sarabhai.[420] The INCOSPAR was assigned to take over the responsibilities of the DAE with respect to space science and research, as well as to formulate the Indian Space Programme.[421] In the same year, Thumba Equatorial Rocket Launching Station (TERLS) was then established with support from the United States, the Soviet Union and France.[422] In November 1963, a NASA Nike-Apachie Rocket was successfully launched from TERLS, which marked the beginning of the Indian space programme.[423]

In 15 August 1969, the INCOSPAR was then reconstituted to form an organization called the Indian Space Research Organization (ISRO).[424] Later, in 1972, the Government of India formed the Department of Space and the Space Commission, and ISRO was then transferred to this Department. At present, ISRO is the research and development arm of the Department

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[417] "India steps up space program with big budget, bigger satellites and a leap to Mars", *RT.com,* 30 September 2012, http://rt.com/news/india-space-satellite-budget-331/, accessed: 29 February 2013.
[418] See Jayaraman, K.S., *id*., at 8.
[419] See, "Overview of Indian Space Sector 2010", at 6, http://115.113.225.49/webcms/Upload/Antrix-CII-Deloitte%20report%20on%20Indian%20Space%20Sector%202010.25Aug102.pdf, accessed: 23 May 2011.
[420] Dr. *Vikram Sarabhai* has been considered the father of the Indian Space Programme. See *id*., at 16; see also http://www.isro.org/scripts/Aboutus.aspx, accessed: 28 February 2013.
[421] See *supra* note 419, at 16. See also http://en.wikipedia.org/wiki/Indian_National_Committee_for_Space_Research, accessed: 28 February 2013.
[422] The setting up of a rocket range at Thumba was done for the launching of sub-orbital rockets for scientific purposes. Davies, J.K., *Space Exploration*, Chambers Encyclopaedic Guides Series, (Edinburgh: W & R Chambers, 1992), at 76.
[423] Reddy, V. Balakista, "Space Law and Space Policy in India", Recent *Trends in International Space Law and Policy,* Eds., Mani, V.S., S. Bhatt and V. Balakista Reddy, (New Delhi: Lancers Books, 1997), at 118.
[424] ISRO official website is available at http://www.isro.org/index.aspx. See also http://planetarysocietyindia.blogspot.com/2009/08/historical-40th-anninversary-of-isro.html, both accessed: 28 February 2013.

of Space,[425] and has emerged as the main body managing the Indian space programme. ISRO's prime objective is to develop space technology and its applications to various national tasks.[426] Its long-term plan 'Vision 2025' for the Space Research Programme encompasses the development of reusable launch vehicles, human space flight, enhanced imaging capability, and satellite-based communication and navigation systems, as well as planetary exploration.[427]

In performing its tasks, ISRO has established various centres with their respective areas of work throughout the country. These centres include Vikram Sarabhai Space Centre (VSSC), ISRO Satellite Centre (ISAC), Satish Dhawan Space Centre (SDSC) SHAR, Space Application Centre (SAC), and many others. The VSSC is ISRO's major centre for the development of satellite launch vehicles and sounding rockets. It conducts research and development in fields like as launch vehicle design, propellants, solid propulsion technology, and vehicle integration and testing. Meanwhile, ISAC is concerned with developing satellite technology and implementing satellite systems for scientific, technological and application missions. SDSC SHAR is ISRO's main launch centre. It has two launch pads with infrastructure for launching satellites into low earth, polar, and geostationary orbits. It also has a facility for launching sounding rockets. SAC engages in the development of payloads for communication, meteorological and remote sensing satellites. It also conducts research and development on various space application programmes.[428]

Apart from ISRO, the Department of Space implements its programmes through the Antrix Corporation, which was established in 1992 as an Indian Government-owned company. It is a commercial wing of ISRO, dedicated to the promotion and commercial exploitation of space products, technical consultancy services, and transfer of technology developed by ISRO.[429]

Regarding the Indian space programmes and activities, major areas of focus include the following: (1) satellite communication for telephony, television broadcasts, radio broadcasts,

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[425] The Indian Department of Space official website is available at, http://dos.gov.in/about-dos.aspx; see also http://dst.gov.in/stsysindia/space.htm, both accessed: 1 March 2013.
[426] See http://www.isro.org/scripts/Aboutus.aspx, accessed: 1 March 2013.
[427] See *supra* note 419, at 11.
[428] See http://www.isro.org/isrocentres/isrocenters.aspx, accessed: 1 March 2013.
[429] Reddy, V. Balakista, "Commercialization and Privatization of Space Industry in India: Legal Issues and Challenges", (2008) 50 *IISL Colloquium on the Law of Outer Space* 545. Reddy, V. Balakista, "Space Law and Space Policy in India", supra note 423, at 127. See also http://www.antrix.gov.in/aboutus.html, accessed: 1 March 2013.

mobile communications, satellite-aided search and rescue, meteorology and others; (2) remote sensing for resource surveys and management, environment monitoring, and meteorological services; (3) development and operation of indigenous satellites' launch vehicle, and ground systems for supporting the services.[430] In respect of satellite technology development, its first satellite, *Aryabhata*, was launched on 19 April 1975 by a Soviet rocket. It was built by ISRO mainly to gain experience in building and operating satellites in space. Nevertheless, it also carried out some astronomical experiments.[431] Four years later, the country's first experimental earth observation satellite, *Bhaskara 1*, was launched on 7 June 1979, also by a Soviet rocket. It was designed to observe the ocean. Afterwards, many other satellites were launched by the Indian Government.[432] The first Indian cosmonaut to travel into space was *Rakesh Sharma*. The mission was launched on 3 April 1984 as part of a joint programme by ISRO and the Soviet space programme.[433] It is expected that another Indian astronaut will be launched into space, as India has reportedly signed, with Russia, a 'Memorandum of Understanding on Joint Activities in the Field of Human Spaceflight Programme'.[434] This plan involves putting the first ever Indians into space using an Indian rocket from Indian soil.[435] If it is successful, the country will become the fourth nation, after the United States, Russia, and China, to have indigenous capabilities of sending a man into space.[436]

One of the major achievements of the Indian Government in satellite technology is its successful operation of two major satellite systems: (1) Indian National Satellites system (INSAT); and (2) Indian Remote Sensing (IRS) satellites. INSAT is designed for

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[430] For more information on the Indian space programmes, refer to Lochan, Rajeev, "Indian Space Programme and Its Policy Dimension", *Proceedings of United Nations/International Institute of Air and Space Law Workshop, 'Capacity Building in Space Law,' in The Hague, Netherlands, 18-21 Nov. 2002,* (New York: United Nations, 2003), 240. See also, *supra* note 419, at 11.

[431] See Davies, J.K., *supra* note 422, at 76. See also http://en.wikipedia.org/wiki/Aryabhata_%28satellite%29, accessed: 1 March 2013.

[432] For more information on various categories of launched satellites, see Reddy, V. Balakista, "Space Law and Space Policy in India", *supra* note 423, at 122-125.

[433] See Davies, J.K., *supra* note 422, at 76-77.

[434] See "Russia to Take Indian Astronaut on Space Mission In 2013", *Space Travel Exploration and Tourism*, http://www.space-travel.com/reports/Russia_To_Take_Indian_Astronaut_On_Space_Mission_In_2013_999.html, 11 December 2008, accessed: 1 June 2011.

[435] NASA has offered India the use of the top-class facilities of its astronauts training programme for the Indian astronauts. Bagla, Pallava, "NASA praises ISRO, Offers Training for Indian Astronauts", 14 July 2012, http://www.ndtv.com/article/india/nasa-praises-isro-offers-training-for-indian-astronauts-243319, accessed: 1 March 2013.

[436] Ramesh, Randeep, "India to Launch Its First Astronauts into Space by 2015", 23 February 2009, http://www.guardian.co.uk/world/2009/feb/23/india-space-astronauts, accessed: 1 March 2014.

communication services, whereas IRS satellites is aimed at natural resources management.[437] The country's first operational communications satellite, known as INSAT 1A, was launched on 10 April, 1982. However, it was abandoned in September 1983 due to its altitude control propellant being exhausted.[438] It was then replaced by INSAT 1B, launched on 30 August 1983, also commissioned by the INSAT system. Many other launches took place after that, including INSAT 1C, launched on 21 July 1988, INSAT 1D on 12 June 1990, and others. Today, INSAT is the largest domestic communication satellite system in the Asia-Pacific region. Its space segment consists of 24 satellites, nine of which nine are in operation. They are INSAT-3C (launch date: 24 January 2002), KALPANA-1 (12 September 2002), INSAT-3A (10 April 2003), INSAT-3E (28 September 2003), INSAT-4A (22 December 2005), INSAT-4B (12 March 2007), INSAT-4CR (2 September 2007), INSAT-4G/GSAT-8 (21 May 2011), and GSAT-12 (15 July 2011). [439] In terms of application, the system provides telecommunications, television broadcasting, weather forecasting, and societal application services such as tele-medicine and tele-education.[440]

The IRS satellite system consists of a series of earth observation satellites. India's first operational earth observation satellite was IRS-1A, launched on 17 March 1988. On 29 August 1991, the next satellite, IRS-1B, was launched. It was followed by many other launches of remote sensing satellites including IRS-1C (1995), IRS-1D (1997), and others.[441] The IRS system is the largest constellation of remote sensing satellites in the world for civilian use,[442] with twelve satellites in operation. They are TES (launch date: 22 October 2001), IRS P6/RESOURCESAT-1 (17 October 2003), IRS P5/CARTOSAT-1 (5 May 2005), IRS P7/CARTOSAT-2 (10 January 2007), IMS-1 (28 April 2008), CARTOSAT-2A (28 April 2008), OCEANSAT-2 (23 September 2009), CARTOSAT-2B (12 July 2010), RESOURCESAT-2 (20 April 2011), MEGHA-TROPIQUES (12 October 2011), RISAT-1

[437] See http://www.isro.org/scripts/currentprogramme.aspx, accessed: 1 March 2013.
[438] See Davies, J.K., *supra* note 422, at 77. See also http://www.isro.org/satellites/insat-1a.aspx, accessed: 1 March 2013.
[439] See http://www.isro.gov.in/satellites/geostationary.aspx, accessed: 1 March 2013.
[440] The Indian space application sectors witnessed tremendous developments with the active involvement of private sectors. See Reddy, V. Balakista, "Commercialization and Privatization of Space Industry in India: Legal Issues and Challenges", *supra* note 429, at 545. See http://www.isro.org/scripts/currentprogrammein.aspx#INSAT, accessed: 1 March 2013.
[441] See Davies, J.K., *supra* note 422, at 76. See also http://eoedu.belspo.be/en/satellites/irs.htm, accessed: 1 March 2013.
[442] See http://www.un-spider.org/about-us/news/en/5121/2011-05-02t124700/india%E2%80%99s-latest-satellite-starts-beaming-pictures, and, ttp://en.wikipedia.org/wiki/Indian_Remote_Sensing_satellite, accessed: 1 March 2013.

(26 April 2012), and SARAL (25 February 2013).[443] Data from the IRS satellites are used in several applications including agriculture, water resources, urban development, mineral prospecting, environment, forestry, drought, food forecasting, ocean resources, and disaster management.[444]

According to UNOOSA records, India has launched 62 objects into space between 1975 and 2012.[445] Most of the space objects were registered with the United Nations in accordance with the Registration Convention 1975,[446] although a number of them were not.[447]

Another significant achievement of India's space activities is its space launch vehicle development programme. Its space programme has become self-reliant with the operation of its two satellites launch vehicles: Polar Satellite Launch Vehicle (PSLV), and Geosynchronous Satellite Launch Vehicle (GSLV). The PSLV is mainly used to launch the remote sensing class of satellites in polar orbits. However, the GLSV is used for launching communication satellites into geosynchronous transfer orbit.[448] With regard to India's space launch facilities, although the facilities are owned by the Indian Government, the launch services are offered to both national and foreign entities.[449]

India also commenced its first moon mission when it successfully launched *Chandrayaan-1* on 22 October, 2008. This event verified that India had managed to develop its own technology to explore the Moon, which then boosted the country's space programme. The spacecraft orbited the moon for chemical, mineralogical, and photo-geologic mapping of the Moon. It carried 11 scientific instruments built in India, the United States, United Kingdom, Germany, Sweden, and Bulgaria. However, it stopped sending signals on 29 August, 2009.[450]

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[443] See http://www.isro.org/scripts/currentprogrammein.aspx#IRS, http://en.wikipedia.org/wiki/Indian_Remote_Sensing, both accessed: 1 March 2013.
[444] See *supra* note 442.
[445] Data is of September 2012. See http://www.oosa.unvienna.org/oosa/showSearch.do, accessed: 1 March 2013.
[446] Further information is provided in Chapter 3 of the thesis (3.5.4. India and the Five Outer Space Conventions).
[447] From 62 Indian objects launched, only three were not registered with the United Nations. See http://www.oosa.unvienna.org/oosa/search.do, accessed: 3 March 2013.
[448] See *supra* note 443.
[449] Kaul, Ranjana, and Ram S. Jakhu, "Regulation of Space Activities in India", *National Regulation of Space Activities,* ed., Jakhu, Ram S., (Dordrecht: Springer, 2010), at 164.
[450] See http://www.isro.gov.in/satellites/chandrayaan-1.aspx, and, http://en.wikipedia.org/wiki/Chandrayaan-1#Objectives, both accessed: 3 March 2013.

Apart from the past and current programmes, India is planning various future space programmes, including forthcoming satellites, future launches, reusable launch vehicles, human space flights, space science missions, and satellite navigations.[451]

3.5.3. Space-Related Policies, Laws, and Regulations

In general, there is no comprehensive Indian national space policy.[452] However, there are two space-related policies.[453] The first is concerned with satellite communication policy and is called 'A Policy Framework for Satellite Communication in India'. This policy framework was approved by the Government of India in 1997. Its fundamental aim is to develop a healthy and thriving communication satellite and ground equipment industry and satellite communication service industry in India.[454] The second is related to the remote sensing data policy. This policy is known as 'Remote Sensing Data Policy 2011'. It was endorsed in 2011 by the Government of India. The policy was introduced, *inter alia*, to provide guidelines for dissemination of satellite remote sensing data in India.[455]

Apart from the above, the Indian Department of Space issued a Citizen's Charter[456]. The Citizen's Charter embodied the citizen's possible expectations of the organization that sets down the Department of Space vision with its objective of promoting the development and application of space science and technology to assist in the all-round development of the Indian nation. The Charter also prescribes, among other things, the organization's types of activities, the services provided, and categories of clients involved.

In contrast to the United Kingdom, Australia, and the United States,[457] India has no specific single space legislation to govern its space activities.[458] At this point, national space

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[451] For more information on future Indian space programmes, visit http://www.isro.org/scripts/futureprogramme.aspx, accessed: 14 May 2014.
[452] Information is as of 31 August 2013; read also Rajeswari Pillai Rajagopalan, "Should India Declare a Space Policy?", *The Diplomat,* 31 August 2013, http://thediplomat.com/2013/08/should-india-declare-a-space-policy/, accessed: 14 May 2014.
[453] See http://dos.gov.in/space-policy.aspx, accessed: 1 March 2013.
[454] For full text of Policy Framework for Satellite Communication in India 1997, refer to http://www.isro.gov.in/news/pdf/satcom-policy.pdf, accessed: 1 March 2013.
[455] For full text of Remote Sensing Data Policy 2011, visit http://www.isro.gov.in/news/pdf/RSDP-2011.pdf, accessed: 1 March 2013.
[456] For full text of Citizen's Charter see http://dos.gov.in/citizencharter.htm, accessed: 1 March 2013.
[457] For more information, read Chapter 3 of the thesis (3.2. United Kingdom); (3.3. Australia); and (3.4. United States of America).
[458] This fact is as of 1 March 2014.

legislation refers to the Indian space legislation that might impose the rules and obligations prescribed by the United Nations space treaties. However, Indian space-related matters are, in fact, regulated by many other domestic laws, rules, guidelines and procedures. They include the following:[459] the issuance of licences for private satellite telecommunications operators is governed by 'The Norms, Guidelines and Procedures for Implementation of the Policy-Framework for Satellite Communications in India 2000'.[460] By virtue of the aforesaid Guidelines and Procedures, the Department of Space designates the Department of Telecommunications[461] to function as a licensing authority for satellite and terrestrial telecommunications, whereas the Ministry of Information and Broadcasting[462] is the licensing authority for satellite and terrestrial broadcasting.[463] Other norms and guidelines provided include the INSAT capacity, which will be made available to private service providers on a commercial basis. In special cases, the use of foreign satellites is allowed until such capacity can be provided by Indian satellites. The Guidelines and Procedures also allow the establishment of Indian satellite systems by Indian companies with a foreign equity involvement of less than 74 per cent. [464]

The Indian space technology applications, such as telecommunications and broadcasting, have witnessed the highest rate of development of legal regulatory regimes.[465] For telecommunications, the principal statutes, as amended from time to time, are the Indian Telegraph Act 1885[466] and Indian Wireless Telegraphy Act 1933.[467] The Indian Telegraph Act 1885 provides the Indian Government with exclusive privileges and powers with respect to telegraphs and the power to grant licences. The Indian Wireless Telegraphy Act 1933 regulates the possession of wireless telegraphy devices. A telecommunications policy,

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[459] See *supra* note 453.

[460] The Guideline was issued on 8 May 2000. The full text is available at http://www.isro.gov.in/news/pdf/SATCOM-norms.pdf; see also http://www.isro.org/pressrelease/scripts/pressreleasein.aspx?May08_2000, both accessed: 1 March 2013.

[461] Indian Department of Telecommunications is under Indian Ministry of Communications and Information Technology. Its official website is available at http://www.dot.gov.in/, accessed: 3 March 2013.

[462] The Indian Ministry of Information and Broadcasting website is available at http://mib.nic.in/, accessed: 3 March 2013.

[463] See *id*. See also Kaul, Ranjana, *supra* note 449, at 172.

[464] See "Norm, Guideline, and Procedures for Satellite Communications Announced by ISRO", *Asia.spaceref,* 8 May 2000, http://asia.spaceref.com/news/viewpr.html?pid=1762, accessed: 3 March 2013.

[465] Kaul, Ranjana, *supra* note 449, at 169.

[466] For full text of the Indian Telegraph Act 1885, see http://www.dot.gov.in/Acts/telegraphact.htm, accessed: 3 March 2013.

[467] The full text of the Indian Wireless Telegraphy Act 1933 is available at http://www.dot.gov.in/Acts/wirelessact.htm, accessed: 3 March 2013.

namely the Indian New Telecom Policy 1999,[468] affirms the importance of telecommunications to India. In this policy, the Indian Government recognizes that the provision of world-class telecommunications infrastructure and information is the key to rapid economic and social development of the country. This policy also provides, *inter alia*, the policy framework, objectives and targets for the industry. Its objectives include providing access to telecommunications, which is of the utmost importance for achieving the country's social and economic goals, and encouraging development of telecommunication facilities in remote areas. India also introduced the Indian National Telecom Policy 2012[469] to guide the industry. Its first objective is to secure affordable and high-quality telecommunication services to all citizens of the country.

To regulate broadcasting, the country has broadcasting acts and rules and also Codes Guidelines and Policies.[470] This includes Cable Television Network (Regulation) Act 1995[471]to regulate the operations of cable television networks in the country. The Act prescribes the legal rules, including prohibition on operating cable television networks before registration, powers of the authorized officer to seize operating equipment used in the operation in the event of the operator contravening the rules, and power of the Government to prohibit the operation should the Government consider it in the public interest to do so. The Indian Broadband Policy 2004[472] aims to provide an impetus to accelerate broadband services and internet penetration, as well as the use of personal computers throughout the country.[473] Several other guidelines have been issued by the Indian Government to regulate activities, including Guidelines for Up-linking from India.[474] This deals among other things with the power of the Ministry of Information and Broadcasting to issue licences permitting Indian private companies to set up up-linking hubs for the purpose of leasing or hiring out to other broadcasters.

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[468] For full text of the Indian New Telecom Policy 1999, see http://www.dot.gov.in/ntp/ntp1999.htm, accessed: 3 March 2013.
[469] Full text of National Telecom Policy 2012 is available at http://www.dot.gov.in/ntp/NTP-06.06.2012-final.pdf, accessed: 3 March 2013.
[470] For details, refer to http://mib.nic.in/linksthird.aspx, accessed: 3 December 2013.
[471] Act No. 7 of 1995. For full text of Cable Television Network (Regulation) Act 1995 (Updated up to 31.08.2007), see http://mib.nic.in/linksthird.aspx, accessed: 1 December 2013. Read also Negi, Chitranjali, "Broadcast Law in India: Indian Laws about Broadcasting Industry", *Santaniello and Partners, International Law Firm,* 23 March 2012, http://www.legalsl.com/en/broadcast-law-in-india.htm, accessed: 1 November 2013.
[472] For full text of the Indian Broadband Policy 2004, refer to http://www.indiantelevision.com/indianbrodcast/legalreso/uplink.htm, accessed: 6 March 2013.
[473] Kaul, Ranjana, *supra* note 449, at 174.
[474] For full text of the Guidelines for Up-linking from India, see http://www.trai.gov.in/uplinkingPolicy.asp, accessed: 1 June 2011.

In relation to remote sensing or earth observation satellites, there is no specific law to govern the earth observation satellite services in India, including the phases of processing and distribution of data collected by the satellites.[475] However, after recognizing that remote sensing data provide much essential and critical natural resource information, among other things, the Indian Government introduced the Remote Sensing Data Policy 2001. This contains policies to manage the acquisition and dissemination of remote sensing data in support of India's developmental activities. The Department of Space was the agency that was given authority under the Policy. However, in 2011, the Policy was replaced by a new remote sensing data policy known as Remote Sensing Data Policy 2011.[476] This new Policy allows all data of resolutions up to 1 meter to be distributed on a non-discriminatory basis and on a request basis.[477]

3.5.4. India and the Five Outer Space Conventions

Of the five United Nations outer space conventions, four have been joined by India.[478] The first United Nations outer space convention that India joined was the Outer Space Treaty 1967.[479] India signed the Treaty on 3 March 1967. The signing was executed about two months after the Treaty was opened to signature for all states on 27 January 1967. Nevertheless, India only ratified the Outer Space Treaty 1967 on 18 January 1982.[480] The state took almost 15 years to consider ratification of the Treaty.

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[475] Kaul, Ranjana, *supra* note 449, at 184.
[476] For full text of the Remote Sensing Data Policy 2011, see http://www.isro.gov.in/news/pdf/RSDP-2011.pdf, accessed: 6 March 2013.
[477] "Government Unveils New Remote Sensing Data Policy", 5 July 20111, http://www.dnaindia.com/india/report_government-unveils-new-remote-sensing-data-policy_1562713, accessed: 6 March 2013.
[478] The four conventions are: the Outer Space Treaty 1967, the Rescue Agreement 1968, the Liability Convention 1972, and lastly the Registration Convention 1975. See United Nations, *United Nations Treaties and Principles on Outer Space and Related General Assembly Resolutions: Status of International Agreements Relating to Activities in Outer Space as at 1 January 2010*, Addendum, Ref.: Sales No. E.08.1.10, ST/SPACE/11/Rev.2/Add.3, (Vienna: United Nations, 2009).
[479] Treaty on Principles Governing the Activities of States in the Exploration and Use of the Outer Space, Including the Moon and Other Celestial Bodies (1967) (Resolution 2222 (XXI)), adopted on 19 December 1966, opened to signature on 27 January 1967, entered into force on 10 October 1967. (1967) 610 UNTS 205, 18 UST 2410, TIAS 6347; (1967) 6 ILM 386; (1967) 61 AJIL 644.
[480] See http://www.oosa.unvienna.org/oosatdb/showTreatySignatures.do, accessed: 27 January 2013.

The second agreement was the Rescue Agreement 1968.[481] India became a party to this Agreement by accession on 9 July 1979, having taken 11 years to accede to the Agreement after it entered into force on 3 December 1968.[482] The third convention was the Liability Convention 1972,[483] of which India became a member by accession on 9 July 1979.[484] It is interesting to note that this date was also the date of India's accession to the Rescue Agreement 1968. In other words, India acceded simultaneously, on the same date, to two United Nations conventions: the Rescue Agreement 1968 and the Liability Convention 1972. However, in contrast to the Rescue Agreement 1968, the accession to the Liability Convention 1972 took only seven years after its entry into force on 1 September 1972.

The last convention to which India became a party was the Registration Convention 1975[485]. The membership started from its accession date on 18 January 1982. India acceded to the Convention roughly six years after it came into force on 15 September 1976. It is noted that, on 18 January 1982, the accession date of the Registration Convention 1975, India also signed the Moon Agreement 1979.[486] Thus, in a single day, India acceded to the Registration Convention 1975 and signed the Moon Agreement 1979. Thus, the signature of the Moon Agreement 1979 took place three years after it was opened for signature to all states in 1979, and two years prior to the Agreement coming into force on 11 July 1984. However, the Agreement has not yet been ratified.[487]

To summarize, India is a state party to four United Nations outer space treaties: the Outer Space Treaty 1967, the Rescue Agreement 1968, the Liability Convention 1972, and the Registration Convention 1975. However, India is a signatory state only to the Moon Agreement 1979. India became a party to those treaties by two means: accession and ratification. Three treaties - the Rescue Agreement 1968, the Liability Convention 1972, and

[481] Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (1968) (Resolution 2345 (XXII)), adopted on 19 December 1967, opened to signature on 22 April 1968, entered into force on 3 December 1968. 19 UST 7570, 672 UNTS 119, TIAS 6599.
[482] See *supra* note 480.
[483] Convention on International Liability for Damage Caused by Space Objects (1972) (Resolution 2777 (XXVI)), adopted on 29 November 1971, opened to signature on 29 March 1972, entered into force on 1 September 1972. 24 UST 2389, 961 UNTS 187, TIAS 7762.
[484] See *supra* note 480.
[485] Convention on Registration of Objects Launched into Outer Space (1974) (Resolution 3235 (XXIX)), adopted on 12 November 1974, opened to signature on 14 January 1975, entered into force on 15 September 1976. 28 UST 695, 1023 UNTS 15, TIAS 8480.
[486] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (1979) (Resolution 34/68), adopted on 5 December 1979, opened to signature on 18 December 1979, entered into force on 11 July 1984. 18 ILM 1434, 1363 UNTS 3.
[487] See *supra* note 480.

the Registration Convention 1975 - were joined by India through accession. Only one treaty, the Outer Space Treaty 1967, was joined by ratification. Being a party to those treaties, India is bound legally, politically and morally to abide by the legal rules stipulated therein.

3.5.5. Legal Implications

Although India is a party to four United Nations outer space conventions, it currently has no domestic space legislation to give legal effect at the domestic level in relation to the obligations prescribed by the United Nations conventions. As stipulated earlier, when India ratified the United Nations outer space treaties, such treaties actually bound the state. Non-fulfilment of the treaties' obligations by the Government can be considered a breach of international law. Apart from implementation of the treaties' obligations at the international level, such obligations should also be implemented at the domestic level if they are to be effective.

Since India is among the active space participants, the absence of Indian domestic space legislation may have several implications. The most obvious is in terms of liability. The Indian Government, besides being responsible for its own space activities, will be held responsible for all its national space activities at the international level.[488] Thus, in the event of damage or loss resulting from the activities of its nationals in foreign states, the Indian Government would have to bear the liability, as prescribed by the international rules. In the absence of a domestic space law, the Indian Government cannot exempt, limit, or even transfer the liability to its national wrongdoer, which in fact could be executed at the domestic level for the purpose of indemnification. Absence of such law might result in the Indian Government being held liable for full payment of compensation claimed by the victim. Moreover, such circumstances would also leave the Government facing the legal problem of improper claim procedure, especially in relation to compensation for damage or loss suffered by the Indian entity as a result of their space activities.

Other implications include the possibility of non-compliance with the requirement to obtain liability insurance or demonstrate sufficient financial responsibility before conducting space activities. The absence of legal rules on such matters might lead to non-compliance by the

[488] Article VI, the Outer Space Treaty 1967, *supra* note 40.

national in obtaining liability insurance or proving financial responsibility. In fact, this requirement is important to ensure that Indian nationals are able to compensate the victim in the event of damage or loss resulting from outer space activities. Such circumstances are indeed crucial in order to indemnify the Indian Government in situations where the Government pays compensation on behalf of the national to the victim.

Additionally, in the absence of domestic space legislation, the Indian Government will encounter difficulties in ensuring that the space activities conducted by its national are in conformity with the United Nations space treaties. Hence, the state is unable to observe the treaties' obligations. As a state party to the United Nations treaties, India is obliged to ensure that the space activity carried out by its nationals are in conformity with the provisions of the treaties.[489] With the enactment of a domestic space law, India would be able to control the activities of its nationals, for instance by imposing legal rules including a constant monitoring system and continued supervision of related activities.[490] To ensure effective compliance with its national space law, the Indian Government could also impose sanctions on those who violate its law at the national level.

Regarding the registration obligation imposed by the United Nations space treaties, it is noted that India has registered most, but not all, of its space objects. This indicates that India has not fully observed its international obligation to register all its objects launched into space with the United Nations, as prescribed by the United Nations treaties. The same circumstances may occur at the domestic level, as the absence of a domestic space makes it difficult for India to impose the obligation for its nationals to register objects launched into space.

Although India has no specific space legislation, Indian law prescribes certain obligations for the Indian Government to observe concerning the international treaties it has ratified. Article 51 of the Indian Constitution 1950[491] stipulates the following: the Indian Government is obliged to foster respect for international law and treaty obligations; the Government is required to maintain just and honourable relations between the nations; and the Government

[489] See *id*.
[490] See *id*.
[491] See Indian Constitution 1950. For full text refer http://www.wipo.int/wipolex/en/details.jsp?id=6771, accessed: 7 March 2013.

is obliged to strive for promotion of international peace and security.[492] As the Indian Government has a duty to foster respect for treaties' obligations, this may imply that it has a duty to observe such treaties' obligations at the international as well as the national level. In other words, such circumstances may impose on the Indian Government a duty to implement the treaties' obligations at the domestic level as well. To implement the obligations at the domestic level more effectively, the Government therefore has a further duty to domesticate the treaties' obligations in accordance with the Indian national laws.

Article 53 of the Indian Constitution 1950 empowers the President to exercise the executive power of the Union of India, or delegate such authority to the Vice-President or the Governor of State.[493] Meanwhile, Article 73 extends the executive power to exercise such rights, authority, and jurisdiction as are exercisable by the Indian Government by virtue of any treaty and agreement.[494] It is noted that the mandate in Article 51, read with Article 53[495] and Article 73, enables the Indian Government to accomplish the treaties' obligations through the exercise of the executive power even without the enactment of the national law. However, in specific circumstances the treaties' obligations still require domestication in order to legalize them at the national level. In short, such situations include the following:[496] (1) if the treaty obligation provides for payment to a foreign entity, withdrawn from the Indian Consolidated Fund;[497] (2) if the treaty obligation affects the rights of a citizen;[498] and (3) if the treaty obligation modifies any law of India.[499] At this juncture, it is noted that, when the treaties' obligations fall under the prescribed categories, such obligations then require domestication. Therefore, the enactment of the Indian domestic legislation is required. In responding to this, the Indian Parliament may, by virtue of Article 253 of the Indian Constitution 1950, enact domestic law for the implementation of treaties, international agreements, and conventions.[500] In other words, by virtue of Article 253, the Indian Parliament has the power to domesticate such treaties' obligations in order to legalize them at the domestic level. Some instances of

[492] See Article 51, Indian Constitution 1950. See also Reddy, V. Balakista, "Space Law and Space Policy in India", *supra* note 423, at 129. Kaul, Ranjana, *supra* note 449, at 157.
[493] Article 53, Indian Constitution 1950.
[494] Article 73, Indian Constitution 1950.
[495] Kaul, Ranjana, *supra* note 449, at 158
[496] *Id*.
[497] See Allahabad High Court's decision in *Moti Lal vs. U.P.,* 1951 All. 257 F.B., as cited in Kaul, Ranjana, *supra* note 449, at 158.
[498] See Indian Supreme Court's decision in *Maganbhai vs. Union of India,* A.1969 SC 783 (789,807), and in *Beubari Union, in re.* A 1960 SC 845, as cited in Kaul, Ranjana, *supra* note 449, at 158.
[499] See Indian Supreme Court's decision in *State of W.B. vs. Jugal,* A 1969 SC 1171 (para. 6), as cited in Kaul, Ranjana, *supra* note 449, at 158.
[500] Article 253, Indian Constitution 1950.

United Nations outer space treaties' obligations that need domestication include liability and indemnification,[501] and the obligation to rescue and protect the rights of astronauts.[502] However, the treaties' obligations that do not require domestication and can be exercised by the executive power in India include the obligation to conduct outer space activities in a peaceful manner, the prohibition of appropriation of outer space, and freedom of exploration of outer space.[503]

3.5.6. Concluding Remarks

The Government of India is paying serious attention to developing space technology for its citizens, and it is involved in various international space activities. This is evident as the state has managed to conduct various space programmes and activities, and seems to have a long list of future space programmes. Many of its activities contribute significantly to the growth of space technology and simultaneously boost the country's space programmes. As a result, the state has emerged as one of the world's pre-eminent space actors.

The Indian space programmes and activities have evolved with the establishment of Indian space-related bodies. This began with the Indian Department of Atomic Energy, which is responsible for space sciences and research; the task was then taken over by the INCOSPAR, which was then reconstituted as ISRO. The ISRO was next transferred to the Indian Department of Space. The ISRO, with its various centres, continues to manage numerous Indian space programmes. Among the most notable are the two major fleets of satellite systems: the INSAT (designed for communication services) and the IRS satellites (designed for earth observation services). Apart from these, other highlighted programmes include the launch space vehicles programmes and the Moon mission programmes.

In terms of regulatory regimes regulating Indian space activities, the state has no specific and comprehensive outer space legislation to control the activities in accordance with the obligations stipulated in the United Nations' outer space treaties. Since India is a state party to four United Nations outer space conventions, the enactment of such legislation at its domestic level is crucial; moreover, the state is an active participant in outer space activities.

[501] See Article VI, *supra* note 40, and VII, *supra* note 79, Outer Space Treaty 1967. See also Liability Convention 1972.
[502] See Article V, Outer Space Treaty 1967. See also Rescue Agreement 1968, *supra* note 481.
[503] See Article I, II, and IV, Outer Space Treaty 1967.

The lack of legislation might have various legal implications and cause an imbalance between development of outer space activities and regulatory regimes. However, with respect to Indian outer space applications, the state is governed by a number of laws, regulations, and policies, especially in relation to the telecommunications and broadcasting areas.

It is noted also that the Indian Constitution of 1950, in its Article 51, requires the state to observe certain obligations in relation to the international treaties ratified by the Indian Government. This includes the obligation to foster respect for the international law and treaty obligations. Such circumstances may therefore signify the duty of the Indian Government to implement the treaties' obligations at both the international and domestic levels. This situation may further lead to the requirement for the enactment of a specific law at the Indian domestic level for the purpose of implementing such obligations.

As regards the implementation of the treaties' obligations, it is observed that Articles 53 and 73 of the Indian Constitution, rather than Article 51, provide the Indian Government with the power to accomplish treaties' obligations by exercising its executive power without the requirement of national law. However, there are some exceptions to this rule, as prescribed by Indian case law. In other words, if the treaties' obligations are classified under such exceptional categories, they need to be domesticated before they can be legally implemented at the Indian domestic level. Hence, the Indian Parliament may, by virtue of Article 253 of the Indian Constitution 1950, domesticate the treaties' obligations for the purpose of their implementation.

3.6. THE NEIGHBOURING COUNTRIES

This part deals with countries neighbouring Malaysia. These countries are Thailand, Singapore and Brunei. As mentioned earlier, Indonesia is excluded from this category even though it is a neighbour of Malaysia.[504] This section presents an overview of each country, including their political, economic and legal aspects. The discussion then moves to each country's space-related bodies and activities, the status of the state in relation to the United Nations space conventions, the space-related policies, laws and regulations, and finally some possible legal implications for these countries. It is hoped that such a discussion will

[504] For the reasons for exclusion, read Chapter 3 of the thesis (3.1. Introduction).

illuminate the current scenario of Malaysia's neighbouring countries with respect to the aforesaid matters, which might then encourage Malaysia to formulate its own domestic space legislation.

3.6.1. Thailand

(a) Overview

Thailand is officially known as the Kingdom of Thailand, and its capital city is Bangkok. It is the only country to share a land border with Peninsular Malaysia. Politically, Thailand is a unitary parliamentary democracy state[505] with a constitutional monarchy system.[506] Under Thailand's constitutional monarchy system, the state is headed by a hereditary monarch, and the Government is leaded by a Prime Minister. The Government is made up of three branches: (1) Executive; (2) Legislative; and (3) Judiciary.[507] The Executive consists of the Prime Minister and a list of Ministries under the Cabinet of Thailand. The Legislative comprises the Senate and House of Representatives. The Judiciary is composed of the Supreme Courts of Justice, the Administrative Courts, and the Constitutional Court.[508] Thailand's legal system is based on civil law, but it has been influenced by the common law legal system. This is evident since Thailand's Supreme Court decisions have a significant influence on the courts themselves, as well as on the lower courts in the hierarchy.[509] The sources of Thai law include the constitution, the codified laws, acts, treaties and administration of laws, and the judicial decisions.[510]

Economically, Thailand is a newly industrialized economy. Its main industries include automobiles and automotive parts, electrical appliances and components, agricultural processing, and others. The country is heavily export-dependent, with exports accounting for

[505] For more information on unitary system, read *supra* note 5.
[506] For more information on constitutional monarchy system, read *supra* note 109.
[507] Read also *supra* note 110.
[508] For further information, see http://en.wikipedia.org/wiki/Government_of_Thailand#Executive, accessed: 8 March 2013.
[509] The decisions, known as Supreme Court Opinions, were published and numbered according to the year issued. See Leeds, Joe, "Introduction to the Legal System and Research of the Kingdom of Thailand", *GlobaLex, Hauser Global Law School Program,* http://www.nyulawglobal.org/globalex/Thailand.htm. See also "Thailand Supreme Court Opinion Summaries", *Supreme Court Opinion,* Thailand Law Forum, http://www.thailawforum.com/supremecourtopinions.html; and http://en.wikipedia.org/wiki/Law_of_Thailand#Sources_of_Law, all accessed: 8 March 2013.
[510] See Leeds, Joe, *id*.

more than two thirds of its gross domestic product. Major exports include computers, electrical appliances, fishery products, and Thai rice. It was classified as the second largest economy in Southeast Asia after Indonesia, as well as having the lowest unemployment rates in the world.[511] Thailand's space sector is one of the emerging sectors, as the Government has deemed the space application sector an integral part of the country's comprehensive development strategy. Moreover, the development of the country's space activities is supported and encouraged by the Government of Thailand, especially regarding the involvement of private sectors.[512]

(b) Space-Related Bodies and Activities

The growth of Thailand's space activities is largely assisted by two main Ministries: the Ministry of Information and Communication Technology (MICT)[513], and the Ministry of Science and Technology (MOST)[514]. Specifically, there are two main agencies involved directly in Thailand's space-related activities. They are the Space Affairs Bureau[515] under the MICT, and the Geo-Informatics and Space Technology Development Agency (GISTDA)[516] under the MOST. The Thailand Space Affairs Bureau was established in 1990 to formulate the country's action plan on national space activities. Its main tasks are to advise the Thailand Government on the state's space-related activities, to collect data on space activities and applications for the benefit of other governmental agencies, to coordinate the implementation and promotion of such activities in the country, and to cooperate with foreign countries and international organizations.[517] GISTDA was founded on 2 November 2002 as an organization involved in geo-informatics and space technology development.

Thailand's space activities mainly revolve around three major areas of space applications. They are: (1) communication, (2) remote sensing and earth observation, and (3) meteorology.

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[511] See https://www.cia.gov/library/publications/the-world-factbook/rankorder/2129rank.html; and http://en.wikipedia.org/wiki/Economy_of_Thailand, accessed: 8 March 2013.
[512] Chitasombat, Nipant, "National Space Programme, Policies and Legislation in Thailand", *2004 Space Law Conference Paper Assemble,* (Beijing: China Institute of Space Law, 2004), at 96-97.
[513] The MICT official website is available at http://www.mict.go.th/, accessed: 8 March 2013.
[514] The MOST official website is available at http://www.most.go.th/, accessed: 8 March 2013.
[515] Thailand Space Affairs Bureau website is available at http://www.space.mict.go.th/home.php, accessed: 8 March 2013.
[516] GISTDA website is available at http://www.gistda.or.th/gistda_n/en/; see also http://www.most.go.th/eng/index.php/agencies-under-most/detail-gistda, both accessed: 8 March 2013.
[517] Noichim, C., *The Asean Space Organization: Legal Aspect and Feasibility,* Ph.D. dissertation, (Leiden, 2008), at 106. See also *supra* note 515.

Firstly, with respect to communications, Thailand has five geostationary communication satellites.[518] They are: Thaicom 1A, Thaicom 2, Thaicom 3, Thaicom 4, and Thaicom 5. This THAICOM system is Thailand's first communications satellite project.[519] Thaicom 1A is Thailand's first satellite and was launched on 17 December 1993.[520] Thailand's second satellite, Thaicom 2, was launched on 7 October 1994, and Thaicom 3 was launched on 16 April 1997.[521] All three of these satellites were de-orbited. However, the other two, Thaicom 4 and Thaicom 5, are still in operation.[522] Thaicom 4, also known as IPSTAR-1, was launched on 11 August 2005, and Thaicom 5 was launched on 27 May 2006.[523] None of these five satellites are registered with the United Nations.[524] They are under the operation of Thaicom Public Company Limited.[525] The company was formerly known as Shin Satellite Plc., founded on 7 November 1991, and it changed its name to Thaicom Public Company Limited on 10 April 2008. It is the first Thailand satellite operator, and it was granted a 30-year licensing period by Thailand's Ministry of Transport and Communication (now transferred to MICT) to launch and operate communication satellites.[526] The company has announced its next project, the Thaicom 6 satellite, which is scheduled for launch around mid-2013.[527] These communication satellites offer services including telecommunications, television broadcasting, internet via satellite, tele-education, and tele-medicine.

Secondly, Thailand has been involved in remote sensing and earth observation areas of application since 1971 through the Thailand Remote Sensing Programme. The Programme was elevated in 1979, and became a division, the Thailand Remote Sensing Centre (TRSC),

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[518] See http://en.wikipedia.org/wiki/Thaicom_%28company%29, accessed: 11 March 2013.
[519] For more information on early development of THAICOM project see Mektrakarn, Wichian, "THAICOM SYSTEM Thailand's First Communications Satellites", *Conference on the South East Asia Regional Computer Confederation, in Kuala Lumpur, 11-14 August 1992* (Kuala Lumpur: Gabungan Komputer Nasional Malaysia, 1992), 5.01.
[520] Thaicom 1A was relocated between May to June 1997. For more information on Thaicom 1A, refer to http://tcns.thaicom.net/t1a.asp, accessed: 11 March 2013.
[521] Thaicom 3 was de-orbited on 2 October 2006 after experiencing power loss. For more information on this satellite, see http://tcns.thaicom.net/t3.asp, accessed: 11 March 2013.
[522] See http://tcns.thaicom.net/satellites.asp, accessed: 11 March 2013.
[523] See http://tcns.thaicom.net/ipstar1.asp; See also, http://tcns.thaicom.net/t5.asp , all accessed: 11 March 2013.
[524] See http://www.oosa.unvienna.org/oosa/search.do, accessed: 11 March 2013.
[525] The company website is available at http://www.thaicom.net/, accessed: 11 March 2013.
[526] See http://tcns.thaicom.net/company.asp, accessed: 11 March 2013. For further information on Thaicom satellites, see Charoenvimolkul, Kobchai, "Thailand's Communication Satellites, Current Status and Guideline for Space Affairs Development", Space Affairs Bureau, Ministry of Information and Communication Technology Thailand, http://www.aprsaf.org/data/aprsaf15_data/csawg/CSAWG_5f.pdf, accessed: 11 March 2013.
[527] See "THAICOM Announces the THAICOM 6 Satellite Project", 31 May 2011, http://www.thaicom.net/eng/press.aspx?id=287; also http://www.thaicom.net/SAT_THCOM6.aspx, both accessed: 11 March 2013.

under the Thailand National Research Council (NRCT).[528] In 1982, Thailand built its Ground Receiving Station, which is capable of receiving data from LANDSAT, RADARSAT, MOS-1, SPOT-2, 4, 5, and many others. The station is operated by TRSC. Apart from the operation of the ground station, TRSC became a remote sensing satellite data distributor to worldwide users. TRSC's other functions include coordinating with local agencies and those abroad in matters of research in natural resources by remote sensing, and developing remote sensing technology.[529] On 1 October 2008, Thailand launched its satellite, Thailand Earth Observation Satellite (THEOS).[530] It is also known as Thaichote.[531] It was the first Thailand operational earth observation satellite, launched from Russia. It is noted that THEOS is the first Thai satellite to be registered with the United Nations.[532]

Thirdly, meteorology was first introduced to Thailand as early as 1905 when the discipline was included in the navigation courses of the Royal Thai Navy. In 1923, Thailand established its first meteorological service, known as the Meteorological and Statistics Section.[533] At present, the country has a specific department to perform its meteorological administrations and managements, known as the Meteorological Department,[534] which operates under the MICT. Its tasks include supplying weather forecasts and publicizing weather warnings for the country, building people's awareness about natural disasters, and improving and developing related research work.[535] In performing its tasks, the Department uses images, for instances, from meteorological satellites such as GMS-5 and NOAA.[536]

Apart from space applications, Thailand is engaged in a micro-satellite programme. The project first started in 1996. It is a technology transfer programme involving Thailand

[528] NRCT official website is at http://www.nrct.go.th/, accessed: 12 March 2013.
[529] See http://www.eoportal.org/directory/info_ThailandRemoteSensingCenterTRSC.html, accessed: 12 March 2013.
[530] THEOS programme was developed by GISTDA and EADS Astrium. For more information on THEOS, see Peanvijarnpong, Chanchai, "THEOS: Thailand Earth Observation System", *Sharing of Space Technology for Satellite Development, 4th Sentinel-Asia Joint Project Team Meeting, 7 September 2007, Manila,* http://www.aprsaf.org/data/jptm4_pdf/Special_Session_Satellite_Development_in_Thailand.pdf; see also http://en.wikipedia.org/wiki/THEOS_%28satellite%29, all accessed: 12 March 2013.
[531] "Thaichote, the First Thai Earth Observation Satellite", http://www.gistda.or.th/gistda_n/en/index.php?option=com_content&view=article&catid=3:newsflash&id=240:thaichote, accessed: 12 March 2013.
[532] See http://www.oosa.unvienna.org/oosa/search.do, accessed: 12 March 2013.
[533] See http://www.tmd.go.th/en/aboutus/history.php, accessed: 12 March 2013.
[534] Thailand Meteorological Department official website is available at http://www.tmd.go.th/index.php, accessed: 12 March 2013.
[535] See http://www.tmd.go.th/en/aboutus/vision.php, accessed: 12 March 2013.
[536] Thailand Concept Paper, *The 47th Session of the United Nations Committee on the Peaceful Uses of Outer Space*, June 2-11, 2004, Vienna, Austria, at 7.

Mahanakorn University of Technology (MUT), which formed a joint venture with the United Communication Company of Bangkok and the University of Surrey, United Kingdom. It is a programme to design, construct and test a micro-satellite. The programme led to the birth of Thailand's first micro-satellite, THAI-PATH, which was launched on 10 July 1998.[537] The programme was enabled Thai engineers to gain expertise in satellite technology.[538]

From the previous discussion, it is noted that Thailand had successfully launched six major satellites (Thaicom 1A, Thaicom 2, Thaicom 3, Thaicom 4, Thaicom 5 and THEOS). The first five satellites, or the Thaicom series, were launched by Arianespace[539] of France from its spaceport. However, THEOS was launched from Dombarovsky, Russia, by International Space Company Kosmotras,[540] a joint project between Russia, Ukraine, and Kazakhstan. Thailand's micro-satellite, THAI-PATH, was launched by Surrey Satellite Technology (SSTL)[541] of the United Kingdom, from Baikonur Cosmodrome, Kazakhstan. Thus, it is construed that Thailand is indirectly involved in the launching of space objects as it uses the services of foreign companies. It is also noted that all seven satellites were recorded in the UNOOSA register. However, only one satellite, THEOS, was properly registered in the United Nations in accordance with United Nations space treaties, whereas the rest were not officially registered.[542]

(c) Five Outer Space Conventions: Thailand's Status

Thailand is a state party to two United Nations outer space conventions.[543] The first convention to which Thailand became a party was the Outer Space Treaty 1967.[544] Thailand signed the Treaty on 27 January 1967, which indicates the state's interest in being a member

[537] Jantarang, Sujate, "THAI-PAHT the Small Satellite for Education", *Cooperation in Space, Euro-Asian Space Week: Where East and West Finally Meet, 23-27 November 1998, Singapore,* http://adsabs.harvard.edu/full/1999ESASP.430..449J, accessed: 12 March 2013.
[538] See http://en.wikipedia.org/wiki/Mahanakorn_University_of_Technology, accessed: 12 March 2013.
[539] The Arianespace website is available at http://www.arianespace.com/, accessed: 12 March 2013.
[540] Kosmotras website is available at http://www.kosmotras.ru/; see also, "Russia Launches Thai Satellite on Converted Missile", *RIANOVOSTI,* 1 October 2008, http://en.rian.ru/russia/20081001/117363703.html, all accessed: 12 March 2013.
[541] SSTL is a spin-off company of the University of Surrey (United Kingdom), and now majority-owned by EADS-Astrium. See http://en.wikipedia.org/wiki/Surrey_Satellite_Technology_Ltd#Platforms; and http://www.sstl.co.uk/heritage/sstl-missions, all accessed: 12 March 2013.
[542] See United Nations Online Index of Objects Launched into Outer Space, http://www.oosa.unvienna.org/oosa/search.do, accessed: 12 March 2013.
[543] The two conventions are the Outer Space Treaty 1967 and the Rescue Agreement 1968. See United Nations, *supra* note 480.
[544] The Outer Space Treaty 1967, *supra* note 479.

state to the Treaty. Then, on 5 September 1968, Thailand finalized its decision to become a party to the Treaty by ratifying it.[545] Thailand thus took only a year and eight months, from the signing date, to ratify the Outer Space Treaty 1967. Such ratification reflects Thailand's consent to be bound by the legal rules stipulated in the Outer Space Treaty 1967.

The second treaty to which Thailand became a party was the Rescue Agreement 1968[546]. Thailand is a member state to the Agreement by accession. The membership started from its accession date on 29 May 1969. It is noted that Thailand took only 6 months to accede to the Convention after it came into force on 3 December 1968. However, Thailand has neither signed not acceded to the other three United Nations space conventions, namely the Liability Convention 1972, the Registration Convention 1975, and the Moon Agreement 1979.[547]

(d) Space-Related Policies, Laws, and Regulations

At present, Thailand has no specific or comprehensive national space legislation to govern the country's space activities, especially laws that deal with obligations stipulated by the United Nations' outer space treaties. There is also no precise law to regulate the launch of space objects belonging to Thailand. In fact, such circumstances were simply achieved through bilateral agreements arranged between the parties involved. Apart from that, Thailand has no space policy, despite various efforts to formulate such a policy.[548]

Although Thailand is deficient in the aforementioned laws, there are a number of other space-related laws that govern space-related activities. These include the Telecommunication Service Act 2001 and the Patent Act 1979 (as amended).[549]

(e) Concluding Remarks

Thailand is the only neighbouring country to Malaysia that shares a land border with Peninsular Malaysia. Thailand's space sector is viewed as an emerging sector in which activities revolve mainly around space applications including communications, remote

[545] See http://www.oosa.unvienna.org/oosatdb/showTreatySignatures.do, accessed: 12 March 2013.
[546] The Rescue Agreement 1968, *supra* note 483.
[547] See *supra* note 480.
[548] "Space Master Plan for Thailand 2004-2014", prepared by Chulalongkorn University, 28 February 2005, at 12, http://lerson.org/public/space/2005SpacePlan091E.pdf, accessed: 13 March 2013.
[549] See Chitasombat, Nipant, *supra* note 512, at 100.

sensing, earth observation, and meteorology. The country is also involved in programmes such as the launching of space objects and a micro-satellite programme. Thailand's space activities are assisted by two main agencies, the Space Affairs Bureau and GISTDA. At present, the country has no specific national space legislation to control the activities in accordance with the rules and obligations prescribed by the United Nations' space treaties. Pertaining to the United Nations' outer space treaties, Thailand is a party state to only two treaties: the Outer Space Treaty 1967 and the Rescue Agreement 1968.

3.6.2. Singapore

(a) Overview

Singapore is officially known as the Republic of Singapore. Its capital city is Singapore city. The country consists of 63 islands including the main island.[550] Singapore is a neighbour to Malaysia as it is located at the southern tip of Peninsular Malaysia, between Malaysia and Indonesia. It is separated from Malaysia by the Straits of Johor and is connected to Malaysia by two man-made connections: the Johor-Singapore Causeway and the Tuas Second Link. Politically, Singapore is a parliamentary republic state.[551] The head of state is the President and the head of the Government is the Prime Minister. The Government is composed of three branches: (1) Executive, (2) Legislative, and (3) Judiciary.[552] The Executive consists of a President, a Prime Minister, and a list of Ministries under the Cabinet of Singapore. The Legislative comprises Parliament, and the Judiciary comprises the Supreme Court and Court of Appeals.[553] Singapore's legal system is based on the English common law legal system. The sources of Singapore law include legislation, judicial precedents, and custom.[554]

[550] See http://en.wikipedia.org/wiki/Singapore, accessed: 12 March 2013.
[551] A parliamentary republic state is a state operating under a parliamentary system of government where the executive branch (the government) derives its legitimacy from and is accountable to the legislature (the Parliament). For information read http://en.wikipedia.org/wiki/Parliamentary_republic#List_of_current_parliamentary_republics, accessed: 12 March 2013.
[552] Read also *supra* note 110.
[553] For more information see http://geography.about.com/library/cia/blcsingapore.htm, accessed: 12 March 2013.
[554] See http://en.wikipedia.org/wiki/Sources_of_Singapore_law, accessed: 12 March 2013.

Economically, Singapore depends largely on exports and refining imported goods, especially in manufacturing.[555] Its main industries include electronics, petroleum refining, mechanical engineering, and biomedical sciences sectors. Singapore's space-related sector is an emerging and promising sector for the state, especially since the Singapore Government has opened its telecommunications area to Foreign Service providers.[556]

(b) Space-Related Bodies and Activities

At present, Singapore has no specific space agency.[557] However, there are certain government space-related bodies that deal with space-related matters of the state. They include the Ministry of Communications and Information (MCI), [558] and Infocomm Development Authority of Singapore (IDA).[559] MCI is in charge of, among other things, information and communications technology, media and design sectors, and the Government's information and public communication policies.[560] Its mission is to build a nation of connected people and achieve a better quality of life by developing vibrant infocomm, media and design sectors and cultivating learning communities..[561] Apart from MCI, the Singapore Government has IDA. IDA is one of the statutory boards under MCI.[562] It is responsible for the development of the information and communications technology sectors with the aim of developing Singapore into a dynamic global infocomm hub and leveraging infocomm for Singapore's economic and social development.[563] IDA offers licences such as telecommunication dealer's licences, service-based operator licences, and radio communication licences.[564]

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[555] See http://en.wikipedia.org/wiki/Singapore#Economy, accessed: 5 August 2011.
[556] See http://en.wikipedia.org/wiki/Economy_of_Singapore, accessed: 12 March 2013.
[557] The fact is as of 12 March 2013. For the importance of the establishment of the Singapore space agency, see Goh, Gérardine Meishan, "Ethir: Singapore as a Delta for Space Law in the Asia-Pacific", (2005) 47 *IISL Colloquium on the Law of Outer Space* 71.
[558] Prior to 1 November 2012, MCI was known as Ministry of Information, Communications and the Arts (MICA). The official website of MCI is available at http://mic.gov.sg/, accessed: 12 March 2013.
[559] IDA official website is at http://www.ida.gov.sg/, accessed: 13 March 2013.
[560] See http://www.mci.gov.sg/content/mci_corp/web/mci/about_us.html; and http://en.wikipedia.org/wiki/Ministry_of_Communications_and_Information, both accessed: 12 March 2013.
[561] See http://www.mci.gov.sg/content/mci_corp/web/mci/about_us/our_organisation/vision_mission_values.html, accessed: 12 March 2013.
[562] See http://www.mci.gov.sg/content/mci_corp/web/mci/statutoryboards.html, accessed: 12 March 2013.
[563] See http://www.ida.gov.sg/About-Us/What-We-Do.aspx, accessed: 13 March 2013.
[564] For more information, refer to http://www.ida.gov.sg/Policies-and-Regulations/Industry-and-Licensees/Licensing/Online-Licence-Application.aspx, accessed: 13 March 2013.

There are several non-governmental bodies. For instance, in the telecommunications sector, one of the most significant is Singapore Telecommunications Limited (SingTel).[565] SingTel provides an internet service, internet protocol television, mobile phone, and fixed-line telephony services. The company owns a communication satellite, ST-1, launched on 25 August 1998.[566] Then, on 20 May 2011, ST-2 was launched into space as well. ST-1 and ST-2 satellites were recorded in the United Nations online database. However, they were not properly registered with the United Nations as required by the United Nations space treaties.[567] Besides ST-1 and ST-2, SingTel aims to enhance its satellite business with the launching of another satellite, ST-3, in the future.[568] Other Singapore telecommunication companies include M1 Limited and StarHub Limited.[569] In contrast, Singapore Space and Technology Association (SSTA)[570] is a Singapore non-profit association. It focuses on developing the country's space technology industry, and facilitates information and communication for government, industry and academia.

Singapore's space activities mainly revolve around three areas of space technology applications: (1) telecommunications and broadcasting; (2) remote sensing and earth observation; and (3) meteorology. Firstly, regarding telecommunications and broadcasting, Singapore has a high level of development in terms of both technology applications infrastructures as they cover nearly the entire state. The state has excellent facilities and services with regard to the telephone system, as well as radio, television, and internet services domestically and internationally.[571] In providing such services, Singapore has at least three satellite earth stations. The first Singapore earth station is Sentosa Satellite Earth Station located at Sentosa Island. The second is Bukit Timah Satellite Earth Station at Bukit Timah,

[565] SingTel official website is at http://info.singtel.com/; see also http://en.wikipedia.org/wiki/SingTel, accessed: 15 March 2013.
[566] SingTel jointly owns ST-1 with Chunghwa Telecom Company, Ltd., the largest telecommunication company in Taiwan. They jointly operate the satellite from earth stations in Seletar (Singapore) and Taipei (Taiwan). See http://en.wikipedia.org/wiki/ST-1, accessed: 15 March 2013.
[567] See *supra* note 542.
[568] Chua, Melissa, "SingTel Aims to Double Satellite Business", *Telecomasia.net,* 11 May 2011, http://www.telecomasia.net/content/singtel-aims-double-satellite-business, accessed: 15 March 2013.
[569] M1 Limited official homepage is at http://www.m1.com.sg/; StarHub Limited homepage is at http://www.starhub.com/; see also http://en.wikipedia.org/wiki/M1_Limited; and, http://en.wikipedia.org/wiki/StarHub, all accessed: 15 March 2013.
[570] SSTA website is at http://www.space.org.sg/, accessed: 15 March 2013.
[571] See http://en.wikipedia.org/wiki/Telecommunications_in_Singapore, accessed: 15 March 2013.

and the third is Seletar Teleport at Seletar, in north eastern Singapore.[572] All these stations are managed and owned by SingTel**.**

Secondly, regarding the remote sensing and earth observation areas of application, Singapore has a centre responsible for such fields. It is called the Centre for Remote Imaging, Sensing, and Processing (CRISP).[573] CRISP receives, processes and analyses data from satellites including SPOT, IKONOS, ERS, TERRA, and AQUA.

Thirdly, in regard to meteorology, Singapore has a division called Meteorological Services Division. It was set up under the National Environment Agency (NEA),[574] a statutory board under the Singapore Ministry of the Environment and Water Resources. Its tasks include providing meteorological services to the aviation, maritime and military communities, as well as weather information.[575]

Apart from space applications, Singapore is also engaged in developing a local micro-satellite namely X-Sat. It was developed and built by Nanyang Technological University (NTU) of Singapore in collaboration with Singapore Defence Science Organization (DSO).[576] The X-Sat was launched into orbit on 20 April 2011 from Satish Dhawan Space Centre, India.[577] It is designed, among other things, for earth observation and imaging for environmental applications such as forest fire monitoring, as well as satellite-based data acquisition and distribution. It was also recorded in the United Nations database, but was not properly registered.

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[572] The Sentosa Satellite Earth Station was established in 1970, while for the Bukit Timah Satellite Earth Station it started operation in 1986. See http://en.wikipedia.org/wiki/Sentosa_Satellite_Earth_Station; http://en.wikipedia.org/wiki/Seletar_Teleport; and, http://en.wikipedia.org/wiki/Bukit_Timah_Satellite_Earth_Station, all accessed: 15 March 2013.
[573] CRISP website is available at http://www.crisp.nus.edu.sg/, accessed: 15 March 2013.
[574] NEA website is available at http://app2.nea.gov.sg/index.aspx; accessed: 15 March 2013.
[575] See also http://en.wikipedia.org/wiki/National_Environment_Agency, accessed: 15 March 2013.
[576] NTU official website is at http://www.ntu.edu.sg/; and DSO website is at http://www.dso.org.sg/, both accessed: 2 August 2011.
[577] "Singapore's First Locally Made Satellite Launched into Space", *AsiaOne News,* 20 April 2011, http://www.asiaone.com/News/AsiaOne+News/Singapore/Story/A1Story20110420-274651.html, accessed: 15 March 2013.

(c) Five Outer Space Conventions: Singapore's Status

Singapore is a state party to three of the United Nations outer space conventions.[578] The first convention is the Outer Space Treaty 1967.[579] Singapore joined the Treaty through accession. The Singapore Government acceded to the Treaty on 10 September 1976,[580] approximately nine years after the Treaty came into force in October 1967. Thus, the accession reflects the consent of Singapore to be bound by the Treaty's legal rules in relation to state space-related activities.

The second convention is the Rescue Agreement 1968.[581] Singapore became a party to this Agreement through accession as well, acceding to the Agreement on 10 September 1976.[582] Such accession took place roughly eight years after the Agreement came into force on 3 December 1968. The third convention to which Singapore became a party was the Liability Convention 1972.[583] The state signed the Liability Convention on 19 July 1972, about four months after the Convention was opened for signature to all states on 29 March 1972. The Liability Convention 1972 was then ratified by Singapore on 19 August 1975.[584] It is noted that Singapore took almost three years, from the signing date, to consider ratifying the Liability Convention 1972. Commencing from the ratification date, according to its international obligation, Singapore is bound by the legal rules stipulated in the Liability Convention 1972.

With respect to the other conventions, Singapore is not a party state.[585] The first is the Registration Convention 1975.[586] Singapore is a signatory state only to this Convention. The state signed the Convention on 31 August 1976, about 1 year 7 months after the Convention opened for signature to all states on 14 January 1975. This Convention has not been ratified.

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[578] Those conventions are: the Outer Space Treaty 1967; the Rescue Agreement 1968; and the Liability Convention 1972. See United Nations, *supra* note 478.
[579] The Outer Space Treaty 1967, *supra* note 479.
[580] See *supra* note 480.
[581] The Rescue Agreement 1968, *supra* note 481.
[582] See *supra* note 480.
[583] The Liability Convention 1972, *supra* note 483.
[584] See *supra* note 480.
[585] See *id*.
[586] The Registration Convention 1975, *supra* note 485.

As for the Moon Agreement 1979,[587] Singapore is also a non-party state.[588] The state has neither signed nor acceded to the Agreement.

(d) Space-Related Policies, Laws, and Regulations

At present, like Thailand, Singapore has no specific or comprehensive national space legislation to govern the state's space activities, particularly those dealing with obligations stipulated by the United Nations' outer space treaties. Moreover, Singapore has no space policy. However, although Singapore has no space legislation and policy, it has a number of other space-related laws that govern such activities. These include the Telecommunications Act (Cap.323), Info-communications Development Authority of Singapore Act (Cap.137A), and Electronic Transactions Act (Cap.88).

(e) Concluding Remarks

Singapore's space sector is an emerging and promising sector for the state. The state's activities revolve around space applications including communications, remote sensing, earth observation, and meteorology. Other activities include the launching of space objects and a micro-satellite programme. Since the state has no specific space agency, its space-related activities are mainly assisted by the Ministry of Communications and Information (MCI) and Infocomm Development Authority of Singapore (IDA). The country also lacks any specific space legislation to regulate such activities. Regarding the United Nations' outer space treaties, Singapore is a party state to three treaties: the Outer Space Treaty 1967, the Rescue Agreement 1968 and the Liability Convention 1972.

3.6.3. Brunei

(a) Overview

Brunei is officially known as the State of Brunei Darussalam. Its capital city is Bandar Seri Begawan. Brunei is located on the north Coast of Borneo Island. It is a neighbour to Malaysia as it is surrounded by Sarawak, a state of Malaysia. Politically, Brunei is a unitary

[587] The Moon Agreement 1979, *supra* note 486.
[588] See *supra* note 480.

parliamentary democracy state[589] governed by a constitution. The state political framework is an absolute monarchy in which the head of state and of the Government is the Sultan or King. The Government is made up of three branches: (1) Executive, (2) Legislative and (3) Judiciary.[590] The Executive consists of the Sultan, Privy Council, Council of Succession, Religious Council, and Council of Ministers. The Sultan has a full executive authority under the Brunei Constitution 1959. The Legislative comprises the Legislative Council, and the Judiciary is composed of the Civil Court and *Syariah* Court.[591] Brunei's legal system is based on the English common law legal system. The sources of the law of Brunei include statute law, common law of England, and the principle of equity.[592] The decisions of higher courts in the British Commonwealth, particularly in Singapore, Malaysia and the United Kingdom, have persuasive authority and are often used to interpret the statutes.[593]

Economically, even though Brunei is a small country, it is wealthy. Brunei's main industries include petroleum, petroleum refining, liquefied natural gas, and construction.[594] Others are agriculture, forestry and fishing. In the space-related sector, Brunei is involved in limited areas, but the country has the potential to engage further in this sector.

(b) Space-Related Bodies and Activities

At present, Brunei has no specific space agency. However, there are certain Government space-related bodies that deal with space-related matters of the state. They include Brunei Ministry of Communications,[595] Department of Civil Aviation,[596] and Brunei Meteorological Service[597]. The Department of Civil Aviation is one of the departments in the Brunei Ministry of Communications, while the Brunei Meteorological Service is a section under the Department of Civil Aviation.

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[589] See *supra* note 5.
[590] Read also *supra* note 110.
[591] For further information see http://en.wikipedia.org/wiki/Politics_of_Brunei, accessed: 15 March 2013.
[592] See http://www.iflr1000.com/pdfs/Directories/1/Brunei_2009.pdf, accessed: 10 March 2013.
[593] Pg.Hj.Tahir, Pg.Kasmirhan, "Brunei Legal Regime on ICT: Are Our Laws Conducive Enough?", http://www.bruneiresources.com/pdf/nasis_s2_6.pdf, accessed: 18 March 2013.
[594] See http://en.wikipedia.org/wiki/Economy_of_brunei, accessed: 18 March 2013.
[595] The Ministry of Communications Brunei Darussalam's homepage is available at http://www.mincom.gov.bn/, accessed: 18 March 2013.
[596] The Department of Civil Aviation Brunei Darussalam's homepage is available at http://www.civil-aviation.gov.bn/, accessed: 18 March 2013.
[597] Brunei Darussalam Meteorological Service's homepage is available at http://bruneiweather.com.bn/, accessed: 18 March 2013.

As for space-related activities, it is observed that Brunei has had no space objects launched into space.[598] Its activities are mainly concerned with telecommunications and meteorological services. The telecommunication service was first introduced in Brunei as early as the 1920s.[599] Nowadays, the country has excellent telecommunication facilities.[600] Furthermore, the Brunei Ministry of Communications has a vision of creating a sophisticated society through excellence in communications, and a mission to establish and sustain hub activities in communications.[601]

Apart from the above, Telekom Brunei Berhad (TelBru)[602] is a telecommunications company in Brunei. Its duties include providing excellent telecommunications and information, as a technological product and service. Historically, the company was corporatized from the Department of Telecommunications, one of the departments previously under the Brunei Ministry of Communications.[603] Besides the telecommunications area, meteorology is another part of Brunei's space-related activities. The country has the Brunei Meteorological Service to deal with such activities. It provides meteorological information including daily weather forecasts for the public, as well as marine services. The Brunei Meteorological Service is also responsible for meteorological data collection, processing, and scientific analysis. It maintains a Weather Forecast Centre equipped with Doppler Weather Surveillance Radar and a Satellite Images Reception System.[604] The country has several weather stations, including Kuala Belait weather station.

(c) Five Outer Space Conventions: Brunei's Status

With respect to the five United Nations outer space conventions - the Outer Space Treaty 1967, the Rescue Agreement 1968, the Liability Convention 1972, the Registration Convention 1975, and the Moon Agreement 1979 - it is noted that Brunei is a non-party state to all those conventions.[605] The Brunei Government has neither signed, ratified, nor acceded to any of the United Nations' outer space conventions.[606] Such circumstances may reflect that

[598] See http://www.oosa.unvienna.org/oosa/showSearch.do, accessed: 18 March 2013.
[599] See http://www.telbru.com.bn/about-us/corporate-info/history, accessed: 18 March 2013.
[600] See http://en.wikipedia.org/wiki/Telecommunications_in_Brunei, accessed: 18 March 2013.
[601] See http://www.mincom.gov.bn/index.php/about-us/history-vision-mission, accessed: 18 March 2013.
[602] TelBru official website is at http://www.telbru.com.bn/, accessed: 18 March 2013.
[603] See http://www.mincom.gov.bn/index.php/history-vision-mission-2, accessed: 18 March 2013.
[604] See http://www.brunet.bn/gov/dca/main.htm, accessed: 18 March 2013.
[605] See United Nations, *supra* note 478. See also *supra* note 480.
[606] See *id*.

the country is not ready to be bound by any obligations and legal rules set forth in the United Nations' outer space conventions to govern its outer space activities.

(d) Space-Related Policies, Laws, and Regulations

Like Singapore and Thailand, Brunei has no specific or comprehensive national space legislation, particularly legislation that deals with obligations as prescribed by the United Nations' outer space treaties to govern the state's outer space activities. Moreover, Brunei has no space policy.

Although Brunei lacks the aforementioned legislation and policy, it has a number of other space-related laws that govern these activities. These include the Brunei Telecommunications Act (Chapter 54), Broadcasting Act (Chapter 180), Internet Code of Practice, and Computer Misuse Order 2000.

(e) Concluding Remarks

Although Brunei has not yet launched any objects into space, the state's space sector has the potential to evolve as a promising sector. At present, the state's activities are concerned with space applications such as telecommunications and meteorology. Brunei has no specific space agency, and its space-related activities are mainly assisted by Brunei Ministry of Communications, Department of Civil Aviation, and Brunei Meteorological Service. The country also has no specific space legislation and policy. Brunei is a non-party state to all the United Nations' space treaties.

3.6.4. Legal Implications

Even though Thailand, Singapore and Brunei are non-active space participants, their lack of domestic space legislation may have several legal implications. As discussed earlier,[607] countries involved in outer space activities must take full responsibility for their activities, as well as the activities of their nationals at the international level. Thus, when damage results from the activities of their national, the legal implication is that the government of the state

[607] For more discussion, refer to Chapter 3 of the thesis (3.5.5. India: Legal Implications).

concerned has no possibility of transferring, limiting or exempting such liability to its national wrongdoer at national level. Consequently, the state will be fully liable for the actions of its national. Furthermore, Thailand, Singapore and Brunei may experience improper claims procedures in the event of claims for damages being brought against the state at the national level.

Apart from that, Thailand, Singapore and Brunei will face the risk of non-compliance with the liability insurance requirement or the demonstration of sufficient financial responsibility in the event of their nationals being involved in outer space activities. This is, in fact, vital for every state in order to ensure that nationals have the ability to compensate the victim when damage or loss occurs as a result of the activities. Additionally, the obligation to take out insurance is important for indemnifying the state government when payment of compensation is executed on behalf of the national to the victim.

The absence of legislation may also result in difficulty in controlling and monitoring the national space activities, particularly to ensure they are in conformity with the international legal rules. This scenario is crucial, especially when the states are parties to outer space international treaties and conventions requiring them to observe and implement the treaties' obligations at both international and national levels for an effective performance. Indeed, Thailand, Singapore and Brunei may face complications in imposing sanctions at the national level on nationals who violate the space law. The difficulty of effectively imposing the obligation to register objects launched into space is another legal implication. Registration of a space object is an obligation imposed by the international law that should be implemented at both international and national levels. Registration is crucial, among other things, in order to identify the space object, especially in the event of it causing damage to others.

As neighbouring countries to Malaysia, Thailand, Singapore and Brunei have a higher degree of responsibility towards one another, particularly in relation to their outer space activities. This circumstance is based on the nature of such activities; there is a strong possibility, for instance, that launches conducted from the territory of one country will have consequences for the neighbouring countries as well. In such circumstances, it is suggested that these countries formulate domestic space legislation to regulate such activities. At this juncture, these states might also consider, to some extent, the harmonization of their space legislations,

especially for the purpose of facilitating international cooperation between them as neighbouring states.

3.7. CONCLUDING REMARKS

This section deals with two aspects: (1) the general conclusion drawn; (2) what Malaysia can learn, specifically, from the experience of the seven selected countries, to develop Malaysian domestic space legislation.

As for the first part, after discussing all seven countries - the United Kingdom, Australia, the United States of America, India, Thailand, Singapore and Brunei - there are several general conclusions to note.[608]

The first is in relation to the enactment of domestic space legislation, particularly regarding the implementation of the United Nations' space treaties obligations. It is noted that the first three countries - the United Kingdom, Australia, and the United States of America - are governed by specific domestic space legislation to regulate their national space activities. The other four countries - India, Thailand, Singapore and Brunei - have no such legislation to govern their space activities. At this point, it is observed that countries with specific domestic space legislations are capable of implementing the United Nations' outer space treaties obligations effectively, as well as controlling their national space activities in accordance with the international legal rules. This situation will then guarantee the sustainability of these countries' space activities at both national and international levels.

It is also noted that countries with space legislations, compared to those with no legislation, have certain and positive approaches to further developing their space activities. Their space sectors are growing confidently in parallel with the development of their national space laws. Moreover, such a stable legal environment has been seen to attract space investors and the involvement of private sectors in the activities, resulting in the expansion and growth of the economies of those countries. In contrast, countries with no specific legislation are facing uncertainty about the laws governing their space activities, particularly in the event of the

[608] A summary of Chapter 3 is available in points on the differences and similarities of those seven selected states. For further information, refer to "Appendix A: Table No. 3.1. Some Differences and Similarities of Seven Selected States".

involvement of private sectors. They will also experience an imbalance in the evolution of space legal rules and the growth of space activities.

Second, most states have specific governmental bodies or agencies to control their space-related activities. To deal with space activities and related matters, a state needs a specialized body to deal with such activities. This body will be responsible for controlling, monitoring and advising on the related activities in accordance with both the national and international law. Indeed, in some states, special posts have been created for an effective performance. For instance, in Australia, the Australian Space Licensing and Safety Office has a 'Launch Safety Officer' for every launch facility to ensure compliance with the legal rules.

Third, the first three states discussed - the United Kingdom, Australia and the United States - which have specific domestic space legislation, are parties to the first four United Nations outer space treaties at least (the Outer Space Treaty 1967, the Rescue Agreement 1968, the Liability Convention 1972, and the Registration Agreement 1975). This arguably reflects the seriousness with which these states go about fulfilling their international and national duties and obligations in relation to their outer space activities. This was proved when these three states, besides being members of most of the United Nations' space treaties, also successfully enacted their national space legislation. This circumstance does, in fact, mirror the states' position as responsible space actors.

Fourth, a variety of modes of authorization of space activities have been introduced and imposed by the states. These include licences, exemption of licences, permits, experimental permits and certificates. All these modes of authorization, despite having different names, have the same ultimate objective, which is to control the state's national space activities. The absence of a mode of authorization will lead to difficulty in controlling, monitoring and supervising such activities. This circumstance may therefore end in a breach of the international legal duty of states party to the United Nations' outer space treaties.

Fifth, countries with domestic space legislation are able to legally impose a registration obligation on their nationals. The registration of space objects is vital to ensure that the object is known and its owner identified. This is important, for instance, in cases of accidents or loss caused by the space object. For effective action, the states, via their space domestic law, have set up a National Registry of Space Objects, as stipulated by the United Nations' space

treaties. The states shall impose legal rules on their nationals, requiring them to register at the national level the space objects they launch into space. Such circumstances, indeed, help the states to meet their further obligations to register such space objects with the United Nations at the international level. From the earlier discussion, it is noted that states with domestic legislation (except India) have greater potential to register their space objects with the United Nations compared to states with no domestic space legislation. It seems that such states are more aware of the importance of registering their space objects with the United Nations.

Sixth, states with domestic space legislation can impose constant monitoring and supervision obligations efficiently at state level. These legal rules are crucial, especially with the involvement of private sectors in space activities. Constant monitoring and continuous supervision are among the key factors that ensure that the activities of nationals are in conformity with domestic and international space legal rules. For effective implementation, it is observed that states designate, via their domestic space law, a specific officer or figure to perform such tasks. For instance, Australia has its 'Launch Safety Officer'.

Seventh, states with domestic space legislation can deal proficiently with issues of liability and indemnification imposed by the international rules, in accordance with the states' interests. The possible liability of states at the international level can be transferred, passed or limited to the responsible space actor at the national level. There are various types of practices performed by the states, including passing the liability without limitation to the responsible party, passing the limited liability based on the maximum probable loss scheme, fixing the liability period, and reciprocal waiver of claim. The rule of obligatory indemnification is imposed by certain states, such as the United Kingdom, through their domestic space laws to ensure that the state is indemnified against any claims brought against it. The requirement to take out liability insurance or demonstrate the financial responsibility of the national space actor is imposed to ensure the availability of funds in the event of obligations arising from the indemnification rule.

Eighth, states with domestic space legislation are capable of instilling values of safety, peace and security, initiated by the international space law, in their national space legislation in a comprehensive manner. Those values are critical in order to protect the space actors, safeguard their activities and related areas, and preserve the outer space remote environment. Various modes have been introduced by the states, such as the establishment of the

investigation regime in Australia to ensure the safety of its future national space activities in the event of accidents occurring. In the United Kingdom, the state implements the technical safety assessment of its national space activities to prevent, for instance, outer space contamination. Numerous other legal rules and provisions, as discussed earlier, have been imposed by states via national legislation to secure the values of safety, peace and security when dealing with their space activities.

Ninth, all states, except Thailand, are governed by the common law legal system. Although Thai law is based on civil law, the state's legal system, as previously discussed, is still influenced to some extent by the common law legal system. At this juncture, it can be stated that, in all seven countries, besides having national space legislation (for those with such legislation), judge-made law and case precedent[609] are among the most important sources of law that make a significant contribution to developing their space legal systems at the national level.

Lastly, states with no specific domestic space law, in contrast to states with space legislation, will be faced with uncertainty regarding legal rules to govern their national space activities. In addition, such states cannot impose the United Nations' outer space treaties obligations effectively at the national level. Moreover, they cannot control and monitor the national outer space activities in order to ensure compliance with the national and international legal rules. The imbalance between the development of space technology and activities and the legal rules is an unhealthy environment that will fail to gain the confidence of space investors. This situation may affect the growth of space activities as well as the economy of the state.

The second part deals with this question: what can Malaysia learn from the experience of those seven countries, particularly the countries that have domestic space legislation, in developing and drafting the Malaysian space legislation? In the process of developing and drafting the domestic space law, there are a numbers of things that Malaysia can learn and should be aware of:

[609] In the common law legal system, a 'precedent' is a rule of law established for the first time by a court for a particular type of case and thereafter referred to in deciding similar cases. See Black's Law Dictionary (5th ed., 1979), at 1059, as cited in http://en.wikipedia.org/wiki/Precedent#cite_note-0, accessed: 22 June 2011.

First, to appear a serious and responsible space actor, Malaysia needs to enact its own specific domestic space law, as well as to seriously consider becoming a party to the first four of the United Nations' outer space treaties, at least.

Second, national space legislation is undoubtedly an effectual and efficient mechanism for implementing the United Nations' outer space treaties' obligations, and simultaneously regulating and controlling the space activities of Malaysia's national and private entities in accordance with the required legal rules.

Third, there are at least five major issues to cope with, in drafting the Malaysian space legislation. Those issues deal with: (1) authorization, (2) registration, (3) liability and indemnification, (4) constant monitoring and continuous supervision, and (5) safety, peace and security elements. Those issues should be dealt with in a way that suits the state's interests, as well as the international legal rules.

Fourth, a clear and definite authorization is required from a state government, as prescribed by the international rules, for nationals and private entities of the state when they are involve in any space-related activities. This is crucial in order to legalize their space activities.

Fifth, there are various types of authorization of space activities that Malaysia can adopt in its space legislation for the purpose of legalizing its national space activities in accordance with the international space legal rules.

Sixth, Malaysia needs to observe the registration obligation of its space objects at national and international levels. At the national level, Malaysia needs to impose a clear legal rule that all objects launched into space must be registered nationally. Moreover, the rule also prescribes a legal requirement for further registration of such space objects by the state government with the United Nations at the international level.

Seventh, states should be required to set up an official 'National Space Registry' to deal with the registration of space objects and other related matters at the national level.

Eighth, a state can either transfer or limit its international liability imposed by the United Nations' space treaties via legal rules enacted in the state's domestic space legislation.

Ninth, a state needs to impose a legal requirement to provide proof of liability insurance or financial ability on those involved in space activities. This is paramount in order to indemnify the state in the event of damage or loss resulting from space activities.

Tenth, a state needs to impose legal rules of constant monitoring and continuous supervision in its domestic space legislation with respect to its national space activities. This is to ensure its national space activities are continuously monitored and supervised in accordance with the requirement of the United Nations' outer space treaties.

Eleventh, a state needs to instil values of safety, peace and security in the provisions of the domestic space legislation. In so doing, the state will support the rule of international space law that space activities should be developed and expanded in a safe and peaceful manner at both national and international levels.

Twelfth, a state has the potential and capacity to define and make clear any ambiguous words mentioned in the United Nations' outer space treaties. This can be executed for the purpose of the state's domestic application. By doing so, any unclear issue at the international level relating to unclear words in the United Nations' space treaties can be resolved at the national level. For instance, Australia, in its Space Activities Act 1998, provides a specific demarcation point of outer space activities by defining the unclear term 'outer space' as an area beyond the distance of 100 km above sea level.

Thirteenth, even though the three neighbouring countries of Malaysia (Thailand, Singapore, and Brunei) discussed above have no specific domestic space law, the progress of their space activities may, more or less, affect and expedite the development and formation of Malaysian space law.

Lastly, since the neighbouring countries of Malaysia (Thailand, Singapore and Brunei) have no domestic space legislation, it is observed that Malaysia has the potential to become a pioneer in enacting national space legislation among its neighbouring Commonwealth countries. In such circumstances, Malaysia may further inspire its neighbours to perform the same actions.