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Outer space weaponisation: International security and Nigeria in the outer space

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Abstract

Outer Space could be seen extensively threatened by the inability of States to universalize commitments against conduct of destructive direct-ascent anti-satellite missile tests, and placement of dual-use nature of space-based capabilities which further aggravate outer Space weaponisation through the presence of over 170 million pieces of debris in orbit, causing collision, damages and outright loss of space assets to developing Space fairing nations like Nigeria. It was against this background that this study adopts Liberal Institutionalism to examine outer Space Weaponisation, and international Security on developing nations. The study deconstructed space weaponisation into implications on Nigeria space assets and adoptable strategies to improve Nigeria's assets in the outer space. Findings from the study established the nexus between space weaponization and space insecurity, which ultimately trigger the failure of Nigeria's NIGCOMSAT-1, increasing cost of launching, maintaining space assets and causing apprehension in the global community. This study also situates the possibility of stronger nations blocking developing State's access to space know-how and making space access development by developing countries like Nigeria very expensive and out of reach. This study therefore recommends that due to the presence of ideological and doctrinal difference among the veto wielding permanent members on the use of outer space, Nigeria should join forces with other nations that oppose weaponization of space and accordingly spearhead the drive towards a stricter new space treaty banning the testing, deployment and use of all kinds of intentional, harmful, and dual use weapons in space. That Nigeria should devote an accountable proportion of her GDP between 2-4% to space-related programmes in order to generate and develop scientific and technological capacities as by-products that would enhance national development.

Keywords: International Security; Liberal Institutionalism; Space Assets; Space Weaponisation

1. Introduction

The weaponization of space significantly impact on developing nations who are grossly caught in the crossfire of geopolitical tensions and conflicts among more powerful space faring nations, while the constricted access of developing nations to space assets driven communication, weather forecasting, disaster management, and navigation, slow down socioeconomic development. The presence of anti-satellite (ASAT) and other space-based weapons increases the risk of damage of these assets, disrupting essential services. Developing nations could be seen struggling to launch, maintain their own space assets, access and benefit from space technology, as space weaponization increases global competition for space resources. Space weaponization particularly space debris from ASAT tests, poses risks to States with no debris cleaning technology, even as debris collision with operational satellites increase the risk of loss of satellites in space and extensively compound international security.

An endangered international security emanate from the weaponisation of outer space as seen when the United States and three of the BRICS+ nations; China, India, and Russia successfully shoot down or decommission their own satellites with ASAT in a show of force (Gohd, 2021). The inability of the constellation of international treaties; Outer Space Treaty (OST), Conference of Disarmament (CD), UN Committee on the Peaceful Uses of Outer Space (COPUOS), Anti-Ballistic

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Missile (ABM) Treaty, Partial Test-Ban Treaty (PTBT) and the Moon Agreement of 1979 amongst others account for the increasing weaponisation of the outer space. As activities in the space increases, so also space debris is a growing threat to Low Earth Orbit (LEO), such that there may be as many as 170 million pieces of debris in orbit, with the vast majority too small to track due to limits in current technology (Iyer, 2023). The collision with space debris is among the suspected cause of the failure of Nigeria's NIGCOMSAT-1, on 12 November, 2008 (Nkanga, 2008).

Concerningly, indicators show that the Nigeria Space Programme failed to meet over 70 per cent of its mission, vision, and particularly the failure to launch unmanned mission to space as promised by the Federal Ministry of Science, Technology and Innovation (FMSTI) and the Nigeria's National Space Research and Development Agency (NASRDA). Despite launching NigeriaSat-1 in 2003, NIGCOMSAT1 in 2007, NASRDA has also facilitated the training of engineers in building Earth Observations (EO) satellites, with the NigeriaSat-X solely built by Nigerians, alongside the Nigeria-Sat-2 launched by the SSTL in 2011. In 2017, the EduSat-1 built by Nigerians and launched from Kennedy Space Center, was decommissioned in 2019. While as of 2019, the Centre for Space Transport and Propulsion (CSTP), completed three successful experimental rocket launches. Yet, all these may not be able to account for an agency that gulped N101.744 billion between year 2021 to 2023, so much so that more than 60 per cent of the yearly budget for NARSDA and its affiliate agencies are used for paying salaries with little or nothing left for capital projects (Muanya, 2023).

This research is based on the fact that space, which is already militarised, is increasingly being weaponized and this portends danger for international security and developing nations of lesser space capabilities. The Superpowers; USA, China and Russia are in the acts and deeds of putting weapons in space, the consequences of such major shift while not completely predictable are likely to be widespread and deep-seated (Hitchens, 2003). Though Russia and China are officially in favour of banning space weapons, but unofficially both have made clear that a unilateral USA's move towards space weaponization will force them to re-think their own military space policies and programmes. It is therefore expected that if a space arms race were to begin among space powers, other emerging space nations like Nigeria would feel pressured to follow suit or stand the risk of losing her Outer space investments.

The negative consequences of a space arms race are far-reaching, given the inherent offence - dominant nature of space warfare. Nigeria as an emerging space power in the African continent therefore has to focus the minds of the stakeholders not only on the possible applications to which satellite technology could be put, but also on the dangers facing the global space assets. Thus, in view of the implications of space weaponisation to international security in general, and Nigeria in particular, it becomes relevant if Nigeria get actively involved not only to protect her space assets, but also to contribute to a regime that would require moderating the use of the outer space for peaceful purposes only.

The expected outcomes of this study would be relevant to policy makers on national and international security matters and space technocrats in Nigeria. Additionally, it would be helpful in the formulation of strategic options for Nigeria's space programmes. Furthermore, it should aid scholars and the possible linkages between the academia and the space industries

This research work answers the following research questions;

- What are the implications of Space Weaponization on Nigeria in outer space?
- What adoptable strategies can improve the security of Nigeria's assets in the outer space?

2. Literature Review

2.1. Concept of Space Weapons

Space weapons like most other concepts in the social sciences or military science does not lend itself to precise definitions. While seen by Bulkeley and Spinardi (1986) as almost anything that can and has been used as weapons, hence the concept cannot really be applied to objects in themselves, but only to how they are utilised. Space weapons include, on the one hand, armed systems like weaponized satellites stationed in space and armed orbital gliders circling the Earth for long periods. Such systems may be designed for space-to-space attacks and/or space-to-Earth attacks. On the other hand, there are Earth-to-space missiles, which must also be classified as space weapons since they could be used against satellites. Land-launched weapons like intercontinental ballistic missiles that are directed at targets on Earth are, by contrast, not normally classed as space weapons, although they do pass through space. Nor do passive systems, primarily satellites, with militarily uses in space count as space weapons, even though they play a key role in military surveillance, communication and navigation (Bonn International Center for Conversion, 2013).

The draft treaty by China and Russia on the prevention of placement of weapons in outer space (PPWT), defines a weapon in outer space as any device placed in outer space, based on any physical principle, which has been specially produced or converted to destroy, damage or disrupt the normal functioning of objects in outer space, on the Earth or in the Earth's atmosphere, or to eliminate a population (DeFrieze, 2014). The discussion on space weapons should not be limited to deployment in space but include those weapons on Earth that can be directed into space.

2.2. Concept of International Security

International security is a term which refers to measures taken by states and international organizations, such as the United Nations, European Union, African Union, and others, to ensure mutual survival and safety. These measures include military action and diplomatic agreements such as treaties and conventions. While International and national security are invariably linked, as international security is national security or state security in the global arena. Member states of the North Atlantic Treaty Organisation (NATO) and the Warsaw Treaty Organisation opine international security to mean lack of adversarial relationship amongst nations, borne out of partnership and friendship (Vaynman, 2014). Hence, this study conceives international security as the aggregation of all nations' security interests in acceptable cohabitation.

Put together, COPUOS, CD, OST, ABM Treaty, and PTBT are the international instruments employed for the control of military activities in outer space. An assessment of these treaties and mechanisms revealed that though they are well intended, they lack the requisite mechanisms for enforcement and effective monitoring. The USA has been particularly adamant that COPUOS should be restricted to discussing civilian uses of space without any consideration of the potential threats to civilian uses posed by military programmes or activities. This is the sort of dilemma that faces these international treaties and renders them ineffective (Ortega, 2023).

2.3. Challenges of Space Weaponization on International Security

The unilateral U.S. move towards space weaponization has a lot of implications on international security, as well as international stability. The fact that most other nations technically trail behind the United States in use of space notwithstanding, the anarchic nature of the international system makes it inconceivable that other space powers, particularly China and Russia who continue to see their global role as in part balancing U.S. power, would allow the U.S. military a space weapons hegemony. While both nations have made clear that a unilateral U.S. move toward space weaponization would force them to rethink their own military space policies and programs. It is fairly reasonable to expect that if a space arms race were to erupt among the United States, Russia and China, other emerging space powers would feel pressured to also compete, in particular, North Korea, India, Pakistan and Iran (Koplow, 2018).

The security dilemma that is created by space weaponization mean that other nations seeking to challenge or degrade U.S. space capabilities do not necessarily have to seek a level playing field with U.S. space power, or even have a highly sophisticated space program. Reasonably low-tech methods to counter or attack on-orbit systems; such as detonation of a nuclear weapon in Low-Earth Orbit (LEO) using a mid-range ballistic missile which already exist or are rapidly emerging (O'Hanlon, 2005). Furthermore, if the United States is to move all the way to the deployment of space weapons against terrestrial targets, even non-space powers might feel threatened enough to seek other asymmetrical means of deterring the use of U.S. force against them, such as weapons of mass destruction, other means to damage ground-facilities or communications links used by U.S. space assets, or even the development of terrorist operations.

The negative consequences of a space arms race are hard to exaggerate, given the inherent offense-dominant nature of space warfare. Space weapons like anything else on orbit, are inherently vulnerable and, therefore, best exploited as first-strike weapons even by rogue State and non state arm actors. The hair-trigger postures of the nuclear competition between the United States and Russia during the Cold War would be elevated to the "ultimate high ground" of space (Krepon & Clary, 2003). It is envisaged that any conflict involving ASAT use is likely to be highly escalatory, in particular among nuclear weapons states, as the objective of an attacker would be to eliminate the other side's capabilities to respond either in kind or on the ground by taking out the satellites providing surveillance, intelligence, communications, and targeting. War in space would rapidly deteriorate into all-out nuclear war, precisely because it quickly becomes impossible to know if the other side has gone nuclear (Szymanski, 2019).

The commercial sector of the space industry would suffer great consequences from the weaponization of space. Most commercial systems, including those used for communications, are not seriously hardened against jamming, much less given protections such as extra fuel for maneuvering against kinetic energy ASATs or hardening against nuclear explosions. More so, given that the current military space powers are highly dependent on commercial providers for much of their communications needs, especially in wartime, as evidenced by the Iraq war, where more than 80 percent

of the bandwidth used by the U.S. military came from commercial providers, vulnerable commercial systems could be chosen as the "softest targets" for first attack (Hagt, 2006; Yonekura et al., 2022).

Thus, insurance rates would likely skyrocket if insurers were to feel that commercial assets might be threatened by space warfare; if commercial providers felt the need to take extra protective measures, those would have costs too. While the costs to industry and their pass-on to consumers (including governments) might be bearable for developed countries, developing countries would have a more difficult time using space assets in areas such as communications and agriculture. Developing nations are already concerned about their future access to orbital slots and usable radio-frequency spectrum, and officials from some nations worry that space weaponization by developed nations could make it more difficult for developing countries to achieve the benefits provided by space assets (United Nation, 2023).

The civil space arena is another non-military arena that could suffer from space weaponization. International cooperation in the scientific exploration of space which is believed that one day it could benefit all humankind is based on the relatively free dissemination of data and sharing of technology. This is a largely "trust-based" community of public and private scientists. What happens to this cooperation if the major space powers become extremely suspicious about each other's motives; thus it is believed that the testing and use of weapons in space would threaten ongoing scientific programs.

2.4. Implications of Space Weaponization on Nigeria

2.4.1. Orbital Debris

One other critical reason to worry about the testing and deployment of space weapons is the creation of space debris. Offensive counterspace capabilities could permanently damage or destroy costly satellites and leave substantial harmful debris in space if they physically destroy the satellites. Traveling at speeds of 7.5 kilometers per second, space debris poses a significant threat to spacecraft (Project Ploughshare, 2007). Thus, space debris can collide with and destroy satellites and is an important element in thinking about space weapons. Like radioactive fallout from nuclear war, debris from space war can linger for many years. Thus the deliberate generation of persistent space debris constitutes a great hazard to space operations.

The number of objects in Earth orbit has increased steadily; today there are an estimated 35 million pieces of space debris. Approximately 13,000 of the objects in orbit that are large enough to seriously damage or destroy a spacecraft, over 90 percent of which are space debris and are presently being tracked (Project Ploughshare, 2007). The Chinese attempts to intercept a satellite with a ballistic missile in 2005 and 2006 culminated with the hit-to-kill explosion of an aging Chinese weather satellite in 2007 (Project Ploughshare, 2007). It is considered to be one of the worst manmade debris-creating events in history, as it created over 100,000 pieces of lethal debris which will remain a hazard to space flight and orbiting satellites for a century (Michael, 2008). Presently, over 1,300 pieces of large debris from the event have been catalogued and being tracked by the US Space Surveillance Network (USSSN) (Space Security, 2007), thus it increased orbital debris by 10 percent (Macdonald, 2008).

In place of an ASAT, a poor state could also wreak havoc with a ballistic missile loaded with a payload of sand or small gravel bits that could be dispersed in orbit. The U.S. NASA have concluded that over 50 percent of accidents that could occur to the space shuttle would result from space debris (Krepon & Kartz-Hyman, 2004). Significant on-orbit collisions and tracking efforts have encouraged the recognition of space debris as a growing threat. In 2006 the Space Debris Working Group of the UN COPUOS drafted non-binding international space debris mitigation guidelines that significantly include avoiding intentional destruction and other harmful activities in space. Few countries U.S. Russia, China have debris tracking capability while Japan is projecting commercial agency to engage in removal of space junks (Teeratanabodee, 2023). There is, however, the issue of maintenance for assets deployed in space where they will be constantly degraded by collisions with smaller (< 1cm) debris and meteoroid particles (Federation of American Scientists, 2004). Some of the satellites that have been damaged by space debris include the French military satellite Cerise, the Space Shuttle, the 10-year-old Hubble Space Telescope, and the Russian Kosmos 1275 military navigation satellite (Space Security, 2007).

If space weaponization is not prevented, and states starts massive strike of targets in space, going by the amount of debris generated by the Chinese ASAT test, and the reported increase in the total quantity of space debris by 20 percent in 2007, the space would soon get saturated with debris, thus making it difficult to be orbited by any satellite. This will result in a gradual depreciation of the life of satellites in the orbit, as the debris approach a saturation point, where orbiting by any satellite would be practically difficult, if not impossible. A combination of shielding, orientation, system redundancy and replacement should be capable of overcoming some of the effects of space, which though with limitations, would be cost intensive. Nigeria as well as other developing nations would find it difficult to provide the

resources for debris mitigating measures for their satellites. In a fully debris saturated space, launching of satellite would even be impossible, making it impossible for states to realize their space dreams as well as utilizing the space for commercial and peaceful purposes.

2.4.2. Ground Based Anti-Satellite Weapons

Satellites especially those in LEO orbits are vulnerable to attacks by booster rockets used for medium, intermediate, as well as intercontinental ballistic missiles (Wright & Grego, 2003). Attacks on satellites with even Scud-like ballistic missiles that do not have homing capabilities is possible though it may have low probability of success, and could be limited to only the lowest altitude satellites (Theodore, 2006). Such an attack with a conventional warhead containing shrapnel would need to place the debris cloud in the direct path of the satellite. Most countries with missile technology like North Korea, Iran, Israel, India, Pakistan, and Brazil in addition to the well established superpowers have this capability (Krepon & Clary, 2004). Additionally, Cruise missile-sized ASAT vehicles launched from aircraft, along the lines of the U.S. Pegasus program of two decades ago, could also be capable of ASAT operations in LEO (Krepon & Clary, 2004). Finally, ICBMs can be fitted with an ASAT and adapted for orbital matching against target satellites, and midcourse ballistic missile defense interceptors able to reach altitudes of 1,000 to 2,000 km could also be used as ASATs against satellites in LEO (Krepon & Clary, 2004).

Thus without any international treaty banning the testing of ASATs, many developing nations, especially those antagonistic to the U.S. space dominance would tend to follow the path of China which tested a direct ascent ASAT on 11 January, 2007. The Chinese forces are reported to have incorporated ASAT in its military doctrine to offset U.S. military superiority in space (Manzo, 2003). The threat posed by ground-based ASATs is best countered by hardening against explosives and improved maneuverability of satellites, important satellites could be provided with their own means of self-defense, such as explosive charges or small homing missiles to destroy ASATs before they can carry out attacks. Additionally, “deception”, where Satellites, much like advanced combat aircraft, could be designed to be “stealthier,” reducing visibility to either radar or optical systems would complicate the tracking, and hence the targeting, of satellites (Richelson, 2001). Furthermore, the use of onboard decoys to divert an attack on a satellite, in addition to ensuring redundancy of critical systems, developing quick launch capabilities to field replacements, and if possible, using conventional forces to destroy enemy launch sites, are all options against ASAT attacks. Each of the above suggested counter-measures against ASATs would definitely increase the cost and technological requirement of the Nigeria’s space dream, and might even place the space industry out of her reach.

2.4.3. High Altitude Nuclear Explosion

A much-discussed threat is that of a high altitude nuclear explosion to knock out virtually all satellites in low earth orbit. The United States conducted a set of atmospheric tests in 1958 called Argus, in which three modest warheads of about 1-2 kilotons were exploded at altitudes of 100, 182, and 466 miles. The explosion created high energy electrons damaged the solar arrays of several satellites and caused three of them to fail. The electromagnetic pulse generated by the test led to power surges in electrical cables in Hawaii, blowing fuses, streetlights, and circuit breakers. Residual radiation from the experiment lingered in the magnetosphere for nearly seven years (Carlowicz & Lopez, 2002). An additional test called Starfish exploded a 1.4 megaton warhead at an altitude of 300 miles near the equator in the middle of the Pacific Ocean. This test of a 1.4-megaton warhead effectively killed or disabled almost every satellite in LEO over a seven-month timeframe (Stares, 1987).

In 2001, the U.S. Defense Threat Reduction Agency (DTRA) conducted a study called HALEOS to assess the HANE threat. The study concluded that "one low-yield (10-20 kt), high-altitude (125-300 km) nuclear explosion could disable in weeks to months, all LEO satellites not specifically hardened to withstand radiation generated by that explosion." A Defense Threat Reduction Agency study concluded that a single low-yield nuclear weapon detonated at high altitude (above 100 km) can negate a majority of LEO space assets in a few months. This study estimated that tens of billions of dollars in space assets would be destroyed in such a scenario. Recovery of services provided would require several years. Reconstitution might have to wait months until the radiation levels dropped to the point where satellite electronics could survive. The total cost to replace all lost civilian satellites could be as high as $100 billion (Dennis, 2002).

Ballistic missiles carrying nuclear weapons could do considerable damage to satellites in LEO, as was demonstrated by the Starfish nuclear test in 1962. Apart from the superpowers, many other nations like North Korea, Iran, Israel, India, Pakistan, and Brazil have the requisite rocket technology already, and some are pursuing nuclear technology, while some have it already. This puts the space assets especially those in LEO at great risk, as any nation can decide in time of crisis to cause what could be termed a “space nuclear holocaust” to degrade the offensive capability of the other side especially space dependent forces like that of the U.S. According to the Federation of American Scientists (FAS) Panel,

the best way to counter the HANE threat is not to deploy space-based missile defenses, but rather to ensure that critical space satellites in LEO are radiation hardened to appropriate levels, and to destroy missile launch sites in the event of war if possible. Satellite hardening against both electromagnetic pulse and radiation, depending on the extent could add up to half of the original cost of the satellite to its final cost; this development would make it more difficult for new entrants into the space faring club of nations from the developing world like Nigeria to break even in the space business.

2.4.4. Jamming of Satellite Links

The entire world economy makes extensive use of commercial satellite communications. However, space systems face jamming threats both to the communications link from the ground to the satellite and from the satellite back to the ground, or to the uplink and the downlink, respectively (Krepon & Clary, 2003). The long distance of satellites, coupled with the economic factors that drive the industry, actually make them more susceptible to electronic jamming. Instead of jamming the receiver on the ground, as a radio jammer would attempt when trying to block a ground-based transmitter, the satellite-signal jammer attacks by trying to overwhelm the signal sent to the satellite, which then rebroadcasts that jammed signal back to earth.

The recent jamming by Iran from its embassy in Cuba of Telestar-12 satellite, which carried the Farsi TV (a station operated by an Iranian dissident group based in Los Angles) broadcasts to the Middle East, demonstrates the viability of such a threat. Additionally, Libyans also jammed the mobile phone services of Thuraya Satellite Communications for months (Project Ploughshare, 2007). The U.S. military is responding to GPS jamming vulnerability by developing upgraded capabilities to the GPS signal, new bands, and increased signal strength. In addition, GPS-dependent military systems are adding anti-jamming capability as well as backup terminal guidance (Gonzales, 1999). Adding anti jamming technology, as well as anti-cyber warfare technology are well out of reach of developing countries like Nigeria, acquiring these services, or technology might even derail the space dreams in areas of the cost and time implications.

2.5. Ground station protection

Destroying ground-based control facilities associated with satellite operations may be a more feasible option for future adversaries than initiating space warfare, particularly when large constellations of target satellites are supported by a small number of terrestrial facilities, as is the case with the GPS system. In such circumstances, the loss of a few ground stations could “result in a significant decrease in GPS performance worldwide” (Wilson, 2001). The same argument applies to attacks on the ground segment of observation satellites, early warning satellites, weather satellites, and even communication satellites. Clearly, there is benefit in diversifying and multiplying ground segment nodes, as is the case for some communication satellites in GEO. The direct threat of physical destruction or sabotage against critical infrastructure, including satellite operations, thus deserves priority attention, as this threat appears more likely now than ever. A good example is the U.S. Homeland Security Act’s inclusion of satellites within the classification of critical infrastructure to accelerate risk reduction measures in this regard (U.S. Congress, Homeland Security xxx). The need to provide adequate defence shield against missiles, aircrafts and other attack means could negatively affect satellite systems deployment by developing countries like Nigeria.

2.6. Micro-Satellites and Space Mines

Small, lightweight satellites are making space accessible to an increasingly large number of countries. Generally, this development could be viewed as both stabilizing and desirable. Advances in miniaturization and the proliferation of space technologies create opportunities for many countries to enter space with small, lightweight, inexpensive and highly capable systems that can perform a variety of missions (Wheelon, 2004). Micro-satellites can perform satellite inspection, imaging and other functions and could be adapted as weapons, and even space mines. It is reported that China is secretly developing a nano-satellite ASAT weapon called "parasitic-satellite."

The Chinese parasitic-satellite system would be covertly deployed and attached to the enemy's satellite, during a conflict, commands would be sent to the parasitic-satellite which will interfere or destroy the host satellite in less than one minute. Micro-satellites can carry out almost all tasks accomplished by large satellites. They are easier and cheaper to build than large satellites, with a lower launch cost. The fear that some countries might use these micro-satellites as ASATs might draw the wrath of bigger powers who might then attempt to stifle even genuine satellite technology acquisition programmes of developing nations including Nigeria, on national security grounds.

2.7. Directed Energy Laser Weapons

Satellites in low earth orbit (LEO) are also vulnerable to laser illumination that could potentially cause loss of power due to solar cell degradation. Low to medium-power lasers fired from the ground or from an aircraft at high altitude might be able to damage sensors on imaging or missile launch detection satellites. The amount of energy needed to

destroy a light sensor, or infra-red sensor, at the wavelength to which it is most sensitive is much smaller than that needed to do structural damage to a satellites. The U.S. airborne laser program would have capabilities against some satellites in LEO and even beyond (Hui, 2006). China in September 2006 successfully conducted a laser blinding test against a U.S. reconnaissance satellite (Hollingham, 2015).

The effect of lasers on satellites could be severe, thus there are at least two precedents for restricting the use of lasers during peacetime: the Dangerous Military Activities Agreement and the Incidents at Sea Agreement, also known as the "IncSea" accord (Krepton et al., 2007). The multiple applications of lasers highlights the utility of establishing rules of the road that distinguish between acceptable uses such as range-finding, communication, and information gathering, and other uses that could be considered acts of war, such as dazzling, blinding, and damaging satellites. Norms regarding laser power/configuration for tracking purposes might be discussed to reduce the likelihood of damage to satellites and to reduce miscalculation. This becomes important as antagonists dazzling, blinding, and damaging satellites of their opponents, would definitely harm the other satellites in the orbit in the process. Thus neutral states, especially low income space aspiring developing nations ought to do all necessary to prevent the weaponization of space (United Nation, 2023).

2.8. Space Access Denial

The 2006 U.S. National Space Strategy emphasized the need to for the U.S. to deny access to space to those states that they consider hostile or unfavorable to the U.S. interest. In an era of space weaponization, and its attendant arms race in space, it would be very easy to categorize one state or the other as being sympathetic to one antagonising block or the other just as was the case during the cold war. With weapons deployed in space, blockage of access to space, or even the destruction of a nation's space assets both in flight and in space would be possible. Additional to physical access denial or assets destruction, is the readiness of the U.S. to block access to the space know-how to those states that they consider unfavorable to their cause. The expression of concern by the U.S. to the U.K. government on the cooperation between China and Surrey Satellite Technology Ltd., after Chinese ASAT test (Hitchens, 2007).

The U.S. recently warned Nigeria over her nuclear cooperation agreement with Iran (Nnamdi, 2008) telling Nigeria to steer clear of Iran and other 'rogue states' in her bid for nuclear technology. This is an indication that the U.S. or other super-power might move to stop a genuine aspiration of a less powerful state. Thus, in a weaponized space environment where a space arms race is bound to occur, states would now be categorized according to their leanings and interests. Therefore, associating with some states might incur the wrath of these bigger powers that will do all possible to protect their interests. It is now evident that some powers may not be well disposed to a Nigerian space advancement or even technology transfer should she go ahead with cooperation with some states. In an anarchic world as ours, a peaceful economic aspiration by some developing countries like Nigeria might be adversely affected by the security dilemma to be created by space Weaponization and its attendant arms race in the space.

3. Theoretical Framework

3.1. Liberal institutionalism

Liberal institutionalism as propounded by Robert Keohane views international institutions as the main factor to avoid conflicts between nations (Keohane, 1993). Liberal institutionalists argue that; although the anarchic system presupposed by realists cannot be made to disappear by institutions; the international environment that is constructed can influence the behavior of states within the system (Navari, 2008). Varieties of international governmental organizations (IGOs) and international non-governmental organizations (INGOs) are seen as contributors to world peace. Some believe that these international institutions lead to neotrusteeship, or postmodern imperialism. International institutions lead to an interconnectedness between strong and weak or post-conflict nations. In a situation such as a collapsed, weak-nation without the means of autonomous recovery, international institutions often lead to involvement by a stronger nation to aid in recovery (Weinstein, 2005).

Because there is no definite international security policy to address weak or post-conflict nations, stronger nations sometimes face "mission-creep," a shift from supplying and aiding nations to an escalation of mission goals, when aiding weaker nations (Fearon&Laitin, 2004). The absence of enforceable International treaties could be seen in the space weaponisation activities of the Super Powers with the deployment of their ASAT which extensively endangers developing nations like Nigeria. The aids from the super powers could also erode the resistance position of developing nations even while they are grossly put at disadvantage position due to the reckless space weaponisation by the super powers. In addition, there is some debate due to lack of testing that international intervention is not the best institution to aid weak or post-war nations (Fortna, 2004).

4. Methodology

The work is primarily based on secondary sources; desktop research design was extensively employed on extant literature, publication, books, the internet, and journals as well as other published material on the topic were consulted. The LECIA Research Library, the National Defence College, the Institute for Peace and Conflict Resolution, the USA Information Service, and the British Council libraries were very helpful for sourcing information. The primary source used was unstructured interviews with some officials at the National Space Research and Development Agency (NASRDA) Abuja, Nigeria.

5. Conclusions and Recommendations

A review of the relevant literature established the nexus between space weaponization and international security, which would ultimately affect Nigeria, being part of the international system. Specifically threat of research, development or deployment of space weapons and use of weapons in space by the USA has caused apprehension in the global community with a destabilising effect on international affairs and security. Russia, China, India and probably other nations are taking counter measures to negate US drive towards space dominance. These potentially have triggered an arms race in space, and create a security dilemma that is unhealthy for international security. Result emanating from empirical analysis shows that existing legal instruments and guidelines under the auspices of the UN (COPUOS, OST and CD) meant to curtail the development, testing and deployment of space weapons, are fraught with gaps in their mandate, being exploited by the space powers like USA, Russia and China, thereby rendering them ineffective to control the weaponization of space.

This study properly situates the implication of space weaponization on Nigeria. The areas covered included the effects of space debris, ground based ASATs, and high altitude nuclear explosions on the Nigerian Space industry. Other areas covered include the likely effect of jamming of satellite links, micro-satellites and space mines, directed energy laser weapons, and ground station protection. The possibility of some stronger nations blocking Nigeria's access to the space and space know how was also analysed. The study was however not ignorant of the present position of Nigeria technologically as it relates to space science and these were adequately considered while making the analysis. Result from empirical analysis confirms that the weaponization of space would make space access and development by developing countries like Nigeria very expensive and difficult, if not entirely out of their reach. Debris presence in the space further increases the cost of space assets outside the reach of developing nations. Nigeria currently does not have the technical know-how to independently undertake space weapons programme, which is even against her present space policy. Nigeria is a state party to international bodies for the peaceful use of space. However, her space policy and the peaceful intention of using space to achieve scientific and technological developmental goals would be adversely affected by space weaponization.

Recommended Strategies for Nigeria

That Nigeria knowing well the ideological and doctrinal difference among the veto wielding permanent members on the use of outer space, should join forces with other nations that oppose weaponization of space and accordingly spearhead the drive towards a stricter new space treaty banning the testing, deployment and use of all kinds of intentional weapons in space, deployment and use of earth based anti-satellite weapons, which should include land, air and sea-based ASATs in addition to the ban on space-based ASATs.

Nigerian should initiate policies that would allow her to devote a reasonable and accountable proportion of her GDP between 2-4% to space-related programmes in order to generate and develop scientific and technological capacities as by-products that would enhance national development. This would enhance her capability to protect or even bargain for the protection of its space assets, should collective security initiatives fail.

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