



## **Outer Space Policy from the Ethiopian Context: Better to Make or Stay Out?**

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### ***Abstracts***

*Modern day technologies that drive our global society are highly dependent on the use of outer space-based technologies which presupposes the making of space policies. This is because, today every nation relies on space-based technology for communications, weather forecasting, satellite navigation and resource management, either through indigenous programs or through programs run by its allies. The main objective of this article is to assess whether Ethiopia needs to have outer space policy and regulatory frame works for attaining economic development. The methods used is analysis of different primary sources such as treaties, laws and interviews from the concerned organ as well as secondary sources such as books, articles, and internet sources. It concludes that Ethiopia have been utilizing the benefits accrued from outer space based technologies without having national space policy and regulatory frameworks whose absence is hinders the social well-being and sustainable development of the country. Therefore, Ethiopia should speed up the formulation and implementation of national space policy and strategies and the policy should be able to properly fulfill national demands.*

**Key words:** *International responsibility of state, outer space, air space, space policy*

### **1. INTRODUCTION**

Space is a vital resource for addressing different domestic and international economic development challenges, innovations, social benefits, and inspirations to citizens and institutions are among the fundamental benefits of space science technology <sup>1</sup>.

Historically, space issues started in 1957 with the first launch of sputnik, by the Former USSR shortly followed by the first launch in 1958 by the United State. That time was the time of cold war so that

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<sup>1</sup>Federal Democratic Republic Of Ethiopia , "Ethiopian Space Science Policy And Strategy -Green Paper ,Ethiopian Space Science And Technology Institute "Addis Ababa Ethiopia, 2018,P.1and 2.

space and science was used for military purpose. Then onwards, the activity of states in the outer space has been increasing at alarming rate.<sup>2</sup>

To regulate the then space race between the United States of America, the former Soviet Socialist Republics and the activities of other states in the outer space, the United Nations established the Committee on Peaceful Uses of the Outer Space (COPUOS) in 1959. Then the legal sub-committee of the space committee of the United Nations General Assembly has prepared a “more comprehensive treaty on these matters as a result of which five subsequent treaties and non binding resolutions governing the activities of state in the outer space are adopted at UN”<sup>3</sup>.

The participation of African countries in exploration and use of the outer space were very low for many decades due to their weak economic strength. However, nowadays, they are starting to unveil their space programs as space based technologies highly contribute for disaster management, communication and security.

As part of this program, the Fourth African Leadership Conference on Space Science and Technology for Sustainable Development (ALC IV), which was held in Mombasa, has passed a declaration on space and Africa's development. The declaration recognized the major contribution that space science and technology makes to the “well-being of humanity and specifically to the economic, social and cultural development of Africa in terms of Earth observation, satellite navigation and communications services that support, inter alia, education, health, environmental monitoring, management of natural resources, disaster management, meteorological forecasting and climate modeling.”<sup>4</sup>

Ethiopia have been utilizing the benefits accrued from outer space<sup>5</sup>. It is due to this benefit that she unveiled the first phase of a space exploration program, which includes East Africa's largest observatory designed to promote astronomy research in the region.<sup>6</sup>

To mention few benefits, Ethiopia is highly reliant on agricultural based activity in line with agricultural development led industrialization economic development strategy with multi faceted environmental

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<sup>2</sup>Malcolm N. Shaw, 1997. *International Law*. 4th Ed. London: Cambridge University Press. P. 382

<sup>3</sup>Ian Brownlie, 2008. *Principles Of Public International Law*. 7th Ed. Newyork: Oxford University Press.

<sup>4</sup> Mombasa Declaration Final Draft[On Line] Available At [Www.Unoosa>ALC2010](http://www.unoosa.org/ALC2010), Accessed On 03/04/2018

<sup>5</sup> Anon., 2013. *Ethiopian News Forum*. [Online] Available At: [Http://Ethiopiannewsforum.Com/Viewtopic.Php?F=2&T=63469](http://Ethiopiannewsforum.Com/Viewtopic.Php?F=2&T=63469) [Accessed 05/ 04/ 2018].

<sup>6</sup>*Ibid*

crisis whose solution is highly dependent on space technology<sup>7</sup>. Though space technology is determinant to modernize the agricultural system, the country does not have space policy. In areas of mining and mineral exploitation also, non existence of Ethiopians own earth observation satellite, low level of the geo science and geological mapping coverage and air born geo physics survey are the other major challenges that hinders the creation of conducive environment to enhance the development of the mining sectors and still the use of space based technology is very pertinent whose application is difficult in the absence of space based policy.

The other challenge is relating with environmental resource degradation. It is a known fact that Ethiopia is not only important for having different natural resources, but also one of the most environmentally fragile county in the world. Though the application of space based technology to manage such challenges are very crucial, she does not have space policy to apply space based technologies in a better way. These and other many challenges that need space based technology solutions are not sufficiently utilized by the country as a result of which Ethiopia is not getting the benefits that space driven solutions could provide.

The author believes that the available paper that is related with this article is a Green Paper policy and strategy developed by Ethiopia Space Science and Technology Institute which is not a complete space policy. This article aims to assess whether Ethiopia needs to have outer space policy and regulatory frame works for attaining economic development.

## 1.1 BACK GROUND LITERATURE

### 1.1.1. THE CONCEPT OF OUTER SPACE

The word “Outer Space” occurs in the 1967 Space Treaty and in the 1968 Agreement on the Rescue of Astronauts without defining its meaning.<sup>8</sup> The absence of definition creates an ambiguity on the meaning and demarcation line between outer space and air space. This legal gap is attributed to two reasons. First, during the conclusion of outer space treaties, the space science was at its infant stage, states could not possibly defined the limit of outer space. Second, the willingness of space faring nations had hampered the definition. The Black’s law dictionary defines outer space as “The known

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<sup>7</sup> *Ibid*

<sup>8</sup> A.S. Piradov(Ed), Boris Belitisky (Trans) 1976. *International Space Law*, Progress Publishers New York P. 26

and unknown areas of the universe beyond airspace. These definitions unable to state boundary between airspace and outer space .”<sup>9</sup>

In 1996, the United Nations General Assembly established the Committee on the Peaceful Uses of the Outer Space( UNCPOUS) to begin “...the study of question relative to the definition of Outer Space and Celestial bodies.<sup>10</sup> As a result, the UN and states in their national space regulatory frameworks have tried to fill the gaps of the space treaties. Therefore, member states agreed the Outer space to be laid beyond the current upper limit of a Nation’s Sovereign territory according to which “the geo-stationary orbit is part of the outer space.”<sup>11</sup>

Then after various member states in their national space activities governing laws started to define the term. For instance, the South African Space Act defined it as “space above the surface of the earth from a height at which it is in practice possible to operate an object in an orbit around the earth.”<sup>12</sup>

In conclusion, until the present time, as a matter of law, neither the term Outer Space is defined nor the line between Air Space and Outer Space is demarcated.

### 1.1.2. EVOLUTION OF INTERNATIONAL SPACE LAW MAKING

International space law is young<sup>13</sup> and it is an evolving branch of international law. Upon the launch of Sputnik I in 4 October 1957 and the commencement of space race between the United States and the former USSR, has necessitated the making of regulatory mechanism and the need to define the term space law. In fact the face value of the term space law, give us the meaning that space law is a law of space or a law governing activities in space. Francis Lyall and Paul b. Larsen<sup>14</sup> defined space law , as “*a Law of Space, and can range from the terms of an insurance contract in respect of a particular space launch to the broadest of principles that govern how states act in outer space. So ‘space law’ is therefore simply the application of the principles of the existing domestic laws such as contract to a new field of activity. ‘Space law’ a is particulate law, developed to deal with the practical problems of the use and exploration of outer space.*” The evolution of space law

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<sup>9</sup>Definition Of Outer Space, Black’s Law Dictionary 1212 (9th Ed. 2009 )

<sup>10</sup>A.S. Piradov(Ed), Boris Belitisky (Trans), *Supra, Note* 15, P. 27

<sup>11</sup>Mohamed Ahmed Tarabzouni, *Supra, Note* 13, A geostationary orbit, often referred to as a geosynchronous equatorial orbit (GEO), is a circular geosynchronous orbit 35,786 km (22,236 mi) above Earth’s equator and following the direction of Earth’s rotation. see [https://en.wikipedia.org/wiki/Geostationary\\_orbit](https://en.wikipedia.org/wiki/Geostationary_orbit), Accessed on feb, 2020

<sup>12</sup> Space Affairs Act Of South Africa, Statutes Of The Republic Of South Africa - Trade And Industry No. 84 Of 1993

<sup>13</sup> Joachim Lommelen, *Supra, Note*, 14, P. 3

<sup>14</sup>Francis Lyall And Paul B. Larsen, *Supra, Note*, P. 2

evolved through decades and has evolved in to three stages. These are the era of declarations (1957-1963), the Era of Treaties (1963-1979) and the Era of Resolutions (1979 – 2004).

### 1.1.3. STATE RESPONSIBILITY UNDER INTERNATIONAL LAW

The concept of responsibility under international law is highly interrelated with the notion of liability and sometimes they tend to overlap.<sup>15</sup> Because, if damage occurred, international responsibility results in international liability.<sup>16</sup> Activities in outer space are not free of potential harmful effects. That is why it is said that Space activities are inherently dangerous, so it is right that they should be properly supervised, and that liability should follow in the event of damage.<sup>17</sup>

For the purpose of this article, defining OST( Outer Space Treaty), as the treaty on governing principles on the activities of states in the exploration and use of Outer Space is suffice<sup>18</sup>. Hence, the OST established a state responsibility regime under Article VII saying *“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.”*

## 1.2. THE STATUS OF AFRICAN STATES IN OUTER SPACE TREATY MAKING

### 1.2.1. RELEVANCE OF SPACE BASED ACTIVITIES FOR AFRICA

It is known that the application of some space related activities can highly contribute for human security through *“reducing the risk of natural disasters, forecast crop yields, monitor environmental degradation and prevent the spread of infectious diseases.”*<sup>19</sup> As Van Wayk argues, *“on a continent ravaged by natural and human-induced disasters, the application of these technologies can greatly enhance human security.”*<sup>20</sup>

Developing countries, including those in Africa, irrespective of costly nature of engaging in space science, are investing in space activities. For Agnieszka Lukaszczyk<sup>21</sup> the possible reasons include the urge of getting international recognition and the prestige of being part of a space club. In addition,

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<sup>15</sup> G. M. GOH, 2007, *Dispute Settlement In International Space Law: A Multi-Door Courthouse For Outer Space*, Leiden, Martinus Nijhoff Publishers, 2007, P. 17 Cited In Joachim Lommelen, *Supra*, Note 14, P. 19

<sup>16</sup>See, Kay-Uwe Horl, *Supra*, Note, P. 81

<sup>17</sup> Francis Lyall And Paul B.Larsen, *Supra*, Note, 17, P.66

<sup>18</sup> *Ibid*

<sup>19</sup> United National General Assembly. *International Cooperation In The Peaceful Uses Of Outer Space. A/RES/61/111. 15 January 2007 And COPUOS. Report Of The Scientific And Technical Subcommittee On Its Forty-Fourth Session, Held In Vienna From 12 To 23 February 2007.*

<sup>20</sup> Van Wyk, *Supra*, Note, 6, P. 92

<sup>21</sup> Space Affairs Act of South Africa, Statutes of the Republic of South Africa - Trade and Industry No. 84 of 1993

space tools can enhance the life and safety of citizens at large. The benefits of a successful space program includes telecommunications, Position, Navigation, and Timing , Earth Observation, and various military applications.<sup>22</sup>

African governments have officially admitted the benefits of engaging in space based activities through their policies and conferences. The Nigerian government, for example, regards its space policy and program “as an essential tool for its socio-economic development for the enhancement of the quality of life of its people, and Nigeria’s national security.”<sup>23</sup> In fact, wish is fine and we can see their policy from the context of how it is used as political cosmetics. Countries are having such technologically advanced space policies on paper while millions of their nationals are below poverty line .

The Republic of South Africa on the other hand has identified the possible uses of space technologies in its national space policy.”<sup>24</sup> African Leadership Conference on Space Science and Technology as also recognized the significance.<sup>25</sup>

The use of space technologies has a “dual” character, which s expressed through use either for peaceful purpose or for military.<sup>26</sup>For instance, Agnieszka Lukaszczyk said, “even in relatively poor African countries on the continent, space applications increasingly play a part in various development and security schemes.”<sup>27</sup>

### **1.2.2. AFRICAN PARTICIPATION IN SPACE RELATED ACTIVITIES**

Algeria, Nigeria, South Africa and Egypt are the only African states that have launched satellites. ALSAT-1 was launched by the Algerian Centre National des Techniques Spatiales of Arzew on 28 November 2002 from Plesetsk Cosmodrome (Russian space Port).<sup>28</sup>

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<sup>22</sup> *Ibid.*

<sup>23</sup> Van Wayk, *Supra, Note*, 6, P. 96

<sup>24</sup> Space Policy Of South Africa ,Department Of Trade And Industry, December 2008

<sup>25</sup> The Mombasa Declaration On Space And Africa's Development The Participants In The Fourth African Leadership Conference On Space Science And Technology For Sustainable Development (ALC IV), Held In Mombasa From 26 To 28 September 2011,

<sup>26</sup> Stefan Hobey, *Supra, Note*, 32, P. 10

<sup>27</sup> Agnieszka Lukaszczyk, *Supra Note*, 12

<sup>28</sup> Van Wayk, *Supra, Note*, 6, P. 96

Egypt became the fourth African state to launch a satellite. Roscosmos at Baikonur launched EgyptSat-1, Egypt's National Authority for Remote-Sensing and Space Sciences (NARSS) first remote-sensing satellite, on 17 April 2007.<sup>29</sup>

Besides South Africa, only Nigeria, Kenya, Algeria, Egypt and Tunisia have been developing space programs. In the Egyptian case, space activities have been largely concentrated on security concerns. For the other African states, however, socioeconomic benefits have been the focus.<sup>30</sup>

South Africa has already made its presence felt in the global space arena, as Africa's leader in astronomy. The countries' newly built modern telescope, the Southern African Large Telescope (SALT) in Sutherland, in the Northern Cape, contributed over R60 million in contracts to the industry, and helped us develop new manufacturing capacities. This was a worthy pilot run of what could be possible.<sup>31</sup>

### 1.2.3. STATUS OF AFRICA IN UN SPACE RELATED TREATIES

The participation of Africa in space related activities is discussed above. This section discusses the status of African states regarding the same.

By far the most widely supported and ratified outer space Treaty in Africa is The Outer Space Treaty (OST).<sup>32</sup> In Africa, only Niger, Nigeria and Seychelles, South Africa has ratified all but the Moon Agreement, which has been ratified by Morocco (as the only African state). The reason as Van Wayk puts it that, "Whereas the Outer Space Treaty (OST) signed at the onset of the Cold War is more symbolic and normative in spirit, the subsequent four Treaties (Rescue Agreement of 1968, Liability Convention of 1972, Registration Convention of 1978, Moon Agreement of 1979) were more practical in addressing problems arising from states' space activities."<sup>33</sup>

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<sup>29</sup> *Ibid.*, 97

<sup>30</sup> Agnieszka Lukaszczyk, *Supra, Note*, 12

<sup>31</sup> space policy of south africa, department of trade and industry, december 2008

<sup>32</sup> Van Wayk, *Supra, Note*, 6, P. 94

<sup>33</sup> *Ibid.*, P. 94



#### 1.2.4. RELEVANCE OF MEMBERSHIP OF AFRICA IN SPACE BASED TREATIES

José Monserrat Filho<sup>34</sup> identified three main importance of membership in international outer space treaties. The first is space-based treaties contribute to establishment of international rule of law in space-based activities. The second benefit, which emanate from membership in international treaties is predictability.

Thirdly, membership in treaties creates an environment conducive for pursuing justice and order in case violation of right occurs. The United Nations General Assembly in its yearly Resolutions, UN Workshops on Space Law, the UNCOPOUS and the African Union has noted repeatedly the importance of membership in international treaties space-based treaties and in UNCOPOUS. For instance the UN General Assembly in its resolution 64/86 of December 2009 “*reaffirmed the importance of international cooperation in developing the rule of law, including relevant norms of space law, and urged States that had not yet become parties to the international treaties governing the uses of outer space to give consideration to ratifying or acceding to those treaties, as well as incorporating them into their national legislation.*”<sup>35</sup>

The Legal Sub Committee of the UNCOPOUS has also noted the benefits of membership in international treaties call upon states to join the treaties. It is reported that, “Working Group also referred to the common understanding that States should consider acceding to and implementing the United Nations treaties on outer space.”<sup>36</sup>

At African level different attempts are being made to maximize African participation in outer space based activities and to enhance African states participation in enhancing the peaceful use of the outer space.<sup>37</sup> This is manifested through African Leadership Conferences on Space Science and Technology

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<sup>34</sup> José Monserrat Filho , 2005 , Benefits Of Becoming A Party To Treaties And Conducting Space Activities In Accordance With The Principles, Paper Presented At United Nations/Nigeria Workshop On Space Law Nigeria Available At [Http://Www.Oosa.Unvienna.Org/Pdf/Sap/2005/Nigeria/Presentations/01-06\\_1.Pdf](http://www.Oosa.Unvienna.Org/Pdf/Sap/2005/Nigeria/Presentations/01-06_1.Pdf). Accessed On April 20, 2014

<sup>35</sup> United Nations General Assembly. 2011, Report On The United Nations/Thailand Workshop On Space Law On The Theme “Activities Of States In Outer Space In The Light Of New Developments: Meeting International Responsibilities And Establishing National Legal And Policy Frameworks” Workshop Held 16-19 November 2010) Bangkok, Available At [Http://Www.Oosa.Unveinna.Org/Pdf/Reports/Ac105/AC105-989.Pdf](http://www.Oosa.Unveinna.Org/Pdf/Reports/Ac105/AC105-989.Pdf) Accessed On March 13, 2018 paragraph 2

<sup>36</sup> Committee On The Peaceful Uses Of Outer Space Legal Subcommittee Report Of The Working Group On National Legislation Relevant To The Peaceful Exploration And Use Of Outer Space On The Work Conducted Under Its Multi-Year Work Plan, A/AC.105/C.2/101, 3 April 2012 Paragraph 11

<sup>37</sup> See The Accra Communiqué On Space And Africa's Development, The Fifth African Leadership Conference On Space Science And Technology For Sustainable Development (ALC V), Held In Accra, Ghana From 3rd To 5<sup>th</sup> December 2013, Available At [Http://Alc2013ghana.Com/ALC%20Presentations/Speech/THE%20ACCRA%20DECLARATION%20ON%20SPACE%20AND%20AFRICA.Pdf](http://Alc2013ghana.Com/ALC%20Presentations/Speech/THE%20ACCRA%20DECLARATION%20ON%20SPACE%20AND%20AFRICA.Pdf) Accessed On April 13, 2018



for Sustainable Development, held in Abuja in 2005, South Africa in 2007, Algeria in 2009, and Kenya in 2011 and in Accra in 2013. The conferences have affirmed the importance of participation in the space science and technology, and urge states to consider membership in international treaties. For instance, the Accra declaration says, *“Recognizing that the orderly conduct of space activities is beneficial to all countries, whether or not they have national space programmes, and that the observance by States and by international organizations of the provisions of the outer space treaties should be encouraged.”*<sup>38</sup>

## 2. MATERIALS AND METHODS

Qualitative research has been used as different primary sources treaties, laws and secondary sources such as books, articles, and internet sources, etc are analyzed. Data are also collected through interview from governmental organizations such as the Ministry of Ethiopian Science and Technology.

Purposive sampling has been used as the selection of persons with expertise or experience in the area can best meet the purpose of the study. Accordingly, two persons from different authorities such as from Ministry of Science and Technology and Ethiopian Metrological Agency, who have great knowledge on the subject matter aspect as well as familiar with the existing reality of Ethiopia have been interviewed.

## 3. RESULT AND DISCUSSIONS

### 3.1. A BRIEF DESCRIPTION OF ETHIOPIA

Ethiopia is one of the worlds` biodiversity hotspot that occupies the major part of the Horn of Africa. The country has different geological features which have a profound effect on ecological processes, ecosystems and biodiversity.<sup>39</sup> Regarding its physical setting, Ethiopia is land locked country located in the horn of Africa and shares borders with Sudan and South Sudan in the West, Djibuti and Somalia in the East, Kenya in the South, Eritria to North and North East and has an area of 1104300km<sup>2</sup> It has three major climatic groups: Tropical rainy regions, Warm temperature rainy climate and dry climate.<sup>40</sup> AS UN estimation, currently, the population is estimated 103,445,193,

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<sup>38</sup> The Mombasa Declaration On Space And Africa's Development, The Fourth African Leadership Conference On Space Science And Technology For Sustainable Development (ALC IV), Held In Mombasa From 26 To 28 September 2011, Available At [Http://Www.Unoosa.Org/Pdf/Bst/ALC2010/Mombasa\\_Declaration\\_Final\\_Final\\_28-10-2011.Pdf](http://www.unoosa.org/pdf/bst/ALC2010/Mombasa_Declaration_Final_Final_28-10-2011.pdf) Accessed On April 20, 2018

<sup>39</sup> Jonathan Mckee, Ethiopia Country Environmental Profile”,( Ethiopia, Addis Ababa, Ec Delegation, 2007) P.16

<sup>40</sup> Food And Agricultural Organization (FAO) (2003), "Land Use, Production Regions And Farming System: Assistant To Land Use Planning, Technical Report No. 3.Rome.

which the second largest population in Africa, next to Nigeria and ranks 14<sup>th</sup> in the world.<sup>41</sup> The principal economic sectors of the country is Agriculture, industry and Manufacturing,, Tourism, etc. Textile and Energy to bolster the economy in addition to agriculture is also the other important sectors that cannot be under estimated. <sup>42</sup> Culturally, Ethiopia is a country whose political identity dates back to 3 million years, making it one of the oldest civilizations in history. Culture is reflected in the work of architects, writers, artisan and crafts people.

The next part explains the importance of space solutions for the challenges that we are facing.

### **3.2. MAIN DEVELOPMENT CHALLENGES OF ETHIOPIA AND THE CONTRIBUTION OF SPACE SOLUTIONS**

Taking into account the reality of our country and the contribution of space technology, the next part discusses the major challenges that Ethiopia is facing and the contribution that space technology have and thereby the deals with the importance of having policy and regulatory frame works. To begin:-

Among the challenges that we are facing is from agricultural perspective as it accounts for around 50% of GDP , 85% the labor force and 90 % of the total foreign exchange earnings, with coffee alone contributing about 60% of total export value. <sup>43</sup> However, this situation is still unable to prove the holistic development of the country. The food insecurity status of most of the people still remains at high and increasingly problem in rural areas too. Space based technologies and applications are used for modernizing agriculture, providing access to technologies that support rural development. Space products contribute for access to sufficient food by using Earth Observation Satellite GNSS (Global Navigation Satellite). This helps decision making, crop cultivation livestock husbandry etc.

The other importance of space based technology is that Ethiopia does not have effective land administration and land information system both in urban and rural areas.<sup>44</sup> In response to this modern cadastral and land information system (LIS)in which most of the inputs data sets are derived from earth observation space and ground based technology play the key role as to land administration and development program for urban and rural areas.<sup>45</sup> Space technologies such as launching of earth

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<sup>41</sup> Ethiopian Space Science Policy And Strategy -Green Paper;Situational Analysis And Identification Of Policy Issues(Ethiopian Science And Technology Institute,Ethiopia; Addis Ababa) , 2018, P.8.

<sup>42</sup> Ibid

<sup>43</sup> Ministry Of Agriculture And Rural Development

<sup>44</sup> World Bank, "Diagnosing Corruption in Ethiopia: Perceptions, Realities and the Way Forward For Key Sectors. [Http://Elibrary.Worldbank.Org/Doi/Book/10.1596/978-008213-9531-8](http://Elibrary.Worldbank.Org/Doi/Book/10.1596/978-008213-9531-8). Accessed On January, 2019.

<sup>45</sup> *Supra Note* 171, P.13

observation satellite, establishment of space radar, and Global Navigation satellite system support the establishment of Geodetic Networks that are one of the components of land information system.<sup>46</sup>

The other importance is for expanding basic geo science mapping coverage, geological mapping coverage, airborne geo physics survey, hydro science geological mapping, maximizing the geo hazard study as well as delineation of the potential areas of mineral exploration in the country, in effective way. Though minerals are among the sources of Ethiopian economy, the capacity to explore and use the mineral source is low. Thus, earth observation application is not only technique for effective mineral exploration and a tool to monitor environmental impacts which are resulted from mining activities.<sup>47</sup>

Environmental challenge issue is the other perspective due to which space technology is important. It is known that Ethiopia is not known one of the most important natural resource natural resource hotspot country, but also one of the most environmentally fragile countries in the world. Soil erosion, land degradation, deforestation, and forest degradation, water degradation and scarcity, loss of bio diversity...Etc is among money. Land, soil, water, solar energy, forests, trees, range lands, different forms of agro-diversity resources, several forms of wild animals are at stake<sup>48</sup>

Space application plays a very important role in the areas of natural resource management and environmental monitoring<sup>49</sup>.

Not only is these, space application also a solution for different problems we are facing energy development. The great hydro renaissance Hydro Electric Power Projects and wind power projects can be mentioned. Here, it can support the exploitation of geothermal reservoirs and allows the determination of wind, water, and solar energy potential.

In the quest for both renewable and non renewable energy, the role of space technology is pivotal. Earth observation technology helps to identify the energy potential that can be harvested, designating the optimum areas for trapping, distributing and utilizing the energy. For this what is required is radar remote sensing which is the result of space technologies.

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<sup>46</sup> *Ibid*

<sup>47</sup> *Ibid*

<sup>48</sup> Gessese,B, "Characterization And Modelling Of Landscape Transformation For Optimizing Agricultural Land Use In Ethiopian High Lands: A Case Study Of Modjo. Phd. Dissertation, Addis Ababa. Ethiopia, 2011.

<sup>49</sup> *Supra Note* 171,P.19

The contribution of space science cannot be undermined for the development of infrastructure. Space science and space technologies applications such as based Geodetic reference system, navigation are some of the foundations of infrastructure for the improvement of transport service of the country. Furthermore, it serves as a platform for planning and analysis of different projects using remote sensing and GIS technologies. Global Navigation Satellite system (GNSS), LiDAR, Photogrammetry, Remote Sensing and Geographic Information System are among the result of space technology contributions.

In general, from the above discussions, one can understand that the importance of space technology and strategy touches all the spectrum of the economy, use resource, national security and technological compatibility which the most sounding and repetitive are its benefits for socio,-economic development, lying legal and structural ground for effective collaboration and to solve science and technology related problems. The answer for the question raised above is not only answered positively, but it should be said that having laws and regulatory frame works are the only option that Ethiopia has to continue as a competitive state within the existing complex globalized world.

If it is found that laws and policies are important, what is the status of laws and policies towards space? who are the responsible organ that should be in charge to deal with this matter is discussed in the next part.

### **3.3. THE EXISTING SCENARIOS**

Regarding the status of the current situation, it was found that the concerned organ (the Ethiopia Space Science Institute) is working hard to enable the country to make national laws and policies and strategies that are pertinent to promote and apply space science and technology. The policies, that are connected with space science and technology areas are the following.

- Rural development policy and strategy
- Science, Technology and Innovation
- Industrial development
- Information and Communication Technology (ICT)
- Environmental policy Climate-Resilient Green Economy (CRGE) strategy

Regarding the mandate of the Ethiopia Space Science Institute, it was responded that the institute is established by regulation number, 393 in 2016 by the Council of Ministers. The council is chaired by top government official and high level of government to support the growth of the space industry.

The council works in collaboration with member countries of International Astronomical Union and Committee on the Peaceful use of Outer Space.

However, though the Council is working hard in promoting space technology, the following problems also reflected.

- Lack of interaction between national development priorities and research programs conducted in the field
- Low capacity in space engineering, satellite assembly, manufacture and operation of satellites.
- Lack of coordination among local institutes who are engaged in space program development
- Low Participation of women in space education and research
- Shortage of sufficient man power in space science, technology and application.

The respondent added that Ethiopia is very near to the equator, the magnetic equator passes through Addis Ababa. The wind speed is slower, there are less cloud cover and clear sky, low humidity and high altitude up to 4620 meters above sea level in addition with high availability of water resources makes Ethiopia one of the best places for space related industries like for the establishment of launch sites and satellite installation .That is why different companies which came from some space faring nations, have approached the Ethiopian government for a authorization to engage space based activities.

Ethiopia, like other developing countries, use of space-based activities, by far, is limited to satellite communications and the services are procured from industrialized countries.<sup>50</sup> Now days, the dependence of states on space technologies has increased the strategic significance of space.<sup>51</sup>

In Ethiopia, various scenarios manifest this. For instance, currently, as the rest of the world, climate change is a pressing issue. On top of that, the use of space technologies fundamentally help Ethiopia to curb its climate change problems through space technologies such as Remotes Sensing, GPS and Meteorological satellites.<sup>52</sup>

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<sup>50</sup> Caribbean Sylvia Ospina, 2005. *United Nations/Brazil Workshop On Space Law Disseminating And Developing International And National Space Law: The Latin America And Caribbean Perspective, National Space Activities And Legislation In Latin America*, New York, United Nations Publication. Available At [Http://Www.Oosa.Unvienna.Org/Pdf/Publications/St-Space-28E.Pdf](http://www.Oosa.Unvienna.Org/Pdf/Publications/St-Space-28E.Pdf) Accessed On April 12, 2018 P. 85

<sup>51</sup>Yun Zhao, *Supra, Note*, 113, P. 58

<sup>52</sup> Demeke Nigussie Alemu, 2013, Use Of Space-Based Technologies To Climate Change Adaptation And Mitigation: Prospects For Ethiopia, Paper Presented At United Nations/Indonesia International Conference On Integrated Space Technology Application To Climate Change, Jakarta, Indonesia, September 2-4, Available At [Http://Www.Unoosa.Org/Pdf/Indonesiaclimatchange/Indonesia\\_Abstracts.Pdf](http://www.Unoosa.Org/Pdf/Indonesiaclimatchange/Indonesia_Abstracts.Pdf) Accessed On April 12, 2018

In the country, different attempts made to enhance the possible use space. In AAU, the Institute of Geophysics, Space Sciences and Astronomy (IGSSA) is established and Astronomical Observatory and Space Science Research Center is established at Entoto.<sup>53</sup> There are also other plans for in the future from the government. For instance, Ethiopian government is ready\* to invest more than 60 million Ethiopian Birr for Africa Telescope in Lalibela.<sup>54</sup>In addition, Ethiopia is set to launch its first satellite, the ET-SAT, satellite after a couple of years.<sup>55</sup>,

National space regulatory mechanisms regulate activities like “launching of objects into outer space, the operation of a launch or re-entry site, the operation and guidance of space objects, in some cases the design and manufacturing of space craft, the application of space science and technology such as that used for Earth observation and telecommunications, and exploration activities and research.”<sup>56</sup> Therefore, the governmental activities, especially those included in the plans highly determine for the formulation of national space related regulatory frameworks.

It is also found that in 2019, Ethiopia is set to launch its first earth observatory satellite.

The main goal of launching the satellite is two. The first one is to build technology application capacity and skills of our engineers through collaborations with different countries’ space scientists and institutions. So that they will be in a position to design, build and launch the second satellite independently. The second one is the direct support the first satellite gives to the social and economic development in terms of saving the money the country is currently spending for buying data, such as climate data.

It was also found that the only regulatory frame works that is made by the council of Ministers is The Ethiopian Space Science and Technology Council and Institute Establishment Council of Ministers Regulation No. 393/2016. As per the regulation, the council is chaired by top government official to

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<sup>53</sup> *Ibid.*,

<sup>54</sup> Solomon Belay, 2011, Astronomy And Space Science Development In Ethiopia, The 2nd Middle--East Africa Regional IAU Meeting (MEARIM II)(II)1010—16 April, Cape Town, South Africa Cape Africa) Available At [Http://Mearim2.Saao.Ac.Za/Images/Presentations/Solomon\\_2.Pdf](http://Mearim2.Saao.Ac.Za/Images/Presentations/Solomon_2.Pdf). Accessed On 17 April, 2018

\*Note that the interview was conducted before Ethiopia launch the satellite. Now, it has already been launched

<sup>55</sup>Ethiopian Space Science Society ET-SAT Is Set To Become The First Ethiopian Satellite 15 August 2012 [Http://Www.Ethioss.Org.Et/Index.Php/En/Home/News/95-Et-Sat-Is-Set-To-Become-The-First-Ethiopian-Satellite](http://Www.Ethioss.Org.Et/Index.Php/En/Home/News/95-Et-Sat-Is-Set-To-Become-The-First-Ethiopian-Satellite) Accessed On April 7, 2018

support the growth of the space industry. However, until the day on which the interview is conducted, none of the government organ is commenced the enactment of the law dealing with space.

At policy level, there is a green paper, the "Ethiopian Space science Policy and Strategy -Green Paper", prepared by Institute of Ethiopian Space Science and this green paper served as a base for the white paper that is served as a policy that will be made in the future.

## 4. CONCLUSIONS AND RECOMMENDATIONS

### 4.1. CONCLUSIONS

- Though Integrated Space Technologies and Space-based Information is necessary for the analysis and Prediction of Climate Change, Ethiopia has not national space policy that helps her much to use these technologies.
- Though Space systems therefore provide vast socio-economic benefits, and it is the obligation of the concerned body as space stakeholders, to spread the space related importance in an understandable manner to the general public, it is not in a right position to spread its importance for the House of people's representative.
- To accommodate the recent technological, economical progress and political developments that Ethiopia is experiencing, building comprehensive national space policy and regulatory frame works should be taken as an urgent need.
- In Ethiopia, the space policy and regulatory frame work has not developed to the extent necessary for tackling new complex problems. This may be the result of the failure of law and policy making organs to develop in the same speed in which the space technology is developing.
- Though the modern world space program counted more than half century, the status of space program is at a very early stage compared to other African space faring nations.
- Even though, Ethiopia have been utilizing the benefits accrued from outer space, she has not benefited much from the opportunity that space driven solutions could provide to mitigate the socio economic and environmental challenges persisted a long.
- Though space activities in Ethiopia dates back to 1950s, beyond the development in 1960, the establishment of some research centers and institutions, and a green paper named Ethiopian Space science Policy and Strategy -Green Paper which is made in 2018, she does not has national space law.



- The mere fact that Ethiopia is not a member in space based treaties, the absence of national space law and regulatory regimes (frameworks) treaties does not exonerate states from responsibility and liability and Ethiopia's responsibility in outer space stems from customary international law till she enact national laws.

#### 4.2. RECOMMENDATIONS

- Ethiopia should speed up the formulation and implementation of national space policy and strategies and the policy should be able to properly fulfill different national demands.
- Though the work started by Ethiopian space science and Technology Institute(ESSTI) is a good start, it is found only in the level of Green Paper policy and strategy so that the concerned body should be able to make the white paper policy taking in to account all national interests without delay.
- Ethiopia should make National Space Legislation and this legislation should be in line with international space treaties though it should differ taking into account national interest.
- The government cannot insure the development of the use and exploration of outer space without the private sector should participate so that national regulatory frameworks, since they are the best vehicles of stimulation of the private sector.
- As part of encouragement of private sectors, government should use different mechanisms such as tax incentives (tax exemptions), insurance and subsidies etc.
- The establishment of research centers, installation of satellites, plans of building and launching different satellites and allocating budget for installation of telescopes should continue and it should be done in cooperation with different concerned international and national actors.

#### ACKNOWLEDGEMENT

First, I thank the Almighty God. A heartfelt gratitude deserves to my interviewees for their provision the necessary information for the research.

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