

## Research Article

## Outer Space Law in Retrospect

Tunku Intan Mainura

Faculty of Law, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia

**ABSTRACT:** The purpose of this article is to analyse the literature concerning legal framework for outer space activities by states. Review was conducted on the elements of national space law, including literature critiquing particular strengths or weaknesses of existing laws and literature, on the obligations placed on States under international law and on why writers make particular recommendations as to the content of legislation. The article will summarise the key elements one would anticipate finding in the outer space regulatory framework and which will form the structure of the analytical framework when considering how States implement international space law in practice.

## 1. Introduction

There are many writers who have written on the subject of space law. Whilst most writers focus their writings around the general issues of space law, which include the historical perspective of the evolution of space law and the international policy and law governing space-related activities, very few writers specifically comparatively analyse or discuss the national space legislation of any particular State.

## 2. Books

The first monograph on space law was published in Germany in 1932 by Vladimir Mandl, widely known as the 'Father of Space Law'<sup>1</sup>. In his *Das Weltraum-Recht: Ein Problem der Raumfahrt*<sup>2</sup>, he discussed and elaborated on the law of outer space 'as an independent legal branch governed by principles from the law of the sea and the law of the air'. He 'opposed the then common idea of sovereignty in outer space'<sup>3</sup>.

In 1963, Andrew Haley discussed the issues pertaining to the relationship between the space law and the conduct of States in his *Space Law and Government*<sup>4</sup>. He discussed the actual and potential benefits of space exploration, and the connection between space flight and the rule of law. He described the approaches that are taken by some States as regards to the

limits of national sovereignty over the celestial bodies, and most importantly, he maintained that although States have sovereign rights over their land, this right is not extended to outer space. Elaborating on the rules regarding to the space vehicle regulation, he recognised that there is the administrative problem of enforcing these rules, and made suggestions on how to overcome the problem. On issues regarding liability relating to the space activities, he made a case study on the domestic law of the USA. He foresaw that as more States will want to embark on the space ventures, there would be a need for an international treaty to regulate space activities, especially in respect of States' international liability. He also discussed space medical jurisprudence, the players in the space arena, i.e. the intergovernmental and nongovernmental organizations in space activities, and he also articulated and elaborated the rules of 'metalaw' in regards to the extraterritorial intelligence<sup>5</sup>. The year 1963 also saw McDougall, Casswell and Vlastic discussing the relationship between law and public policy in their *Law and Public Order in Space*<sup>6</sup>. In 1964, Cohen discussed the relationship between legal and political approaches in States wanting to be involved in space-related activities in his *Law and Politics in Space*<sup>7</sup>. He discussed how the political system of States could influence the legal aspect of the regulation of the space-related activities. In 1968, Vlastic wrote on the similarities and differences between aviation law and space law in his *Explorations in Aerospace Law*<sup>8</sup>. In 1968, Fawcett wrote

<sup>1</sup>Kopal, V., 'Vladimir Mandl – Founder of Space Law', (1968) II Colloquium on the Law of Outer Space 357, and Reintanz, G., 'Vladimir Mandl – The Father of Space Law', (1968) II Colloquium on the Law of Outer Space 362, in Jasentuliyana, J., *International Space Law and the United Nations*, (Netherlands: Martinus Nijhoff Publishers, 1999) 2.

<sup>2</sup>Mandl, V., *Das Weltraum-Recht: Ein Problem der Raumfahrt*, (Manheim: Bensheimer, 1932)

<sup>3</sup> In Doyle, S.E., *Origins of international space law and the International Institute of Space Law of the International Astronautical Federation*, (San Diego: Univelt Inc., San Diego, 2002) 135.

<sup>4</sup> Haley, A. G., *Space Law and Government*, (Appleman: Century Croft, 1963).

<sup>5</sup> Haley, A. G., *Space Law and Government*, (Appleman: Century Croft, 1963).

<sup>6</sup> McDougall, M. S., Casswell H. D. and Vlastic I. A., *Law and Public Order in Space*, (New Haven: Yale University Press, 1963).

<sup>7</sup> Cohen, M., *Law and Politics in Space*, (Leicester: Leicester University Press, 1964).

<sup>8</sup> Vlastic, A. I., *Explorations in Aerospace Law*, (Montreal: McGill University Press, 1968).

*International Law and the Uses of Outer Space*<sup>9</sup>. He maintained that due to the features of the declaration on outer space by the United Nations General Assembly, i.e. it was adopted unanimously, and it was expressly entitled a 'declaration of legal principles', this international declaration would establish rules of law, if the following four conditions at least were satisfied: that the sponsoring States had authority to make the declaration, that the declaration served a common interest, that the principles declared were capable of functioning as rules of law without further elaboration and that the sponsoring States intended to observe them as such<sup>10</sup>. In 1970, White wrote on the legal aspects of giving judgements in his book entitled *Decision-Making for Space; Law and Politics in Air, Sea, and Outer Space*<sup>11</sup>. He discussed how the political view of States could influence the legal aspect of the regulation of space-related activities. He also discussed how States should behave when giving out their decisions when they concerned space-related matters. He also discussed the similarities and differences between the sea, airspace and outer space<sup>12</sup>. In the same year, Lay and Howard took a more direct interest in the question of international treaties that regulate the activities in outer space in their *The Law Relating to the Activities of Man in Space*<sup>13</sup>. However, they only discussed two out of the five international treaties that were in force at that time, namely the 1967 Outer Space Treaty and the 1968 Rescue Agreement. They gave their interpretation of the treaties and maintained that States must use and explore the outer space in accordance with the international treaties prescribed<sup>14</sup>. Manfred Lach from Poland took a more direct interest in 'the question of the definition of the scope of space law' in his book *The Law of Outer Space: An Experience in Contemporary Law-Making*<sup>15</sup>. He advised jurists of space law 'to use analogies creatively and follow the most progressive tendencies in international law' and also 'opposes the presumption that outer space had been a 'lawless area or legal vacume' since it has always been subject to international law'<sup>16</sup>. In 1976, Ogunbanwo discussed the relationship

between international law and outer space activities in his *International Law and Outer Space Activities*<sup>17</sup>. He discussed the benefits of the use and the exploration of outer space and made suggestions on how States can conduct their activities in accordance with the international treaties<sup>18</sup>.

Starting from the 1980s, writers have significantly developed the interpretation of the international treaties on outer space law. A particularly significant contribution was made by Carl Christol when he wrote *Modern International Law of Outer Space* which provided a complete study of the outer space international treaties, published in 1982<sup>19</sup>. He also developed the idea of the non-existence of exclusive rights of usage and exploration of outer space and its celestial bodies even though some States might have the practical advantage and capabilities over others<sup>20</sup>. In the same year, Forkosh discussed the liability of States in conducting their space-related activities in his *Outer Space and Legal Liability*<sup>21</sup>. He argued that States would be responsible and liable under the outer space international treaties irrespective of whether the activities were conducted by the States itself or by a private person of that State. He also discussed the method of compensation as prescribed by the 1972 Liability Convention<sup>22</sup>. In 1984, Matte discussed space activities and international law in his *Space Activities and Emerging International Law*<sup>23</sup>. In the same year, Fawcett discussed the contemporary issues relating to the activities in outer space in his *Outer Space: New Challenges to Law and Policy*<sup>24</sup> where he acknowledged the arrival of modern technologies in space devices used for space-related activities and made some suggestions on how the international space law should be used to regulate the activities<sup>25</sup>. Gennadi on the hand was interested in the peaceful use of outer space when he wrote *Keep Space Weapon-Free*<sup>26</sup>. He discussed the definition and interpretation of the word 'peaceful use' and the reasons why weapons

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*Contemporary Law-Making*, (Leiden: Sijthof, 1972).

<sup>17</sup> Ogunbanwo, O. O., *International Law and Outer Space Activities*, (The Hague: Martinus Nijhoff Publishers, 1976).

<sup>18</sup> Ogunbanwo, O. O., *International Law and Outer Space Activities*, (The Hague: Martinus Nijhoff Publishers, 1976).

<sup>19</sup> Christol, C. Q., *The Modern International Law of Outer Space*, (New York: Pergamon Press, 1982).

<sup>20</sup> Christol, C. Q., *The Modern International Law of Outer Space*, (New York: Pergamon Press, 1982).

<sup>21</sup> Forkosch, M. D., *Outer Space and Legal Liability*, (The Hague: Martinus Nijhoff Publishers, 1982).

<sup>22</sup> Forkosch, M. D., *Outer Space and Legal Liability*, (The Hague: Martinus Nijhoff Publishers, 1982).

<sup>23</sup> Matte, N. M. (ed), *Space Activities and Emerging International Law*, (Montreal: McGill University, Centre for Research of Air and Space Law, 1984).

<sup>24</sup> Fawcett, J. E. S., *Outer Space: New Challenges to Law and Policy*, (Oxford: Clarendon Press, 1984).

<sup>25</sup> Fawcett, J. E. S., *Outer Space: New Challenges to Law and Policy*, (Oxford: Clarendon Press, 1984).

<sup>26</sup> Gennadi, G., *Keep Space Weapon-Free*, (Moscow: Novosti Press Agency Publishing House, 1984).

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<sup>9</sup> Fawcett, J.E.S., *International Law and the Uses of Outer Space*, (Manchester: Manchester University Press, 1968).

<sup>10</sup> Fawcett, J.E.S., *International Law and the Uses of Outer Space*, (Manchester: Manchester University Press, 1968).

<sup>11</sup> White, I. L., *Decision-Making for Space; Law and Politics in Air, Sea, and Outer Space*, (Purdue: Purdue University Studies, 1970).

<sup>12</sup> White, I. L., *Decision-Making for Space; Law and Politics in Air, Sea, and Outer Space*, (Purdue: Purdue University Studies, 1970).

<sup>13</sup> Lay, S. H. and Howard, J. T., *The Law Relating to the Activities of Man in Space*, (Chicago: Chicago University Press, 1970).

<sup>14</sup> Lay, S. H. and Howard, J. T., *The Law Relating to the Activities of Man in Space*, (Chicago: Chicago University Press, 1970).

<sup>15</sup> Lach, M., *The Law of Outer Space: An Experience in Contemporary Law-Making*, (Leiden: Sijthof, 1972).

<sup>16</sup> Lach, M., *The Law of Outer Space: An Experience in*

should not be used and kept in the outer space<sup>27</sup>. Similarly, in 1986, Hurwitz wrote *The Legality of Space Militarization*<sup>28</sup> where he discussed the provisions in the international treaties pertaining to space-related activities particularly in relation to the practical aspects of the usage and the non-usage of outer space for military purposes<sup>29</sup>. In 1991, Henri Wassenbergh discussed the evolution of the regulations pertaining to outer space in his *Principles of Outer Space Law in Hindsight*<sup>30</sup>. He discussed the extension of roles and involvement of private enterprise in the space-related activities and how they have made an impact towards the need to have national space legislation that ‘develops within the context of the five main multilateral inter-governmental agreements concerning space law’. He did not however, discuss the provisions that should be incorporated into the national space legislation but instead emphasised the fact that the need to have national space legislation emerged from Article VI of the 1967 Outer Space Treaty, which states that ‘the provisions of the space treaty do not directly apply to ‘national activities’ carried out by non-governmental entities, but they are accepted under the responsibility of the ‘appropriate state’<sup>31</sup>. Thus Wassenbergh argued that due to the fact that a State has jurisdiction over ‘nationals activities’ that are carried out by non-governmental entities, therefore that State must have regulations to supervise the conduct. He also defined the word ‘national activities’ in the case of activities of non-governmental entities as referring to ‘the ‘nationality’ of the enterprise which deploys the activities, or the nationality of the persons who engage in space activities, but in any case that it referred to space activities carried out from a state’s territory, as that makes the state a ‘launching state’<sup>32</sup>. In the same year, Stephen Gorove discussed the evolution of the regulations pertaining to the legal issues and policies surrounding the usage of the outer space in his *Development in Space Law: Issues and Policies*<sup>33</sup>. In 1992, Hurwitz specifically concentrated on the liability of State in using and exploring the outer space and discussed the meaning of ‘launching state’ and the extent of a State’s liability in his *State Liability for Outer Space Activities in Accordance with the 1972 Convention on International*

*Liability for Damage Caused by Space Objects*<sup>34</sup>. In the same year, Masson-Zwaan discussed the similarities and differences between airspace and outer space in her *An aerospace plane: an object at the cross-roads between air and space law*<sup>35</sup>, where she argued that the new technology surrounding the making of the space plane has made the UN outer space treaties not up-to-date with the new technology development. In 1994, Bloomley discussed the relationship between outer space law and politics in *Law, Space and the Geographies of Power*<sup>36</sup>. He argued that States activities in the usage and the exploration of outer space are influenced by the policies and ideologies purported by a State<sup>37</sup>. In 1995, Mosteshae discussed the benefits of using and exploring the outer space and argued that States should use the outer space for purposes that would benefit humankind and how States should use the outcomes of their experiments in outer space in his *Research and Invention in Outer Space*<sup>38</sup>. In 1997, Cheng discussed the UN international space treaties in *Studies in International Space Law*<sup>39</sup>. In the same year, Crowther discussed the issues surrounding outer space activities and made some predictions about how activities would develop in the future in *Outlook on Space Law over the next 30 years*<sup>40</sup>. He argued that in order for the UN international space treaties to be consistent with the development of outer space activities and space technologies, the treaties must be amended so that they would not fall short of being able to regulate the space activities that were not previously in existence<sup>41</sup>. In 1998, Reynolds and Merges looked at the problems surrounding activities in outer space in respect of legal and policy aspects in *Outer Space: Problems of Law and Policy*<sup>42</sup>. In the same year, Bender specifically discussed the activities pertaining to satellites and the legal implications surrounding them in *Launching and*

<sup>27</sup> Gennadi, G., *Keep Space Weapon- Free*, (Moscow: Novosti Press Agency Publishing House, 1984).

<sup>28</sup> Hurwitz, B., *The Legality of Space Militarization*, (The Netherlands: Elsevier Science Publishers, 1986).

<sup>29</sup> Hurwitz, B., *The Legality of Space Militarization*, (The Netherlands: Elsevier Science Publishers, 1986).

<sup>30</sup> Wassenbergh, H. A., *Principles of Outer Space Law in Hindsight*, (Boston: Martinus Nijhoff Publishers, 1991).

<sup>31</sup> Wassenbergh, H. A., *Principles of Outer Space Law in Hindsight*, (Boston: Martinus Nijhoff Publishers, 1991).

<sup>32</sup> Wassenbergh, H. A., *Principles of Outer Space Law in Hindsight*, (Netherlands: Martinus Nijhoff Publishers, 1991) 22.

<sup>33</sup> Gorove, S., *Development in Space Law: Issues and Policies*, (Netherlands: Martinus Nijhoff Publishers, 1991).

<sup>34</sup> Hurwitz, B., *State Liability for Outer Space Activities in Accordance with the 1972 Convention on International Liability for Damage Caused by Space Objects*, (Netherlands: Martinus Nijhoff, 1992).

<sup>35</sup> Masson-Zwaan, T., ‘An aerospace plane: an object at the cross-roads between air and space law’, in Masson-Zwaan, T. (ed), *Air and Space Law: De Lege Ferenda: Essays in Honour of Henri A. Wassenbergh*, (Netherlands: Martinus Nijhoff Publishers, 1992).

<sup>36</sup> Bloomley, N. K., *Law, Space and the Geographies of Power*, (New York: Guildford Press, 1994).

<sup>37</sup> Bloomley, N. K., *Law, Space and the Geographies of Power*, (New York: Guildford Press, 1994).

<sup>38</sup> Mosteshae, S., *Research and Invention in Outer Space*, (Netherlands: Martinus Nijhoff Publishers, 1995).

<sup>39</sup> Cheng, B., *Studies in International Space Law*, (UK: Oxford University Press, 1997).

<sup>40</sup> Crowther, D., *Outlook on Space Law over the next 30 years*, (The Netherlands: Kluwer Law International, 1997).

<sup>41</sup> Crowther, D., *Outlook on Space Law over the next 30 years*, (The Netherlands: Kluwer Law International, 1997).

<sup>42</sup> Reynolds, G. H. and Merges, R. P., *Outer Space: Problems of Law and Policy*, (San Francisco: Westview Press, 1998).

*Operating Satellites: Legal Issues*<sup>43</sup>. In 1999, Diederiks-Verschoor discussed the basic principles relating to outer space in *An Introduction to Space Law*<sup>44</sup>. Although simple and very basic, nevertheless she further elaborated on the rule of 'non-appropriation' of the outer space and the celestial bodies<sup>45</sup>. In the same year Metcalf discussed the usage and the exploration on outer space in *Activities in Space - Appropriation or Use?*<sup>46</sup>, where he argued that although some States have placed their experimental structure or vehicle on celestial bodies, this does not mean that the States have appropriated any particular part of the celestial bodies<sup>47</sup>. In 1999, Nandasiri also discussed the relationship between the international space law and the UN in *International Space Law and the United Nations*<sup>48</sup>. As having the experience with working with the United Nations Office of Outer Space Affairs, he gave his insight into the historical perspective of the evolution of how and why the international space treaties were drafted, how States perceived these treaties, and why these treaties must be used to regulate the space-related activities of States<sup>49</sup>. In 2001, Kayser discussed the legal issues surrounding the launching of space objects in *Launching Space Objects: Issues of Liability and Future*<sup>50</sup>. In 2003, Haanappel wrote on the relationship between law and policy surrounding the air space and the outer space in *The Law and Policy of Air Space and Outer Space: A Comparative Approach*<sup>51</sup>. He commented that national space legislations which are enacted by States which are active in outer space activities are the result of the 1962 United Nations General Assembly Resolution on the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use

of Outer Space<sup>52</sup>, and the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies 1967 (1967 Outer Space Treaty)<sup>53</sup>, and therefore must be considered in the light of the rules contained in those instruments<sup>54</sup>. In 2005, Peterson discussed the international space treaties in *International Regimes for the Final Frontier*<sup>55</sup>. In 2007, Lyall and Larsen discussed issues of space law in *Space Law*<sup>56</sup>. In the same year, Goh discussed how States should settle their disputes when they concerned outer space activities in *Dispute Settlement in International Space Law: A Multi-Door Courthouse for Outer Space*<sup>57</sup>. She discussed the fact that, although the UN international space treaties have already provided the mechanism on how to settle the disputes, the mechanism must be enforced in order for them to be effective,<sup>58</sup>.

Apart from the general works that have been written on outer space law, some writers have concentrated on the outer space activities of a particular State or group of States. However, they do not specifically discuss the national space legislation of those States. For example, in 1992, Bourley wrote *Space Law and the European Space Agency*<sup>59</sup>, where he discussed the relationship between international space law and how it has influenced the space activities of the European Space Agency<sup>60</sup>. Similarly, in 1994 Roger and Vittorio also discussed on how the usage of international cooperation is beneficial to the European Space Agency in *International Cooperation in Space. The Example of the European Space*

<sup>43</sup> Bender, R., *Launching and Operating Satellites: Legal Issues*, (Netherlands: Martinus Nijhoff, 1998).

<sup>44</sup> Diederiks-Verschoor, I. H. P., *An Introduction to Space Law*, 2<sup>nd</sup> edition, (Netherlands: Kluwer Academic Publishers, 1999).

<sup>45</sup> Diederiks-Verschoor, I. H. P., *An Introduction to Space Law*, 2<sup>nd</sup> edition, (Netherlands: Kluwer Academic Publishers, 1999).

<sup>46</sup> Metcalf N. K., *Activities in Space - Appropriation or Use?*, (Uppsala: Iustus Forlog, 1999).

<sup>47</sup> Metcalf N. K., *Activities in Space - Appropriation or Use?*, (Uppsala: Iustus Forlog, 1999).

<sup>48</sup> Jasentuliyana, N., *United Nations Conference on the Exploration and Peaceful Uses of Outer Space: International Space Law and the United Nations*, (Netherlands: Kluwer Law International, 1999).

<sup>49</sup> Jasentuliyana, N., *United Nations Conference on the Exploration and Peaceful Uses of Outer Space: International Space Law and the United Nations*, (Netherlands: Kluwer Law International, 1999).

<sup>50</sup> Kayser, V., *Launching Space Objects: Issues of Liability and Future*, (Netherlands: Kluwer Academic Publishers, 2001).

<sup>51</sup> Haanappel, P. P. C., *The Law and Policy of Air Space and Outer Space: A Comparative Approach*, (Netherlands: Kluwer Law International, 2003).

<sup>52</sup> General Assembly Resolution 1962 (XVIII) of 13 December 1963.

<sup>53</sup> 610 UNTS 205, adopted by the General Assembly in its resolution 2222 (XXI) on 19 December 1966, opened for signature on 27 January 1967, entered into force on 10 October 1967. As at 1 January 2008, this Treaty has been ratified by 99 States and signed by 26 others.

<sup>54</sup> Haanappel, P. P. C., *The Law and Policy of Air Space and Outer Space A Comparative Approach*, (Netherlands: Kluwer Law International, 2003) 10.

<sup>55</sup> Peterson, M.J., *International Regimes for the Final Frontier*, (USA: State University of New York Press, 2005).

<sup>56</sup> Lyall, F. and Larsen, P. B., *Space Law*, (England: Ashgate Publishing Limited, 2007)

<sup>57</sup> Goh, G. M., *Dispute Settlement in International Space Law: A Multi-Door Courthouse for Outer Space*, (Boston: Martinus Nijhoff Publishers, 2007).

<sup>58</sup> Jasentuliyana, N., *United Nations Conference on the Exploration and Peaceful Uses of Outer Space: International Space Law and the United Nations*, (Netherlands: Kluwer Law International, 1999).

<sup>59</sup> Bourley, M., 'Space Law and the European Space Agency' in N. Jasentuliyana (ed.), *Space Law, Development and Scope*, (New York: Praeger, 1992).

<sup>60</sup> Bourley, M., 'Space Law and the European Space Agency' in N. Jasentuliyana (ed.), *Space Law, Development and Scope*, (New York: Praeger, 1992).

Agency<sup>61</sup>. Madders also looked at the legal aspects surrounding the space-related activities of States in Europe and identified the main participants in space-related activities in *A New Force at a new Frontier: Europe's Development in Space Field in the Light of its main actors, policies, law and activities from beginning up to the present*<sup>62</sup>. He argued that one of the reasons why some European States are more active in space-related activities than others is because of the policy and ideology that they have when choosing which activity they want to participate in or otherwise<sup>63</sup>. Steven on the other hand wrote on the space activities of the State of Japan in *Japan's space program: a fork in the road?*<sup>64</sup>, where he discussed the evolution of Japan's space activities and argued that although Japan is very advanced in its space technology, the few launching failures that Japan has suffered have affected Japan's confidence in its space industry<sup>65</sup>.

Treatments of national space legislation have nevertheless been written by some writers. There are four writers that can be identified as having contributed in this field. The first was Nathan Goldman who in 1996 discussed the relationship between the international space treaties and national space legislation in *American Space Law: International and Domestic*<sup>66</sup>. He discussed the juridical status of the American national space legislation under international law and some administrative problems in enforcing the regulation. His discussion, however, is mainly concerned with the relationship between American national space legislation and the international space treaties. He does not discuss other States' national space legislation and thus there is no discussion on the basic common features of national space legislation particularly on appropriate regulatory framework for developed countries<sup>67</sup>. In 1998, the second writer, Frans G. von der Dunk wrote *Private Enterprise and Public Interest in the European 'Spacescape': Towards Harmonized National Space Legislation for Private Space Activities in Europe*<sup>68</sup>

based on his PhD thesis of the same title. He discussed the relationship between regulating the governmental space activities and private space activities, where he argued that because of clear and logical legal regulation is already in the interest of private parties, the regulation of the governmental space activities and private space activities are thus not contradictory. He also acknowledges that because private participation in space alleviates financial burdens of governments, the public interest is served by allowing private enterprise to undertake space activities<sup>69</sup>. Although he discussed the advantages of having a harmonised national space legislation for private space activities in Europe, he does not discuss in detail the key components that should be incorporated into the national space legislation<sup>70</sup>. However, in 2004, Julian Hermida provide the most detailed and thoughtful analysis of how national law should implement key elements of international space law when he wrote *Legal Basis for a National Space Legislation*<sup>71</sup>. He dealt quite thoroughly with questions relating to the common features of the national space legislation. Unlike Von de Dunk who mainly focused on the harmonisation of national space legislation amongst the European countries, Hermida examined and analysed the national space legislation of both European and non-European States, including Sweden, Australia and the United States of America, and focused especially on Argentina's national space legislation. He did not however examine any national law and legislation of Malaysia concerning its space-related activities. Hermida's writings however had a significant impact on the idea of the common features that all national space legislation should contain when he proposed that 'national space legislation must be comprehensive in scope and comprise the regulation of all space activities, clearly identify its space policy objectives which conform to international obligations, provides a straightforward licensing regime, a clear and reasonable continuing supervision regime for all non-governmental entities to verify their compliance with international standards, and a transparent procedure for the recording of all space objects'<sup>72</sup>. He also recommended that the existing national space legislation of other countries could be used as examples when enacting national space legislation. He maintained that 'even if States have established their

<sup>61</sup> Roger, M. B. and Vittorio, M., *International Cooperation in Space. The Example of the European Space Agency*, (Harvard: Harvard University Press, 1994).

<sup>62</sup> Madders, K., *A New Force at a new Frontier: Europe's Development in Space Field in the Light of its main actors, policies, law and activities from beginning up to the present*, (Cambridge: Cambridge University Press, 1999).

<sup>63</sup> Madders, K., *A New Force at a new Frontier: Europe's Development in Space Field in the Light of its main actors, policies, law and activities from beginning up to the present*, (Cambridge: Cambridge University Press, 1999).

<sup>64</sup> Steven, B., 'Japan's space program: a fork in the road?', (Pittsburgh: RAND Corporation, 2005).

<sup>65</sup> Steven, B., 'Japan's space program: a fork in the road?', (Pittsburgh: RAND Corporation, 2005).

<sup>66</sup> Goldman, N. C., *American Space Law: International and Domestic*, (California: Univelt Publication, 1996).

<sup>67</sup> Goldman, N. C., *American Space Law: International and Domestic*, (California: Univelt Publication, 1996).

<sup>68</sup> Von der Dunk, F. G., *Private Enterprise and Public Interest in the European 'Spacescape': Towards Harmonized*

*National Space Legislation for Private Space Activities in Europe* (Leiden: Leiden University, 1998).

<sup>69</sup> Von der Dunk, F. G., *Private Enterprise and Public Interest in the European 'Spacescape': Towards Harmonized National Space Legislation for Private Space Activities in Europe* (Leiden: Leiden University, 1998) 2.

<sup>70</sup> Von der Dunk, F. G., *Private Enterprise and Public Interest in the European 'Spacescape': Towards Harmonized National Space Legislation for Private Space Activities in Europe* (Leiden: Leiden University, 1998).

<sup>71</sup> Hermida, J., *Legal Basis for a National Space Legislation*, (Netherlands: Kluwer Academic Publishers, 2004).

<sup>72</sup> Hermida, J., *Legal Basis for a National Space Legislation*, (The Netherlands: Kluwer Academic Publications, 2004) 255-227.

domestic norms differently as a consequence of their own legal and political individual characteristic there are common denominators in all these domestic jurisdiction'. Specifically, he held that 'all countries, particularly those actively involved in the pursuit of space activities, have implemented an authorization system, one of which pillars is the state's assurance that the activities will not entail significant safety perils'. Additionally, with regard to domestic space launch legislation he postulated that 'any legal framework aimed at governing launch services must necessarily address the issue of the allocation of risks and assignment of liability and reallocate these risks according to the country's space policy objectives'<sup>73</sup>. He articulated that 'the common denominators used by all States which enacted the national space legislation should constitute the basis for the adoption of future national frameworks of space activities in other countries'<sup>74</sup>. Basing on the content of international law, he thus recommended three compulsory 'building block' provisions that should be incorporated into national space legislation, namely regulations on the authorisation and supervision of space activities, regulations on the registration of space objects, and indemnification provisions<sup>75</sup>. On how the national space legislation can be successfully implemented, he suggested that States need to provide a mechanism to staff the space agencies with qualified individuals thus making them equipped with suitable manpower and human resources who are knowledgeable in the area of outer space law<sup>76</sup>. Following Hermida, Michael Gerhard, in his writing entitled *National Space Legislation*, published in 2005<sup>77</sup>, wrote on the two research projects which he was involved in that were jointly carried out by the Institute of Air and Space Law of the University of Cologne and the German Aerospace Centre (DLR), i.e. 'Project 2001- Legal Framework for the Commercial Used of Outer Space' and 'Project 2001 Plus – Global and European Challenges for Air and Space Law at the Edge of the 21<sup>st</sup> Century', which discussed, inter alia, the issue of national space legislation<sup>78</sup>. Based on the outcome of the projects, he concluded that national space legislation should have provisions on authorisation and supervision, registration and indemnification and any other additional related aspects, for example regulation of insurance law and transportation regulation. He argued that the three building blocks

(authorisation and supervision, indemnification and registration of space objects), are based on the international obligations found in the 1967 Outer Space Treaty in particular Article VI (2) that provides that the activities of non-governmental entities shall require authorisation and continuous supervision by the appropriate State Party to the Treaty, Article VII that provides that States are internationally liable for damage caused by objects launched into outer space by themselves and by private entities, and Article VIII that provides that States are bound to register space objects within national registry. This registration obligation, he added, can also be found under Article II of the 1975 Registration Convention<sup>79</sup>. At this juncture, it can be seen that although there are four writers who have written on national space legislation, only Hermida and Gerhard have actually discussed with questions relating to the common features of the national space legislation. As such, from the recommendations that were made by Hermida and Gerhard, it can be concluded that they confirm that national space legislation should have compulsory regulations on licensing regime, regulations on registrations and regulations on liability. The other suggested additional provisions are persuasive on practical grounds, but it is argued that the inclusion of these additional provisions greatly depends on the space activities that a respective state would like to undertake or has undertaken. Therefore, the inclusion of the additional persuasive provisions is quite subjective in the sense that when a provision is incorporated into a particular State's national space legislation it does not necessarily mean that it would be suitable to be incorporated into another state's national space legislation. From the nature of the works that have been written, it can be deduced that book writings referring to particular States starts late in 1980s and resumes again after the mid 1990s, and the writings about national space legislation starts to pick up after the year 2000. This shows that writers have become increasingly aware of the need to have a national space legislation to conduct space-related activities.

### 3. Articles in journals

In addition to books, there have been journal articles on outer space law written by many writers. In the early years, however, most article writers written on the general legal aspects of outer space. Thus, in 1958, Pitman wrote 'International law of outer space' for the *American Journal of International Law*<sup>80</sup>. He discussed the delimitation of outer space and argued that outer space is the space outside the range of 'aircraft' or balloon flight, i.e. above thirty miles in elevation<sup>81</sup>. Kartha wrote 'Some legal problems concerning

<sup>73</sup> Hermida, J., *Legal Basis for a National Space Legislation*, (The Netherlands: Kluwer Academic Publications, 2004) 226.

<sup>74</sup> Hermida, J., *Legal Basis for a National Space Legislation*, (The Netherlands: Kluwer Academic Publications, 2004) 226.

<sup>75</sup> Hermida, J., *Legal Basis for a National Space Legislation*, (The Netherlands: Kluwer Academic Publications, 2004) 228.

<sup>76</sup> Hermida, J., *Legal Basis for a National Space Legislation*, (The Netherlands: Kluwer Academic Publications, 2004) 228.

<sup>77</sup> Gerhard M., 'National Space Legislation', in Marietta Benko and Kai-Uwe Schrogl (ed.), *Essential Air and Space Law*, (Netherlands: Eleven International Publishing, 2005).

<sup>78</sup> Gerhard M., 'National Space Legislation', in Marietta Benko and Kai-Uwe Schrogl (ed.), *Essential Air and Space Law*, (Netherlands: Eleven International Publishing, 2005).

<sup>79</sup> Gerhard M., 'National Space Legislation', in Marietta Benko and Kai-Uwe Schrogl (ed.), *Essential Air and Space Law*, (Netherlands: Eleven International Publishing, 2005) 76.

<sup>80</sup> Potter, P.B., 'International law of outer space', (1958) 52 *American Journal of International Law* 305.

<sup>81</sup> Potter, P.B., 'International law of outer space', (1958) 52 *American Journal of International Law* 305.

outer space' for the *Indian Journal of International Law*<sup>82</sup>, where he discussed the legal problems surrounding the usage and exploration of outer space. Hall wrote 'Rescue and return of astronauts on earth and in outer space' for the *American Journal of International Law*<sup>83</sup> where he discussed the protection of astronauts as the envoy of humankind in outer space. He argued that astronauts must be assisted and protected at all times irrespective of the political ideology of the States that they represent<sup>84</sup>. In 1979, Gorove discussed on the status of the geostationary orbit in 'The geostationary orbit: Issues of law and policy' for the *American Journal of International Law*<sup>85</sup>, where he discussed the Bogotá Declaration<sup>86</sup>, which emphasises that outer space, including the moon and other celestial bodies, which include the geostationary orbit, is not subject to any national appropriation by claim of sovereignty, by means of use or occupation, or by any other means<sup>87</sup>. In 1980, Kopal wrote 'The question of defining outer space' for *Journal of Space Law*<sup>88</sup>. He discussed the need to define outer space and the benefits that would arise from defining it and described the problem that shall arise if there was no precise definition<sup>89</sup>. Therefore, from the writing of articles in this category, it can be seen that the writers only discussed on the general legal aspects of outer space without further discussing on the elements of national legislation.

Starting from the 1980s, article writers have significantly developed the interpretation of the international treaties on outer space law. A particularly significant contribution was made by Christol when he wrote 'International liability for damage caused by space objects' in the *American Journal of*

*International Law*<sup>90</sup> where he discussed States' liability for their space objects that have caused damage to other States. He described the Convention on International Liability for Damage Caused by Space Objects 1972 in particular, where he explained the rights of States which suffered from damage caused by space objects and the responsibilities of States who inflicted the damage<sup>91</sup>. In 1983, Cheng wrote 'The legal status of outer space and relevant issues: Delimitation of outer space and definition of peaceful use' in *Journal of Space Law*<sup>92</sup>. He discussed the significance of defining outer space and the meaning and interpretation of the word 'peaceful use' of outer space as used by the five UN space treaties. He argued that in deciding the actual meaning of the word, States' are bound by the principle that usage and exploration of outer space and celestial bodies must not result in causing harm and damage to other States<sup>93</sup>. In 1984, Galloway took a more direct interest in the question of the functions of international institution when he wrote 'International institutions to ensure peaceful uses of outer space' in *Annals of Air & Space Law*<sup>94</sup>. He discussed the purpose of international institutions in safeguarding outer space from misuse by States and argued that States must respect the decisions made by them in their attempt to ensure that outer space is used only for peaceful purposes, as enshrined by the UN space treaties, and not otherwise<sup>95</sup>. In 1993, Masson-Zwaan wrote 'The Martin Marietta Case-On how to safeguard private commercial space activities' in *Air & Space Law*<sup>96</sup>. She discussed on the evolution of private entities participation in space activities and maintained that States are internationally liable for the activities of their private entities. Elaborating on the responsibilities of private entities in their space activities, she argued that although private entities are allowed to use and explore outer space, they must nevertheless ensure that their activities must not resulted in their States breaching their obligations imposed

<sup>82</sup> Kartha, P. K., 'Some legal problems concerning outer space', (1963) 3 *Indian Journal of International Law* 1.

<sup>83</sup> Hall, R. C., 'Rescue and return of astronauts on earth and in outer space', (1969) *American Journal of International Law* 197.

<sup>84</sup> Hall, R. C., 'Rescue and return of astronauts on earth and in outer space', (1969) *American Journal of International Law* 197.

<sup>85</sup> Gorove, S., 'The geostationary orbit: Issues of law and policy', (1979) 73 (3) *American Journal of International Law* 445.

<sup>86</sup> Also known as 'Declaration of the First Meeting of Equatorial Countries'. Adopted by Colombia, Ecuador, Indonesia, Congo, Kenya, Uganda and Zaire on 3 December 1976.

<sup>87</sup> Also known as 'Declaration of the First Meeting of Equatorial Countries'. Adopted by Colombia, Ecuador, Indonesia, Congo, Kenya, Uganda and Zaire on 3 December 1976.

<sup>88</sup> Kopal, V., 'The question of defining outer space', (1980) 8 (2) *Journal of Space Law* 168.

<sup>89</sup> Kopal, V., 'The question of defining outer space', (1980) 8 (2) *Journal of Space Law* 168.

<sup>90</sup> Christol C Q, 'International liability for damage caused by space objects', (1980) 74 *American Journal of International Law* 346.

<sup>91</sup> Christol C Q, 'International liability for damage caused by space objects', (1980) 74 *American Journal of International Law* 346.

<sup>92</sup> Cheng, B., 'The legal status of outer space and relevant issues: Delimitation of outer space and definition of peaceful use', (1983) 11 *Journal of Space Law* 89.

<sup>93</sup> Cheng, B., 'The legal status of outer space and relevant issues: Delimitation of outer space and definition of peaceful use', (1983) 11 *Journal of Space Law* 89.

<sup>94</sup> Galloway, E., 'International institutions to ensure peaceful uses of outer space', (1984) IX *Annals of Air & Space Law* 304.

<sup>95</sup> Galloway, E., 'International institutions to ensure peaceful uses of outer space', (1984) IX *Annals of Air & Space Law* 304.

<sup>96</sup> Masson-Zwaan, T. L., 'The Martin Marietta Case-On how to safeguard private commercial space activities', (1993) XVIII (1) *Air & Space Law* 16.

upon them by the five UN space treaties<sup>97</sup>. Cheng on the other hand was interested in the launching activities specifically when he wrote ‘International responsibility and liability for launch activities’ for *Air & Space Law*<sup>98</sup>. He discussed the Convention on International Liability for Damage Caused by Space Objects 1972 and maintained that States parties have the responsibility to ensure that their launching activities is in accordance with the Convention and if accident happens, they will be liable against the injured parties<sup>99</sup>. In 2004, Zhao wrote ‘The 1972 Liability Convention: time for revision?’ in *Space Policy*<sup>100</sup>. He questioned the effectiveness of the Convention and argued that although the Convention provides for the basis for responsibility and liability concerning outer space activities, nevertheless, because of the advancement in space technology, the Convention should be revised accordingly<sup>101</sup>. In 2005, Viikari wrote ‘Time is of the essence: Making space law more effective’ for *Space Policy*<sup>102</sup>. She discussed the UN space treaties and commented that international treaty negotiations in general tend to be time consuming. Pointing to the space law negotiations in particular, she argued that in order for space law to be more effective, they must be relevant to the existing time. As such, because space activities is developing very quickly, she advised that negotiations for a revised space law should be made quickly so that it would be able to cater for more sophisticated space activities<sup>103</sup>. In 2006, Porras wrote ‘The “Common Heritage” of outer space: Equal benefits for most of mankind’ for *California Western International Law Journal*<sup>104</sup>. He elaborated the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies 1979 and maintained that the use and exploration of the moon must be for the purpose of benefiting all States irrespective of their economic background. Discussing on the term ‘common heritage’, he recognised that many States are not agreeable to its usage and its definition, thus made a suggestion on how to overcome the problem<sup>105</sup>. In

<sup>97</sup> Masson-Zwaan, T. L., ‘The Martin Marietta Case-On how to safeguard private commercial space activities’, (1993) XVIII (1) *Air & Space Law* 16.

<sup>98</sup> Cheng, B., ‘International responsibility and liability for launch activities’, (1995) XX (6) *Air & Space Law* 300.

<sup>99</sup> Cheng, B., ‘International responsibility and liability for launch activities’, (1995) XX (6) *Air & Space Law* 300.

<sup>100</sup> Zhao, Y., ‘The 1972 Liability Convention: time for revision?’, (2004) 20 (2) *Space Policy* 117.

<sup>101</sup> Zhao, Y., ‘The 1972 Liability Convention: time for revision?’, (2004) 20 (2) *Space Policy* 117.

<sup>102</sup> Viikari, L., ‘Viewpoint: Time is of the essence: Making space law more effective’, (2005) 21 *Space Policy* 1.

<sup>103</sup> Viikari, L., ‘Viewpoint: Time is of the essence: Making space law more effective’, (2005) 21 *Space Policy* 1.

<sup>104</sup> Porras, D. A., ‘The “Common Heritage” of outer space: Equal benefits for most of mankind’, (2006) 37 (1) *California Western International Law Journal* 143.

<sup>105</sup> Porras, D. A., ‘The “Common Heritage” of outer space: Equal benefits for most of mankind’, (2006) 37 (1) *California Western International Law Journal* 143.

2007, Ma took a direct interest in international co-operation amongst States in their space activities when he wrote ‘Statement on international co-operation in the peaceful uses of outer space’ for *Chinese Journal of International Law*<sup>106</sup>. He discussed the effectiveness of the UN space treaties and argued that States must co-operate with one another in their space activities so that they could maximise their resources and hence getting greater outcome<sup>107</sup>. Therefore, from the writing of articles in this category, it can be seen that writers only elaborated and developed the interpretation of the international treaties on outer space law without further discussing the national legislation of States.

In addition to the above articles, there are also journal articles that are written specifically on space-related issues concerning particular State. However, they did not analyse the national legislation of these States when discussing the relevant legal issues relating to their activities in outer space. Thus, in 1989, Saito wrote ‘Japan's space policy background and outlook’ for *Space Policy*<sup>108</sup> where he gave an insight into the legal and political aspect on the usages and explorations of the outer space that are undertaken by Japan<sup>109</sup>. In 1992, Yoshida also discussed on Japan’s situation in regards of its space activities when he wrote ‘The meaning of Japan’s space commercialization efforts’ for *Space Policy*<sup>110</sup>. He discussed on the development of space technology in Japan and the implications of commercialisation of space activities towards the politics and economic development of Japan<sup>111</sup>. In 2004, Freeland wrote ‘When laws are not enough – The stalled development of an Australian space launch industry’ for *University of Western Sydney Law Review*<sup>112</sup>.

He described the space activities in Australia, in particular the launching industry and argued that Australia could developed itself further in this area if all parties concerned are aware about its benefit and make more effort in establishing Australia’s reputation as a launching State<sup>113</sup>. Verheugen on the other hand was interested in the space activities of

<sup>106</sup> Ma, X., ‘Statement on international co-operation in the peaceful uses of outer space’, (2007) 6(2) *Chinese Journal of International Law* 507.

<sup>107</sup> Ma, X., ‘Statement on international co-operation in the peaceful uses of outer space’, (2007) 6(2) *Chinese Journal of International Law* 507.

<sup>108</sup> Saito, S., ‘Japan's space policy background and outlook’, (1989) 5 (3) *Space Policy* 193.

<sup>109</sup> Saito, S., ‘Japan's space policy background and outlook’, (1989) 5 (3) *Space Policy* 193.

<sup>110</sup> Yoshida, H., ‘The meaning of Japan’s space commercialization efforts’, (1992) 8 *Space Policy* 325.

<sup>111</sup> Yoshida, H., ‘The meaning of Japan’s space commercialization efforts’, (1992) 8 *Space Policy* 325.

<sup>112</sup> Freeland, S., ‘When laws are not enough – The stalled development of an Australian space launch industry’, [2004] *University of Western Sydney Law Review* 4.

<sup>113</sup> Freeland, S., ‘When laws are not enough – The stalled development of an Australian space launch industry’, [2004] *University of Western Sydney Law Review* 4.

European countries when he wrote 'Europe's space plans and opportunities for cooperation' for *Space Policy*<sup>114</sup>. Elaborating on the space activities of the European countries, he recognised the need for European countries to co-operate with one another since they will benefit more in space activities when they do so<sup>115</sup>. In 2006, Sadeh wrote 'Management dynamics of NASA's human spaceflight programs' for *Space Policy*<sup>116</sup>. He discussed the administration of NASA and the future of its human spaceflight programme. Recognising the benefits of the programme, he commented that it would be more successful if the administration of NASA were improved<sup>117</sup>. In 2007, Spall wrote 'Creating a UK human spaceflight capability: A modest proposal' for *Space Policy*<sup>116</sup>. He described the space activities of the UK and argued that UK would benefit more if it includes a human spaceflight programme as one of its national space activities. Acknowledging the differences in opinion on the necessity of such programme, he maintained that due to the rapid development of space technology, the human spaceflight programme would be to the advantage of the UK<sup>117</sup>. In 2007, Murthi, Gopalakrishnan and Datta wrote 'Legal environment for space activities' for *Current Science*<sup>118</sup>. They discussed the development of space policies and activities of India and argued that India would benefit more from its space activities if it were to have national space legislation<sup>119</sup>. Noichim on the hand was interested in the space activities of the ASEAN countries when he wrote 'Promoting ASEAN space cooperation' for *Space Policy*<sup>120</sup>. He elaborated the space activities of ASEAN countries and argued the importance and benefits of international co-operation amongst them in pursuing in their space activities<sup>121</sup>. Therefore, from the writing of articles in this category, it can be seen that writers only discussed the space-related issues of States concerned, without further discussing the national space legislation of those States.

Treatments of national space legislation have nevertheless been written by some writers. There are eight writers that can be identified as having contributed in this field. In 1981,

<sup>114</sup> Verheugen, G., 'Europe's space plans and opportunities for cooperation', (2005) 21 *Space Policy* 93.

<sup>115</sup> Verheugen, G., 'Europe's space plans and opportunities for cooperation', (2005) 21 *Space Policy* 93.

<sup>116</sup> Spall, N., 'Creating a UK human spaceflight capability: A modest proposal', (2007) 23 *Space Policy* 150.

<sup>117</sup> Spall, N., 'Creating a UK human spaceflight capability: A modest proposal', (2007) 23 *Space Policy* 150.

<sup>118</sup> Murthi, K. R. S., Gopalakrishnan, V. and Datta, P. S., 'Legal environment for space activities', (2007) 93 (12) *Current Science* 1823.

<sup>119</sup> Murthi, K. R. S., Gopalakrishnan, V. and Datta, P. S., 'Legal environment for space activities', (2007) 93 (12) *Current Science* 1823.

<sup>120</sup> Noichim, C., 'Promoting ASEAN space cooperation', (2008) 24 (1) *Space Policy* 10.

<sup>121</sup> Noichim, C., 'Promoting ASEAN space cooperation', (2008) 24 (1) *Space Policy* 10.

Vereshchetin wrote 'International space law and domestic law: problems of interrelations' for *Journal of Space Law*<sup>122</sup>. He argued that national space legislation which was enacted by States active in outer space activities are the result of the 1962 United Nations General Assembly Resolution on the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, and the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies 1967 (1967 Outer Space Treaty), and therefore must be considered in the light of the rules<sup>123</sup>. In 1989, Meredith wrote 'A comparative analysis of United States domestic licensing regimes for private commercial space activities' for *International Institute of Space Law*<sup>124</sup>. He discussed the national space legislation of the USA pertaining to its commercial space activities and made comparison between them in an attempt to find their effectiveness. He wrote on the similarities and difference between them and articulated that in order for the legislation to be beneficial and effective, they must incorporate provisions that are relevant to the activities<sup>125</sup>. Lyall on the other hand was interested in the UK's national space legislation when he wrote 'UK Space Law' for *International Institute of Space Law*<sup>126</sup>. He discussed the UK's national space legislation, the Outer Space Act 1986, and gave his interpretation of the provisions contained therein. On issue regarding its usefulness, he recognised that the legislation is an important tool to regulate the space activities of private entities who are subjected to the UK's jurisdiction and also maintained that the legislation is beneficial to the UK government because it protects the government through the indemnification provision provided by the legislation<sup>127</sup>. In 2002, Frans G von der Dunk and Sergei Negoda wrote 'Ukrainian national space law from an international perspective' for *Space Policy*<sup>128</sup>. They discussed the political historical events that lead towards the development of Ukraine national space legislation and argued that the main reason for the Ukraine to have national space legislation is for the

<sup>122</sup> Vereshchetin, V. S., 'International space law and domestic law: problems of interrelations', (1981) 9 *Journal of Space Law* 31.

<sup>123</sup> Vereshchetin, V. S., 'International space law and domestic law: problems of interrelations', (1981) 9 *Journal of Space Law* 31.

<sup>124</sup> Meredith, P., 'A comparative analysis of United States domestic licensing regimes for private commercial space activities', (1989) 32 *International Institute of Space Law* 373.

<sup>125</sup> Meredith, P., 'A comparative analysis of United States domestic licensing regimes for private commercial space activities', (1989) 32 *International Institute of Space Law* 373.

<sup>126</sup> Lyall, F., 'UK Space Law', (1992) 35 *International Institute of Space Law* 386.

<sup>127</sup> Lyall, F., 'UK Space Law', (1992) 35 *International Institute of Space Law* 386.

<sup>128</sup> Von der Dunk, F. G., and Negoda, S.A., 'Ukrainian national space law from an international perspective', (2002) 18 (1) *Space Policy* 15.

purpose of demonstrating a responsible attitude to the international security system. They maintained that through having national space legislation, Ukraine has harmonised its legislation with the international space law and thus able to provide clear guidelines for the legal regulation of its commercial space activities<sup>129</sup>. At this juncture, it can be seen that writers under this category discussed the national space legislation. However, their discussion are mainly concerned with the description or elaboration of the national space legislation itself without further discussing the basic common features of national space legislation. Lyall, for example, although he discussed the national space legislation of the UK, did not discuss the key components that should be incorporated into the national space legislation. As for Frans G von der Dunk and Sergei Negoda, although they discussed the Ukraine national space legislation and even pointed out its strength in its potential ability to provide clear guidelines for its commercial space activities, they did not discuss the common basic elements that should contain in national space legislation nor make any suggestion as to whether the provisions in the Ukraine space legislation is suitable to be adopted by other States. Therefore, it was not possible to see the actual strengths or weaknesses of the existing laws with regard to their implementation of the key international obligations placed upon these States under international law. However, in 2001, Reif provide the most detailed and thoughtful analysis of how national law should implement key elements of international space law when she made a report entitled 'Shaping a legal framework for the commercial use of outer space: recommendations and conclusions from Project 2001' for *Space Policy*<sup>130</sup>. In the article, she reported that during the workshop of the Project 2001, recommendations have been made by experts in space law regarding the provisions that should be incorporated into national space legislation. She reported that during the projects, basing on the content of international law, experts have recommended three compulsory 'building block' provisions that should be incorporated into national space legislation, namely the regulations on the authorisation and supervision of space activities, regulations on the registration of space objects, and indemnification provisions<sup>131</sup>. In addition to these recommendations, experts have recommended that national

space legislation should also be enacted in accordance to a State's international obligations<sup>132</sup>. On the methodology of national space legislation, Reif also reported that the outcome of the project also recommended that the existing national space legislation of other countries could be used as examples when enacting the national space legislation<sup>133</sup>. In addition to Reif, Hobe and Neuman also provide a thoughtful analysis of how national space law should implement elements of international space law when they made a report entitled 'Report on the Global and European challenges for space law' for *Space Policy*<sup>134</sup>. In the article, they reported that during the International symposium on 'Global and European Challenges for Air and Space Law at the Edge of the 21st Century' which took place in 2005, discussions and recommendations have been made by experts in air and space law regarding the importance of national space laws and common provisions that should be incorporated into them, especially among the European countries. They confirmed that national space legislation has become ever more important in the light of privatisation because even if the private entities were the ones to cause damage through their space activities, their States would still be liable internationally, irrespective of whether or not domestic space legislation is in place. Thus they argued that by having national space legislation, States concerned could seek for indemnification from private entities that caused the damage. In the attempt to create national space legislation, they maintained that the international and national space legislation should be closely harmonised. However, recognising the fact that conflict would occur among private entities, especially on issues pertaining to the level of competency of States in dealing and regulating space-related activities, they proposed that in addition to suggesting the European countries' national space laws to be closely harmonised with international legal standards, the national space laws should also be harmonised amongst these countries. In finding for common provisions that should be incorporated into national space laws, they deliberated on the question of whether other laws concerning hazardous activities, in particular air-flight activities, could be made as a model for legislating space law. Drawing analogies with air-flight activities and after finding similar features between air law and space law, they therefore confirmed that air law is relevant especially on provisions concerning definitions of outer space, registration and liability<sup>135</sup>. Therefore, from the

<sup>129</sup> Von der Dunk, F. G., and Negoda, S.A., 'Ukrainian national space law from an international perspective', (2002) 18 (1) *Space Policy* 15.

<sup>130</sup> Reif, S. U., 'Report, Shaping a legal framework for the commercial use of outer space: recommendations and conclusions from Project 2001', (2002) 18 *Space Policy* 157.

<sup>131</sup> Reif, S. U., 'Report: Shaping a legal framework for the commercial use of outer space: recommendations and conclusions from Project 2001', (2002) 18 *Space Policy* 157. See also United Nations, Report on the United Nations/Nigeria Workshop on Space Law on the theme 'Meeting international obligations and addressing domestic needs', Abuja, 21-24 November 2005, note 3. United Nations Office of Outer Space Affairs document number A/AC.105/86.

<sup>132</sup> Reif, S. U., 'Report: Shaping a legal framework for the commercial use of outer space: recommendations and conclusions from Project 2001', (2002) 18 *Space Policy* 157.

<sup>133</sup> Reif, S. U., 'Report: Shaping a legal framework for the commercial use of outer space: recommendations and conclusions from Project 2001', (2002) 18 *Space Policy* 157.

<sup>134</sup> Hobe, S., and Neumann, J., Report on the Global and European challenges for space law at the edge of the 21st century, (2005) 21 *Space Policy* 313.

<sup>135</sup> Hobe, S., and Neumann, J., Report on the Global and European challenges for space law at the edge of the 21st century, (2005) 21 *Space Policy* 313.

writings under this category, it can be seen that although there are eight writers who have written on national space legislation, only Reif, Hobe and Neumann have actually written on questions relating to the common features of the national space legislation. Through their report, it can be concluded that national space legislation should have compulsory regulations on licensing regime, regulations on registrations and regulations on liability. More importantly, national space legislation should be enacted in accordance to a State's international obligations, and in drafting up the national space legislation, the existing national space legislation of other countries could be used as examples.

As for the literature about outer space law written by Malaysian authors, only two articles have been written on outer space law. However, although these articles have been written from the Malaysian perspective, they are merely discussions of the relationship between Malaysia and the law of outer space, and the law of outer space *per se*, but not on Malaysia's national space legislation itself. Thus, Tunku<sup>136</sup> discussed the issue pertaining to the domain of space law, its definition, Malaysia's rights and responsibilities over activities in outer space, and made a recommendation for Malaysia to have national space legislation<sup>137</sup>. However, in her article, she did not have any discussion about Malaysia's national space legislation itself. Munir and Mohd Yasin<sup>138</sup> on the other hand discussed the issue pertaining to the provisions on space debris and their effect on the environment in outer space and on earth, the definition of space debris, facts and figures of space debris that are in orbit, the effect of space debris, some proposed solutions and recommendations at both the national and international level on how to reduce space debris, and the adoption of laws and policies with respect to reduction of space debris and protection of the environment from damage caused by space debris by the intergovernmental organisations<sup>139</sup>. However, in their article, the writers made no discussion about Malaysia's national space legislation itself or the relationship between space debris and Malaysia. Therefore, as far as the literature review of the Malaysia's national space legislation is concerned, there is nothing that has been written pertaining to this subject matter.

#### 4. Conclusion

As a conclusion, from the review of relevant literature about how national law should implement international space law, we can conclude that there are certain key elements that one would anticipate finding in an outer space regulatory

<sup>136</sup> Tunku, I. M., 'Malaysia and the law of outer space', (2004) 2 *Universiti Teknologi MARA Law Review* 198.

<sup>137</sup> Tunku, I. M., 'Malaysia and the law of outer space', (2004) 2 *Universiti Teknologi MARA Law Review* 198.

<sup>138</sup> Munir, A. B., and Mohd Yasin, S.H., 'Space debris: legal and policy implications', (1996) *Malaysian Student Law Journal* 10.

<sup>139</sup> Munir, A. B., and Mohd Yasin, S.H., 'Space debris: legal and policy implications', (1996) *Malaysian Student Law Journal* 10.

framework. They can be referred to as 'compulsory elements', and they are:

1. Regulations on the authorisation and supervision of space activities,
2. Regulations on the registration of space objects and
3. Indemnification provisions.

It is also apparent that implementation of space law should give rise to national space legislation which has certain desirable characteristics. Thus national space legislation should:

1. Be comprehensive in scope and comprise the regulation of all space activities,
2. Clearly identify space policy objectives which conform to international obligations,
3. and
4. Provide straightforward licensing regime.

However, although one of the key international obligations for States as provided by the outer space treaties is for them to cooperate internationally with others when participating in their space-related activities, on the other hand, from the literature review conducted in this article, we can see that without giving any reason the experts in space law did not make a recommendation as to the incorporation of the provision on the encouragement of international cooperation.

Be that as it may, combining the key international obligations as established in the outer space treaties and the recommendations made by space law experts as established in this article as to the compulsory provisions that should be incorporated into national space legislation, they can provide as an analytical framework for evaluating whether national regulatory frameworks properly implement international space law. Thus, such a national regulatory framework should contain the following provisions:

1. Provisions that allow States to authorise and supervise the activities that those under States' jurisdiction wish to undertake and to continue supervising the space activities that have been undertaken until they end. (Authorisation and Supervision),
2. Provisions that require States' entities to be responsible towards the consequence of their activities (Responsibility and Liability),
3. Provisions that require States to register their space objects within their national registry (Registration of Space Objects) and
4. Provisions that require States to encourage international cooperation when States' entities participate in space-related activities (International Cooperation).