SPACE TECHNOLOGY AS A CENTREPIECE FOR ADDRESSING NIGERIA'S DOMESTIC CHALLENGES AND STRENGTHENING ITS FOREIGN RELATIONS

By

Kehinde Damilola Abolarin

Canterbury Christ Church University

Thesis submitted for the Degree of Doctor of Philosophy

2024

Acknowledgements

I want to first thank the Almighty God for the privilege and strength to accomplish this PhD. I equally want to thank the Canterbury Christ Church University Graduate School for the award of a scholarship for the PhD programme.

I want to thank my supervisor, Dr Sarah Lieberman, and Chair, Dr Laura Cashman, for their supervision, constant guide, and support at critical times. I also extend my appreciation to the entire Politics and International Relations department for their kindness to me.

To my lovely wife, Dr Adenike Adebayo, and my dear son, Praise Abolarin, their love, cooperation, patience, and support meant a lot to me. I am deeply grateful to both of you for your understanding during the times that I was not there to play my role in the family. I equally owe a debt of appreciation to my parents and siblings, my parents-in-law, and my wife's siblings. Indeed, thank you for believing in me and supporting me with prayers and encouragement through this journey. I want to specifically register my genuine appreciation to my mother-in-law, Mrs Deborah Adebayo, who was always there, travelling all the way from Nigeria to take care of my son whenever the need arose.

I also appreciate everyone who participated in this research. Thank you for your participation during the fieldwork (online). I thank all my family friends, the Osinaikes and the Akintoyes, for their prayers and support. Finally, to my research colleagues and friends, thank you for your help and the useful discussions through this journey.

Abstract

Nigeria's regional hegemony has recently been weakened, mainly due to domestic issues. The state's over-reliance on crude oil resources and insecurity have impacted its influence in Africa. Over the past two decades, there has been a search for a sustainable means of addressing national issues, especially to augment alternative sources of revenue and tackle security concerns. This would stabilise the domestic environment and, by extension, impact Nigeria's foreign policy. Essentially, Nigeria needs an enduring source of power to revive and sustain its influence in Africa and enhance its foreign relations. In light of this, this research examines the use of space technology in Nigeria. It considers the existing Nigerian space capabilities—its expertise, satellites, ongoing space infrastructural projects, and space relations—to be central to strengthening the state's foreign policy. Thus, the thesis does this in three dimensions: it examines the use of space capabilities to stabilise the Nigerian domestic environment; Nigeria's leverage of its space capabilities for acquiring power in Africa through the control of security, production, knowledge, and finance structures; and Nigeria's space partnerships and the impact on its space diplomacy. Nigeria's partnerships are mainly with China Great Wall Industry Corporation (CGWIC) and Surrey Satellite Technology Limited (SSTL) in the UK. China is a space power, while SSTL is a prominent satellite manufacturer. This study examines the impact of these partnerships, particularly the Asian state's influence on Nigeria's spacepower. The theoretical framework is informed by the theories of Neoclassical realism, spacepower, and IPE structural power. The research adopts a qualitative method that combines document analysis and semi-structured interviews. On this basis, the research seeks to make at least three fundamental contributions. The first is a theoretical contribution to the further development of the spacepower concept, specifically how Nigeria's use of space capabilities in its foreign policy contributes to the theory. The second is the thesis' application of structural power theory to Nigeria's control of structures and strengthening of its regional power and space diplomacy through space capabilities. Accordingly, the study proposes space as a new power structure. The third is the contribution of space to the domestic environment and its potential role as an enabler of Nigeria's material power capabilities. Generally taking into account Nigeria's foreign policy, which is mainly Afrocentric, and its space relations, the study makes suggestions on how to improve the state's engagement going forward and the importance of having experienced space diplomats who have the interests of the state at heart. This will ensure that Nigeria maintains consistency in its foreign policy and achieves tangible results in its interactions with global space players.

Contents

List of Figures

List of Tables

List of Abbreviations

AFISMA	African-led International Support Mission to Mali
AfSA	African Space Agency
AITC	Assembling, Integration and Testing Centre
ALC	African Leadership Conference
ALC-SST	African Leadership Conference on Space Science and Technology
ARCSSTE	African Regional Centre for Space Science and Technology Education
ARCSSTE-E	African Regional Centre for Space Science and Technology Education in English
ASECNA	Agency for the Safety of Air Navigation in Africa and Madagascar
AU	African Union
BRI	Belt and Road Initiative
BRICS	Brazil, Russia, India, China, and South Africa
CBSS	Centre for Basic Space Science
CCTV	Closed-Circuit Television
CESRA	Centre for Space Research and Applications
CGG	Centre for Geodesy and Geodynamics
CGWIC	China Great Wall Industry Corporation
COVID-19	Coronavirus Disease 2019
CSTD	Centre for Satellite Technology Department
CSTP	Centre for Space Transport and Propulsion
DMC	Disaster Monitoring Constellation
DSA	Defence Space Administration
DRC	Democratic Republic of the Congo
DTH	Direct-to-Home
ECOMOG	Economic Community of West African States Monitoring Group
ECOWAS	Economic Community of West African States
EFCC	Economic and Financial Crimes Commission
EO	Earth Observation
ESA	European Space Agency
EXIM	Export-Import
FDI	Foreign Direct Investment
FGN	Federal Government of Nigeria
FMCDE	Federal Ministry of Communications and Digital Economy

FMH	Federal Ministry of Health
FMST	Federal Ministry of Science and Technology
FPA	Foreign Policy Analysis
GDP	Gross Domestic Product
GEO	Geosynchronous Equatorial Orbit
GIS	Geographic Information Systems
GNP	Gross National Product
GPRS	Global Production System
GPS	Global Positioning System
ICT	Information and Communications Technology
IMF	International Monetary Fund
IPE	International Political Economy
IR	International Relations
ISIC	International Standard Industrial Classification
ISS	International Space Station
ISWAP	Islamic State West Africa Province
JV	Joint Venture
KIT	Kyushu Institute of Technology
LDCs	Less Developed Countries
LEO	Low Earth Orbit
MAN	Manufacturers Association of Nigeria
MoU	Memorandum of Understanding
MPC	Material Power Capabilities
NASA	National Aeronautics and Space Administration
NASENI	National Agency for Science and Engineering Infrastructure
NASRDA	National Space Research and Development Agency
NBTE	National Board of Technical Education
NCoS	Nigerian Correctional Service
NCR	Neoclassical Realism
NCRS	National Centre for Remote Sensing
NEEDS	National Economic Empowerment Development Strategy
NEMA	National Emergency Management Agency
NEPAD	New Partnership for African Development
NIGCOMSAT	Nigerian Communications Satellite

NILEST	Nigerian Institute of Leather and Science Technology
NIS	Nigerian Immigration Service
NPF	Nigerian Police Force
NSC	National Space Council
NSP	National Space Policy
OAU	Obafemi Awolowo University Ife
OAU	Organisation of African Unity
ODA	Official Development Assistance
OECD	Organisation for Economic Cooperation and Development
OPEC	Organisation of the Petroleum Exporting Countries
PNT	Position, Navigation, and Timing
PPP	Public-Private Partnerships
RFID	Radio-Frequency Identification
R&D	Research and Development
SAP	Structural Adjustment Programme
SAR	Synthetic Aperture Radar
SBAS	Satellite Based Augmentation System
SGI	Space Ground Infrastructure
SKA	Square Kilometre Array
SRM	Solid Rocket Motors
SSTL	Surrey Satellite Technology Limited
TSS	Tiangong Space Station
TNCs	Transnational Corporations
UK	United Kingdom
UN	United Nations
UNCOPUOS	United Nations Committee on the Peaceful Uses of Outer Space
UNHCR	United Nations High Commissioner for Refugees
UNOOSA	United Nations Office for Outer Space Affairs
US	United State (of America)
USAID	United States Agency for International Development
USNS	United States Naval Ship
VSAT	Very Small Aperture Terminal
WEF	World Economic Forum
WTO	World Trade Organisation

Introduction

Since its independence in 1960, Nigeria has acted as, and been portrayed as, a regional hegemon in Africa. However, the state has faced many domestic and external hurdles in the way of this position. The domestic issues are primarily the state of the economy and national security issues, all of which constitute a threat to the state's sources of revenue, stability, and foreign policy. The external challenges include issues that are indirectly out of Nigeria's control, such as the fluctuating global price of crude oil and the state's dependence on other powerful countries to develop its national capabilities.

Nigeria's major source of revenue is crude oil, which accounts for 86 per cent of its total exports (OPEC, 2022). The wealth amassed from oil revenue and membership in the Organisation of the Petroleum Exporting Countries (OPEC) guarantees the supply of resources for Abuja[1]'s foreign policy pursuits (Fayomi, Chidozie and Ajayi, 2015; Odubajo, 2017). However, the fluctuation in the oil price creates a challenge for the state and its economy (Yakub, 2008; Ojakorotu and Adeleke, 2018) and, by extension, the domestic environment and foreign activities. Thus, Nigeria's reliance on crude oil resources poses a risk to the state and its regional hegemony.

Prior to the 1970s oil boom in Nigeria, the state had been a dominant regional power in terms of the economy, demography, and military, and there is no way its primacy could be denied (Mayall, 1976). Notwithstanding, Oshewolo (2019) argues that the impact of unstable oil revenue and other domestic factors has limited the country's influence beyond its borders. The domestic issues are poor leadership, maladministration of natural resources, and overdependence on the wealth accrued from the oil boom (Ibid). The consequence of these is a major economic crisis, leading to unemployment and substandard living conditions for Nigerians. Other issues that affect Nigeria's regional influence include corruption, national disunity, political divisions, and national insecurity caused by terrorism, militancy, civil unrest, a lack of growth, and multi-ethnic grievances, all of which have contributed to increased domestic instability (Mayall, 1976; Shaw, 1987; Odigbo, Udaw and Igwe, 2014; Ojakorotu and

[1] Abuja is the capital of Nigeria and the seat of government. Thus, the term 'Abuja' is occasionally used interchangeably for Nigeria in this thesis.

Adeleke, 2018). The state has also recently experienced a high rate of kidnapping, communal violence, banditry, and poor border management (Okorn and Ndum, 2020).

With regards to Nigeria's foreign policy, the state must be ready to deal with its domestic challenges by seeking ways to sustain its sovereignty, stability, and economy. This is because a state's internal dynamics and socio-economic conditions determine to a massive extent the actualisation of its foreign policy agenda (Odigbo, Udaw and Igwe, 2014). This is not a new idea: Kissinger (1966) states that domestic structure is not insignificant in any historical period; that is, at least, it dictates the volume of total social effort that could be devoted to foreign policy. Kissinger further claims that the more stable the domestic structure, the lower the need to adopt an adventurous foreign policy to achieve domestic cohesion (Ibid). In other words, both the international and national settings are imperative to a state's foreign policy. This strengthens the case for the application of neoclassical realism theory (NCR) in this study. Rose (1998), who coined the NCR, argues that the domestic environment is crucial to a state's foreign policy. The research examines the internal challenges faced by Abuja and their impact on its external activities, as well as how space applications could be used to address them.

Nigeria is one of Africa's leading states investing in space technology. Scatteia, Frayling and Atie (2020) note that the increased investment in space activities demonstrates the sector's potential to be a powerful driver of socio-economic development, hence providing an incentive for states to adopt space technology (ibid). Nigeria's space drive is rooted in the rapid, sustainable, and socio-economic growth, development of new resources, environmental monitoring, and national security that space technology guarantees (Agbaje, 2010). Abuja has launched six satellites into orbit (four are currently active) and has an operational space programme that has contributed to the state's affairs. However, with its domestic challenges and declining regional power, this thesis will explore how Nigeria's space capabilities can aid in addressing its national issues and strengthening its regional influence.

The reasoning behind the use of space capabilities is that their substantial benefits, such as security and socio-economic development, are fundamental to the domestic environment. Several scholars have identified the general contributions of space satellites to the Nigerian domestic setting, but not in relation to the state's foreign policy. That is, such contributions have not been substantially focused on Abuja's foreign policy.

Akinyede and Agbaje (2006) discuss the impact of Nigerian satellites on national development through sustainable enhancement of economic planning. Giokos and Whiteside (2016)

examined the use of satellites for climate change and updating the national maps. Okon (2018) notes the use of Nigerian satellites for tracking areas seized by the terrorist group Boko Haram and for border management. Similarly, George Etomi and Partners (2018) highlight the satellite's role in land surveying and crop cultivation across Nigeria, stating that satellites can provide farmers with data on quality soil and the monitoring of large-scale food production, thus preventing shortages.

Furthermore, Oyewole (2017) observed the importance of the provision of satellite images to the National Emergency Management Agency (NEMA) for national disaster management. He further stresses the importance of space research and development in Africa, mainly to improve human development and security through dependable and reasonable access to space technology benefits. Oyewole notes that African states with large economies and power could build an independent space capacity to help other less-developed countries. This, he claims, would lower the cost of disseminating the benefits of space technology across the continent (Ibid:202). Given the rapidly growing interest of African states in space technology, Nigeria could use its position and experience in this area to serve as a role model to its African counterparts (Tella, 2018).

Tella (2018) identifies the need for Nigeria to utilise space technology in addressing its domestic challenges, such as insecurity, unemployment (the economy), and border security, among others, claiming that the achievement of this would play a vital role in strengthening the state's hegemonic credentials. The issues highlighted correspond with other scholars' assertions regarding Nigeria's internal challenges, as previously stated in this section (Mayall, 1976; Ojakorotu and Adeleke, 2018; Oshewolo, 2019). This author is crucial to this research, and this study builds on his work.

The rationale for the study is to address the gap in the literature by strengthening Nigeria's foreign policy through space capabilities. This research does so by first examining the domestic environment to identify issues that affect Abuja's regional influence and how they could be addressed through space technology. This is based on the premise that the state must be stable to enable it to function effectively in its external affairs.

As stated, some scholars, for example, Oyewole (2017) and Tella (2018), have identified issues that affect the state as well as space contributions to society. However, their research does not comprehensively focus on Abuja's use of space capabilities for spacepower. The studies also did not go in-depth to examine the core issues in the domestic environment. Furthermore,

Oyewole (2017) and Tella (2018) did not use primary data in their analysis; they only made use of secondary sources. This research differs because it uses primary data and document analysis to analyse and state its position. Similarly, this study critically addresses the domestic economy and national security issues, including border management, as these are the major issues that affect the Nigerian state. The thesis further proposes space-enhanced solutions to domestic challenges and foreign policy by gathering data through interviews with key stakeholders such as space diplomats, space scientists, space directors, foreign ambassadors, and the public, as well as analysing government policies (this is discussed in Chapter 3).

Power is crucial to a state's function and influence. Neoclassical realists focus on the domestic factors that strengthen a state's interpretation of foreign pressures to stabilise in a systemic setting. Power, for the IPE scholars, is exercised to control established structures, while an actor can exercise spacepower based on its effective use of its space capabilities.

Space capabilities serve as a basis for power to achieve national goals (Lupton, 1998). Peter (2010) suggests that spacepower is the ability of actors to act skilfully in the global space arena and use space capabilities to achieve their national objectives. Thus, while space capabilities are argued to address domestic issues, they can also be used as a means to acquire power and strengthen Nigeria's influence on the continent. With its relatively substantial space capabilities, Nigeria does not claim to be a regional hegemon in space technology, even though it has acted in this capacity on various occasions. As Nolte (2010) notes, because of the mandate that regional powers have a special responsibility to ensure security and order in their region, Abuja's material power allows it to act hegemonically, despite not clearly defining its use of space technology in its foreign policy objectives (Tella, 2018).

Against this background, the study adopts Strange's (1994, 2015) IPE structural power theory as a means by which Nigeria can leverage its space capabilities to strengthen its regional power and enhance its space diplomacy. Similarly, the spacepower theory is considered to conceptualise Abuja's space capabilities and activities as a means for spacepower.

Strange (1994, 2015) argues that power can be acquired through the control of security, production, finance, and knowledge structures. Structural power can be possessed through the establishment of structures, shaping of incentives and payoff (Cohen, 2016). Research on space and the IPE structural power is not common.

Lieberman (2017a) uses Strange's power structures from both a historical and popularisation standpoint. She shows how states have leveraged their national space programmes to

continually seek to exhibit power in the four structures for the purpose of acquiring greater advantage in relational and structural power (Ibid). In another of her works, Lieberman applies the IPE structures of knowledge, power, and hegemonic influence to the popularisation of space. She discusses the use of space and space activities by performers as inspiration, thereby promoting space and its cultural and artistic aspects. Lieberman also examines the improved use of space for communication as well as the downstream space technologies as common products (Lieberman, 2017b). Rementeria (2022) applied the structural power theory from the perspective of the commercialisation of space. He examines the impact of space commercialisation on the four IPE power structures.

Taking this a step further, and thus filling a gap in the literature, this thesis has set out to examine space as a fundamental power structure from the perspective of foreign policy and the strengthening of Nigeria's regional influence. Apart from Abolarin (2023), no study has been carried out on Abuja's space using the IPE structural power theory. Abolarin applied Strange's power structures from the aspect of the commercialisation of Abuja's space sector and Beijing's involvement in the national space programme. Hence, the study differs by showing how Nigeria can leverage its space capabilities through the security, production, knowledge, and finance structures to acquire structural power on the continent.

As discussed earlier, Nigeria has four operational satellites, a space agency, and ongoing capital space projects, such as the Assembling, Integration and Testing Centre (AITC) and launch station. These are key space infrastructural capabilities that serve as the basis for this thesis's argument. This is because they are enablers of the applications and structures required to address domestic challenges and strengthen the state's external influence. This is where the spacepower theory comes into play. The research on Nigeria contributes to the developing field of spacepower; that is, the use of space capabilities serves as spacepower for the West African state.

Furthermore, Nigeria's space collaboration has contributed to the development of the state's space capabilities. The state has agreements with Surrey Satellite Technology Limited (SSTL), UK, and the China Great Wall Industry Corporation (CGWIC), among other organisations. The two firms, with the inclusion of Nigerian engineers, have built and launched Abuja's satellites. Therefore, this study considers Nigerian space relations, drawing upon the views and opinions of stakeholders within the space sector. Considering the Chinese spacepower and global dominance agenda and Abuja's space ambition, particularly as Beijing is a significant

contributor to the development of its space capabilities, the thesis examines this aspect and how it contributes to Nigeria's space diplomacy.

Finally, this research aims to contribute to knowledge theoretically. The combination of concepts of NCR, spacepower, and IPE structural power analysis is novel. Each theory has been applied to various sections and combined to make a theoretical sense in Chapter 6. This dimension all links to the effective use of Nigeria's space capabilities at both the domestic and international levels, thus enhancing the state's foreign policy.

Research Questions

The thesis proposes space technology as a means of addressing domestic issues and strengthening other key sectors in the state. Considering this, the research suggests Nigerian space applications and activities as a basis and addresses the below question:

1. To what extent does space technology contribute to Nigeria's domestic environment, and in which sectors?

This thesis develops a new trajectory for strengthening Nigeria's regional hegemony. By addressing this central need, the research will contribute to the search for an enduring source of influence for Nigeria in Africa. Therefore, it addresses the below question:

2. To what extent do Nigeria's space capabilities enhance its regional influence, and how does this align with its foreign policy?

Space collaboration is a crucial aspect of the space sector. Nigeria has space partnerships with SSTL and CGWIC, among other firms, which have played a part in the development of its space capabilities. However, considering Nigeria's space diplomacy as well as other states' global agendas, this question is examined:

3. How do Nigeria's international space partnerships, in particular with China, contribute to its space ambitions and shape its space diplomacy?

The final question addressed in this thesis involves the combination of theories to examine the Nigerian case study and contribute to knowledge. Thus, the question discussed is:

4. To what extent do Nigeria's space activities contribute to foreign policy, spacepower, and the International Political Economy (IPE) structural power literature?

Structure of the Thesis

The research consists of a general section and seven chapters, which are outlined in the following structure:

The first part is the general section that serves as the introduction, which sets the background for the research and includes the research questions and structure of the thesis.

Chapter One outlines the theoretical framework and the review of relevant literature, which involves evaluating the contributions of other studies around the research questions. The chapter examines spacepower, NCR, and Strange's IPE theories and their relevance to the central focus of the thesis. Finally, the chapter presents the research methodology, which includes the presentation of data collection techniques used to obtain data and the analysis of empirical data.

Chapter Two focuses on Nigeria's space journey, the state's space capabilities, and its Afrocentric foreign policy. The chapter discusses Nigeria's upstream and downstream space sectors, linked to Abuja's space capabilities and its use of satellites. The discussion on foreign policy set the context for the research, thus highlighting the need for the thesis.

Chapter Three is the first of the data analysis chapters. It applies the NCR theory to examine the Nigerian domestic environment and identify the challenges that affect the country's external influence. The chapter therefore discusses how space applications could be used to address Abuja's domestic issues.

Chapter Four considers the IPE structural power analysis within Nigeria's regional activities. The chapter discusses how Nigeria's space capabilities can be utilised through the security,

knowledge, production, and finance structures to acquire and control power in line with its Afrocentric foreign policy.

Chapter Five analyses Nigeria's space partnerships with SSTL and CGWIC and their impact on the state's space programme and ambition. The chapter also discusses how the space collaboration has shaped Abuja's orientation and space diplomacy, including the need for competent negotiators.

Chapter Six focuses on the findings from the previous three chapters and pulls them together by answering an overall theoretical question. The chapter examines how Nigeria's space activities add to the literature on foreign policy, spacepower, and IPE structural power.

Chapter Seven concludes the thesis by detailing the research's original contribution to knowledge and considers the study's implications for theory and practice. The chapter ends by proposing areas for further research.

Chapter One: Theoretical Framework and Methodological Considerations

1.0 Introduction

The dynamic nature of the international political setting means that there is neither a general theory that applies to all events nor a concept that explains every circumstance. Thus, to interpret International Relations (IR) and offer theoretical clarification, a mixture of theories might be required. This approach equally applies to the study of Nigeria's foreign policy and space activities. Hence, the chapter focuses on the concept of power; theoretical framework; on our understanding of spacepower; on the scope of IR: foreign policy and Neoclassical Realism (NCR); and on the IPE structure of power. The IPE structural power and spacepower theories are mainly applied to Nigerian space activities. Nigeria's space resources represent capabilities that the state can control in the form of structures in which other countries operate. The other theory applied in this thesis is NCR. NCR is principally adapted for the foreign policy aspect because the theory focuses on the state- and unit-level factors that determine a state's foreign behaviour.

The chapter begins with a brief discussion of key terms and the concept of power in IR, followed by the spacepower theory. The next section examines the NCR and the classification of power. The aim of classifying power is to categorise Nigeria within the global power context, despite being a regional hegemon. The third section applies NCR to foreign policy and Nigeria's national interest. The following section focuses on the IPE structural power theory and its link to spacepower and Nigeria's space activities. The latter part of the chapter shifts attention to the conceptual and theoretical framework, while the concluding section discusses the research methodology.

1.1 Power: Key Terms and Concepts

There are several concepts of power in International Relations (IR). To realists, power is the central ordering principle that stems from material resources and is essential to the actualisation of a state's goals of self-preservation or global dominance (Lobell, Ripsman and Taliaferro, 2009). For a liberal in IR, power is central to the promotion of fairness and cooperation without imposing force (Starr, 2007). Thus, the main idea is cooperation and how power exercised indiscriminately can be detrimental to individual freedom and the rule of law.

Furthermore, Steve Lukes, in his 1974 book "Power: A Radical View", postulated a three-dimensional approach to power. These are the one-dimensional view (observable and behavioural power); the two-dimensional view (agenda-setting and covert power); and the three-dimensional view (implicit or structural power) (Haglund and Lukes, 2005). The first dimension, derived from Dahl's (1957) work, focuses on power relations (Lukes, 2005:16). That is, the capacity of an actor to move another actor to perform an action they would not have otherwise considered. Strange (1994, 2015) alluded to this type of power as a relational power where there exists a comparison of power between actors (Azmanova, 2018). Thereby, the more powerful state influences other actors' behaviour (Volgy and Imwalle, 2000). The second dimension, derived from Bachrach and Baratz's (1962) work, goes beyond the one-dimensional view of power to focus on agenda-setting and the control of decision-making processes (Lukes, 2005:20). Lukes argued that an actor possesses power if it dictates the scope of what is discussed, thus manipulating the processes to constrain decision-making to issues considered safe. The three-dimensional view considers the capacity of an actor to shape others' perceptions of a situation, thus influencing their ideology and values. This third dimension critically analyses the first two views' behavioural focus and considers the numerous ways that potential issues are excluded from politics. This could be through social forces and institutional operations or through the choices made by individuals. Essentially, Lukes maintains that the three-dimensional view is more crucial because it examines the ways power can function at a level beyond the awareness of individuals (Ibid).

This is similar to the International Political Economy (IPE) structural power theory. Strange (1994, 2015) argues that power can be acquired by shaping and determining the IPE structures in which other states operate. The acquisition and the structural control of power that transcend beyond the ability of the subordinates is the relatedness of the two theories. However, a clear variation between Lukes' three-dimensional view of power and the structural power analysis is Strange's focus on the four structures of security, production, finance, and knowledge, without which an actor cannot gain power. Likewise, in the tenet of spacepower, an actor can acquire power and influence others based on how effectively and strategically they utilise space and its capabilities (Bowen, 2020).

We might summarise that realists focus on power for self-promotion and self-preservation; liberals concentrate on power to ensure individual rights and cooperation; the three-dimensional view of power is that which focuses on influencing ideology and values; and

among IPE scholars, power exercised to control established structures is crucial. What each of these approaches acknowledges is that the primacy of power and the function of the state are inseparable. The NCR, discussed in this thesis, goes a step further and focuses on the state's domestic sectors and how they affect its foreign policy behaviour. Likewise, spacepower takes the state's space capabilities and activities into consideration and how they could be used to influence other countries. Nevertheless, we must not forget to ask, as Strange does, where authority lies—who has power? It is also necessary to ask why they have it—what is the source of power? (Strange, 1994, 2015).

1.2 Spacepower

A good approach to discussing spacepower is to examine how actors have leveraged space to acquire power or enhance their national power. This is because the use of space is only significant when it can impact earthly events (Townsend, 2019). Thus, an excellent example is the "Space Race" of the 20th century between the two superpowers of the time. The space race began with the launch of Sputnik 1 in 1957. This was followed by a series of space launches by the US, which were met with responses by the Soviet Union. Burwell (2019) suggests that the competition emerged from both states' ambition to achieve technological and ideological superiority, an aspiration articulated through a dualistic discourse that made space an expansion of the nation-state. During this period, the ability to dominate in the technological, industrial, and financial areas was seen as proof of ideological superiority as the space race became a source of global prestige and national pride (Rementeria, 2022).

The interstate rivalry gave birth to the concept of spacepower (Peter, 2010) and is a reminiscence of the realists' anarchic belief that individual states must be relentlessly self-seeking in the international environment (Mearsheimer, 2007; Rathbun, 2008; Waltz, 2010). Therefore, the struggle to dominate outer space transformed the US and Soviet Union's national administrative strategies (Roberts, 1988), prompting a massive increase in military spending and technological advancement as both powers strove to achieve a higher level of knowledge and production (Lieberman, 2017b). Indeed, apart from using outer space as a tool in the Cold War, it was also demonstrated as a sector for the scientific, social, and economic development of states. By the end of the Cold War in 1991, more states had begun to engage in space activities (Tella, 2018, 2020) with an awareness of the enormous benefits, which prompted more investment in the sector. Space technology and space activities have, therefore,

evolved into a vital component of modern states' infrastructure and economy, constituting an essential aspect of power in international relations (Bowen, 2020). That is, space has become a means for the attainment of spacepower by states.

There is neither a widely accepted definition nor a comprehensive theory of spacepower (Townsend, 2019). Instead, many of the definitions that emerge focus on various aspects of spacepower. Bowen (2020), who agrees that spacepower covers a wide range of space activities, technology, and issues related to outer space, defines spacepower as the concept of how an actor could use space and its resources, or what it successfully draws on to enable it to do so. Similarly, drawing from military thinkers such as Mahan and Mitchell, Lupton (1998) defines spacepower as a state's ability to leverage its astronautic capabilities and the space environment in its quest to achieve national goals and objectives. These objectives could be completely military, like gathering intelligence information, or nonmilitary, such as acquiring earthly resource data or private communications (Ibid).

In his attempt to explain spacepower, Peter (2010) describes spacepower as the:

> *"Total strength and ability of a state to conduct and influence activities to, in, through and from space to achieve its goals and objectives (security and military, economic and political) to affect desired outcomes in the presence of other actors in the world stage and if necessary to change the behaviour of others by exploiting the space systems and associated ground-infrastructure as well as political leverage it has garnered"* (p. 351).

This implies the importance of space in states' strategic actions and the achievement of national goals that are not solely military but also economic and political, wherein the role of power is the nature of what is done in and with space, including how it is done. On the basis of these definitions, we can assume that spacepower is the ability of states or related actors to act skilfully in the global space arena and use space capabilities to achieve their national objectives. This is consistent with the space race, in which both superpowers achieved national and international success with space technology.

In the same vein, Peter (2010) believes space activities are increasingly linked to national power for major global powers. He defines national power as the ability of a state to achieve

strategic goals with purposeful effort. In other words, national power is the total effort of a state to use its space capabilities in its quest to realise its objectives. As Ziarnick (2021) puts it, a major benefit of spacepower (space capabilities) to states is the expansion of their general power through the space activities. That is, space activities strengthen the state's diplomacy, technological, military, and economic instruments of national power (Ibid). This justifies the link between spacepower and national power and extends to NCR. As would be discussed in Section 1.3.1, NCR acknowledges the importance of the domestic environment, which is related to national power. If national power is the state's capacity to achieve its national goals and objectives in relation to other states, NCR's role is to examine domestic factors and structures in order to interpret external pressures and respond through its foreign behaviour (Rose, 1998; Foulon, 2015).

Further, Peter (2010) suggests that the evolving nature of the geopolitics of space activities mandates that no state can acquire or maintain global power if it lacks advanced and comprehensive space capabilities. Peter justifies this by claiming that states with at least regional power ambitions have set up space agencies or institutions to help them achieve national space objectives and enhance their capabilities. These agencies or institutions guide both their domestic and international space activities (Ibid). This, overall, shows that spacepower is essential for states with international aspirations. That is, "space activities and the benefits of power a state can derive from it (space power) have become an indispensable element for a country with global ambitions." (Peter, 2010:350). Indeed, these spacepower definitions show that spacepower is not only military but also comprises political and economic aspects of space, and power demonstrated by cooperation to attain national goals (Townsend, 2019). This means that, in whatever aspect or capacity a state uses space, whether for military or security purposes or to improve the national economy, it is spacepower. Moreover, using the NCR framework, spacepower resides in government policies on space activities for the achievement of national goals.

On economy, spacepower can influence the financial status of an actor, and be affected by the actor's economic competence (Hays and Lutes, 2007). States require funds to build or acquire solid space capabilities for the benefit of their citizens and to pursue their foreign ambitions. For example, space applications have contributed to the national economy through telecommunications and the use of Earth observation (EO), remote sensing, meteorology, and

navigational satellites. It has also established opportunities for growth and enhanced globalisation and the international economy (Ibid).

On security, Hays and Lutes (2007) surmise that spacepower improves the capacity of states to operate in an anarchic global security system. Thus, spacepower is commonly considered in connection with national security. While Hays and Lutes agree that the relationship between spacepower and national security depends on how the state observes its national interest, they suggest that the state may expand its power in order to increase or reduce the gap between itself and other space powers or may constrain other space actors' power, including guiding its benign status quo (Ibid). This can be achieved with the upstream and downstream space applications that supply an array of versatile and assorted services and data that actors can use for peaceful and nefarious objectives (Bowen, 2020).

Hays and Lutes (2007) further note that spacefaring states are thought to have two major concerns about security and space capabilities. The first is how to leverage space capabilities to ensure that the state or connected actors are secured. The second challenge is how to protect both military and civilian space capabilities. Overall, Peter (2010) mentions that the possession of equipment and human resources is insufficient for spacepower unless the assets are structured for executing special missions. In other words, the value of spacepower relies on being able to set the agenda for space and have an effect on other actors. It is on this point that this research bases its argument for the use of Susan Strange's IPE power theory, discussed in Section 1.6, to demonstrate the utilisation of space capabilities in quaternion forms, all for the purpose of acquiring structural power.

Considering that the theory of spacepower is still developing and has several gaps that could be filled, applying the concept to Nigeria's case study, that is, quantifying the state's space capabilities as spacepower, is novel. In addition, linking spacepower with the NCR and the IPE structural power theory will contribute to the development of the field of spacepower.

1.3 Realism

Realism is the foundation that supports foreign policy analysis (FPA) and the study of international relations theory (Wohlforth, 2016). Realism "…stresses the primacy of foreign

policy. Its image of international politics is not one of social communications between societies but of diplomatic bargaining between states" (Katzenstein, 1976:7). The theory involves how states stabilise in the systemic setting and what they potentially benefit at the expense of others.

Realism, as an approach, is grounded in three fundamental presumptions of how the world works: groupism, egoism, and power-centrism. Groupism is the idea that human survival hinges on group cohesion, which could form the basis for conflict with other groups (Wohlforth, 2016). In other words, no human being can individually survive except as a member of bigger groups that command their loyalty and offer some degree of security from external rivals (Lobell, Ripsman and Taliaferro, 2009). The dominant social groups are the states, while nationalism is the most significant source of in-group solidity (Wohlforth, 2016). Egoism centres on human nature and self-interest, which primarily drives political behaviour. Likewise, for power-centrism, power is vital in politics and is the central ordering principle, stemming from the inequalities of social influence and material resources (Ibid). A group needs power to secure its goals of self-preservation or global dominance (Lobell, Ripsman and Taliaferro, 2009). All the proponents of realism base their arguments on these assumptions.

A general assumption among realists is that anarchy exists at the international level. Rathbun (2008) argues that anarchy is the driving force in realism because it cannot be avoided without severe consequences. Similarly, Mearsheimer (2007:73) states that "Anarchy is an ordering principle; it simply means that there is no centralised authority or ultimate arbiter that stands above states. The opposite of anarchy is the hierarchy, which is the ordering principle of domestic politics." What differentiates domestic politics and international political systems is the contrast in ordering principles—anarchy versus hierarchy (Lobell, Ripsman and Taliaferro, 2009). Indeed, the nonexistence of governance in the global constellation of states creates a clear distinction between international and domestic politics (Beasley *et al.*, 2012). Given the nature of the international environment, Mowle (2003) claims that conflicts are often likely due to the absence of standard rules, causing the more powerful states to prevent other states from pursuing their preferences. Thus, every state is expected to look after itself. As Waltz puts it, "each unit's (state) incentive is to put itself in a position to be able to take care of itself since no one else can be counted on to do so. The international imperative is 'take care of yourself!'" (Waltz, 2010:107). This implies that states must secure themselves in a world where nobody can be held responsible for their protection. Assuming states want to survive, specific

incentives are provided to them by the system, one of which is the process of *"self-help"*. That is, states need to accumulate power to realise their goals (Rathbun, 2008:304).

1.3.1 Neoclassical Realism

Rathbun (2008) claims that Neoclassical Realism is not a degenerative viewpoint or an independent variation of realism; rather, it incorporates the positions of other variants of realism. As realists highlight the importance of systemic structure, their perspective underlines the primacy of foreign policy (Katzenstein, 1976). Thus, NCR aims to clarify the disparities in foreign policy over time and space by augmenting the structural assumptions of neorealism with some condition variables that guide the extent to which anarchy and conflict impact foreign policy (Wivel, 2005). Further, it addresses issues that other realist theories have failed to explain, such as why states respond differently to similar external environments and incentives. "The value-added of any neoclassical realist theory, therefore, lies in its ability to predict and explain political behaviour that a sparer structural realist theory cannot." (Ripsman, Taliaferro and Lobell, 2016:114).

In highlighting the significance of NCR to foreign policy, Wohlforth (2008:46) dubs NCR the "realist theory for the foreign policy analyst" because the theory was set at the juncture of international relations and foreign policy analysis (FPA) by its pioneers (Hudson, 2005). Gideon Rose, who coined the term "Neoclassical Realism" in his 1998 article, *Neoclassical Realism and Theories of Foreign Policy*, argues that the theory serves as the basis for a "General theory of foreign policy" (Rose, 1998:145). According to Rose, NCR:

> "…explicitly incorporates both external and internal variables, updating and systematizing certain insights drawn from classical realist thought. Its adherents argue that the scope and ambition of a country's foreign policy is driven first and foremost by its place in the international system and specifically by its relative material power capabilities. This is why they are realist. They argue further, however, that the impact of such power capabilities on foreign policy is indirect and complex, because systemic pressures must be translated through intervening variables at the unit level. This is why they are neoclassical" (Rose, 1998:146).

The above statement indicates the connection between foreign policy and the international system, thus emphasising the importance of integrating the systemic setting and domestic environment. This is supported by Zakaria (1992), who claims that the systemic, domestic, and other influences that specify what features of the policy can be explained by specific factors should be included in a state's foreign policy.

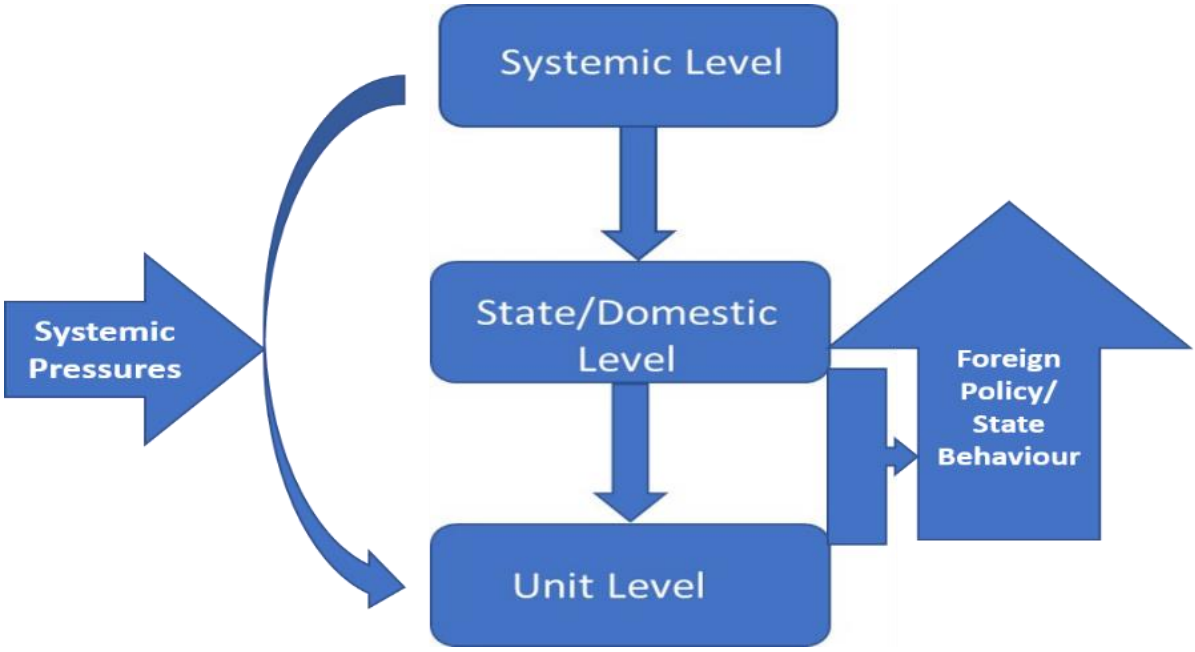
The state's position in the global system (discussed in the next section) is crucial, as are its relative material power capabilities (MPCs), which gradually shape the broad pattern of its foreign policies. Mearsheimer (2007) opines that realists primarily quantify power based on material capabilities. Material capabilities are the power that states can use to influence each other as they secure their own survival by preventing any other state from dominating and ensuring it does not acquire enough power. This action is termed the "balance of power". The argument for the balance of power is based on the ultimate fear that as other states become more influential, they pose a threat to the state (Mowle, 2003). As discussed in Section 1.2, states can acquire power through the use of space capabilities (spacepower). Space capabilities such as modern satellites, gadgets, and space launchers could serve as MPCs or enablers of a state's capabilities, thereby strengthening its external influence. Indeed, NCR predicts that the number of material power resources a state acquires will shape the size and motivation of its foreign policies in the long run. In other words, as a state possesses more relative power, it will try to pursue additional external influence (Rose, 1998). Spacepower can be crucial to the attainment of this feat.

The latter part of Rose's statement on the effect of the MPCs on foreign policy being complex because the intervening variables must translate systemic pressures since no direct or ideal transmission belt connects material capabilities to foreign policy behaviour (Rose, 1998; Schweller, 2004) is where NCR becomes relevant. NCR is a top-down, global system-based theory that, however, integrates internal variables (Narizny, 2017). It acknowledges the central anarchic nature of realism but posits "a state-level-mediating variable between system and foreign policy action and bridge the spatial divide." (Foulon, 2015:637). To simplify this, Rose (1998) identifies independent and intervening variables to explain state behaviour.

The relative power distributed among states is an independent variable situated at the systemic level (see Figure 1), and any changes in the distribution of capabilities often trigger responses from the states. The intervening variables are the domestic transmission belt, through which

systemic pressures are filtered. These variables encompass state-level (state structure, ideology, the political economy, and society relations) and unit-level (political regimes and the individual state leader's perceptions) variables and explain precisely how systemic incentives affect foreign policy (Adigbuo, 2007; Foulon, 2017). In plain terms, NCR analyses the intervening variables (domestic politics and unit-level variables) to determine foreign policy and explain fundamental historical puzzles, such as why states adopt specific policy choices in response to systemic incentives (Schweller, 2003).

Figure 1: Independent, intervening, and dependent variables



Source: Author's elaboration, based on Rose (1998)

Furthermore, Schweller (2004) explains how the unit- and structural-level connect to produce a systemic outcome. He identifies four unit-level factors that could potentially become state strategies and preferences (inputs) crucial for the explanation of systemic outcomes. These are the elites' preferences and perceptions of the external environment; which elites' preferences and perceptions "matter" in the policy making process; the domestic political risks associated with certain foreign policy choices; and the variable risk-taking propensities of national elites (Ibid:169). In line with Schweller's unit-level factors, NCR contends that the elites' perceptions of relative power matter the most because they influence foreign policy decisions. On this basis, Rose (1998) argues that objective material power trends might not be closely or continuously tracked by the state's foreign policy in the short term. Moreover, elites do not have absolute

freedom to direct national resources. Hence, the state's structure and strength relative to its society must be examined, as they are a determining factor in allocating national resources to foreign policy.

For this thesis, it is essential to grasp the general concept of realism, NCR's intervening variables, and their influence on foreign policy behaviour. The following section examines the classification of power, for as Rose (1998) tells us, the scope and ambition of a state's foreign policy are primarily propelled by its position in the global system and its relative MPCs. The classification of power is vital to this thesis as it provides a measure by which to determine Nigeria's place in the international system; this then allows us to understand the extent to which its position affects its foreign policy.

1.4 Classification of Power

This section aims at classifying Nigeria in the international setting and examining its foreign policy choices based on Rose's theory of NCR (1998). There are different levels of power in the international system, with states ranked based on their capabilities and influence. John Mearsheimer suggests these classifications of power when he states that the absence of global regulations in the international system could scupper the chances of 'less powerful states' of gaining favourable policy in their relations with other states, especially the 'power states'. On another occasion, Mearsheimer points out that the main actors in international politics are the 'great powers', who operate in an anarchic setting (Mearsheimer, 2007). Although Nolte (2010) contends that there is less agreement regarding the further characteristics of the international power ranking, several international relations scholars have used different terms to classify states in the power ranking. For example, superpowers, emerging states, secondary powers, intermediate states, middle powers, regional (great) powers, and other states with minor influence (Gilpin, 1981; Ravenhill, 1998; Jordaan, 2003; Flemes, 2007; Nolte, 2010). Nevertheless, this thesis uses general classifications such as "great power", "middle power", "regional power", and "lesser states" for its discussions.

1.4.1 Great Powers

Robert Gilpin defines great powers and their characteristics as "both individually and in interaction with one another, those states that historically have been called the great powers and are known today as the superpowers establish and enforce the basic rules and rights that influence their own behavior and that of the lesser states in the system" (Gilpin, 1981:30). Gilpin's assertion connotes that there are 'great power or superpower' states. The great powers are major actors that concentrate on their economic and military influence in comparison with other great powers (Mearsheimer, 2007). Similarly, Nolte (2010:887) maintains that "the status of a great power requires material resources together with the formal recognition of the power's status by other great powers as well as observable repercussions on the operation of the international system and the behaviour of other great powers (or superpowers)." For example, the US is considered a global superpower because of its strong military and stable economy. China has similar capabilities that it is building on and seeking to replace the US with.

As discussed in Section 1.3.1, the perception of systemic pressures is crucial to states' interpretations of the global stage, and thus influences their foreign policy behaviour. The superpowers or great power states, such as the US and China, with their power capabilities, determine the level of pressures that are perceived and translated by other states on the international arena: for the purpose of this thesis, the impact on Nigeria is of interest. Nigeria has a close relationship with the US, from whom it has purchased military hardware including fighter jets, and has collaborated on military training (Kazeem, 2017; Army Technology, 2022). We can class this as a military relationship based on military hierarchy. Similarly, Nigeria has a close relationship with Beijing on technology. Evidence of this is the Chinese firms' construction of Nigerian railways and communications satellite, including loans acquired by Abuja from the Chinese EXIM Bank (Adepoju, 2021; Adebajo, 2022). We can class this as an economic relationship based on technology hierarchy. Nigeria's relationship with these two great powers is, and has always been stable, thus contributing to national development and security. This is further discussed in the analysis chapters on Nigeria.

1.4.2 Middle Powers

Jordaan (2017) argues that the term 'middle power' in international relations lacks a clear definition. He contends, however, that only mid-range states that are fully engaged in stabilising the liberal hegemonic order should be considered 'middle powers' (Ibid). Similarly,

Flemes (2007) defines middle powers as states that do not have 'great power status' yet possess global influence. Likewise, Jordaan (2003:165) suggests that "middle powers are states that are neither great nor small in terms of international power, capacity and influence, and demonstrate a propensity to promote cohesion and stability in the world system." These definitions provide a basic understanding of middle-power states and their global roles but do not clearly explain the extent to which these states can influence other powerful states. On this note, Malamud (2011) contends that Jordaan's claim, which adds a behavioural perspective to the definition of middle powers, makes it problematic because behaviour is conduct and not a structure. In other words, states' actions do not, in all cases, align with their power ranking. For instance, Jordaan's suggestion that middle powers possess the tendency to promote global stability raises a further question. According to Malamud, states like Iran and Mexico that are middle powers with disruptive behaviours, though excluded in Jordaan's analysis, are still middle powers (Ibid). In light of this critique, it is worthwhile to examine briefly how two major IR theories, Neoliberalism and Realism, view the middle powers.

Neoliberalism theorist, Robert Keohane, in his classic article: *Lilliputian Dilemmas: Small States in International Politics*, argues that a middle power is "a state whose leaders consider that it cannot act alone effectively, but may be able to have a systemic impact in a small group or through an international institution" (Keohane, 1969:295). This claim corresponds with Jordaan's (2017) assertion and highlights the influence of middle powers in their regions and their limitations at the international level, thus using their membership in global institutions as a path to make an impact.

Realists view a middle power as a unit with a regionally influencing power base (with a focus on its national interests) that cannot unilaterally alter the international system. Thus, Wohlforth (1999) postulates that these states can only influence the systemic if they form an alliance with other regional unipolarity and translate their economic potential, power projection, and defence industry into the material capabilities required to be a pole. We may summarise, therefore, that states classified as middle powers have a strong influence in their territories but must collaborate with other middle powers or, sometimes, great powers to make an impact globally.

Contrary to the realists' emphasis on material capabilities, some scholars have defined middle power states based on their foreign behaviours rather than their material resources. Daniel Flemes argues that the concept of middle power is more beneficial for explaining common

patterns in foreign policy behaviour and strategies (Flemes, 2007). Thus, he maintains that "a middle power is active in international organizations and supports the objectives of international peace and security, as one of its defined national interests, which leads to a more stable world order" (Ibid:8). Equally, Cooper, Higgott and Nossal (1993) notes that middle powers possess "the tendency to pursue multilateral solutions to international problems, the tendency to embrace compromise positions in international disputes, and the tendency to embrace notions of "good international citizenship" to guide diplomacy" (P. 19).

Further, John Ravenhill, in his 1998 article: *Cycles of Middle Power Activism: Constraints and Choice in Australian and Canadian Foreign Policies,* analyses middle powers based on five 'Cs' attributes (capacity, concentration, creativity, coalition-building, and credibility).

For capacity, the attributes of a middle power's foreign ministry and its diplomatic services compared to other lesser states are more crucial than its military and physical capabilities. The use of top analytical skills, communication networks, and active gathering of intelligence is adopted by middle powers to maintain their foreign activities. Furthermore, unlike smaller states, middle powers often have sufficient diplomatic tasks by which they share their ideas while also trying to prove their utility to others. Energy and stamina are vital for the implementation of these ideas (Ravenhill, 1998).

Nigeria is a middle power as per these theoretical discussions. The state is involved in several regional engagements that allow it to display its hegemonic prowess. Abuja plays leadership roles in continental organisations, where it shares its ideas with subordinate states. On the other hand, the use of technology and intelligence by Nigeria for foreign policy purposes is generally documented. For example, Nigeria's Earth Observation satellite was part of the Disaster Monitoring Constellation (DMC), which supplied on-time and relevant information to countries for the management of natural disasters (Ikpaya *et al.*, 2016). However, Nigeria could yet leverage more of its space capabilities as a spacepower to enhance its foreign policy.

In explaining concentration, Ravenhill (1998) argues that middle powers possess the same level of diplomatic capacity as superpowers and major powers, only that they differ in the application of their advanced skills to their respective foreign policy agendas. Middle powers can execute only a limited number of objectives at a time, whereas superpowers can simultaneously execute

multiple objectives. The limitations on the resources possessed by middle powers leads to the prioritisation of objectives that are mostly believed to yield anticipated outcomes.

Nigeria carries out fewer foreign policy objectives at a time than a superpower would be inclined to do. On space, this means developing a small number of satellites as part of its space capabilities, as opposed to the numbers produced by (space) superpower states, i.e., the US or China. However, despite lower numbers, Nigeria's satellites are used within its region and circle of influence to garner and further foreign policy aims. Abuja uses its satellites, such as EO and communications satellites, to foster commercial collaboration and for the provision of data for security and environmental management.

Ravenhill (1998) suggests that middle powers should provide intellectual leadership and brokerage. He points out three (3) primary types of leadership: entrepreneurial, intellectual, and structural. Entrepreneurial leaders are brokers who are skilled at negotiating and framing issues in ways that promote integrable bargaining and deal agreements. In contrast, an intellectual leader frames the intelligence capital or innovative systems of thought that form the institutional bargaining participants' perspectives. According to Ravenhill, the middle powers' bureaucratic capacity determines whether they can provide entrepreneurial and intellectual leadership (Ibid).

Structural leadership is when the dominant material resources of a party are used in a specific way to dictate terms to other partners (Ravenhill, 1998). This aligns with Strange's (1994, 2015) structures of power, with which a state can influence other states through its control of the four structures (security, production, finance, and knowledge) in IPE (see Section 1.6). As discussed in Section 1.2, space technology and its applications can be a powerful asset (spacepower) through which Nigeria sets the terms of engagement in its region.

Ravenhill contends that middle powers can be empowered to lead through their creativity and ideas, adding that though they do not monopolise creativity, it is not guaranteed that they will act creatively on any matter. However, "quick and thoughtful diplomatic footwork" can compensate for any weakness in a middle power's relative economy, politics, or military (Ibid: 311-312). The Nigerian economy is one of the largest in Africa, but, like any other country, the national economy was hit hard by the global pandemic in 2020. Likewise, the military has been set back by its ever-extending war against terrorism. However, the potential for the use of space

applications as a means to control the four structures of power can provide Abuja with structural leadership.

For coalition-building, Ravenhill (1998) claims that the creativity demonstrated by the middle powers' entrepreneurial and intellectual leadership is channelled towards the partnership between similar states. In most cases, middle power states are not able to impose their will but can persuade others to support their opinions and act accordingly. Further, the forum and the nature of issues will determine the shift in the composition of coalitions, which may include other middle powers, smaller states, and great powers. The concept of coalition-building is part of the middle powers' diplomacy that is often applied in multilateral institutions. As discussed previously, this statement affirms that, despite the middle power's regional influence, they must cooperate with other states to create a global effect. However, middle powers must build coalitions through entrepreneurial and intellectual leadership to achieve their goals in the global system (Ibid).

It could be argued that Nigeria adopts entrepreneurial and intellectual leadership based on the circumstances surrounding its need to act. Nigeria is a natural leader in West Africa, and thus it funds ECOWAS, including hosting its headquarters in Abuja and contributing to the inter-state laws that West African states abide by. In the same way, Nigeria works through the AU to find economic and security solutions that help all African countries (Saliu and Oshewolo, 2018).

Lastly, for credibility, Ravenhill (1998) maintains that middle powers' relative weakness and diplomatic capacity could enable them to play a constructive role in the international setting. A middle power state that pursues its interests and is not likely to be the only prime recipient of the negotiated outcome may have their initiatives (acquired from intellectual leadership or brokering solutions) found to be more acceptable. This external dimension of credibility is subject to the middle power not being alleged to be a stalking horse for a weightier actor. Also, middle powers need to be consistent with the policies they advocate and pursue locally and internationally, perhaps even more than their small-power and superpower counterparts. This is another essential aspect of credibility. Although the Nigerian domestic environment may be experiencing challenges, its foreign policy has consistently centred on West Africa and Africa, and the state has since pursued this goal with its diplomatic capacity, providing material and non-material support to the region.

Cooper, Higgott and Nossal (1993) add to this, noting that middle powers pursue joint solutions to global issues through compromise, which states cannot achieve without playing a constructive role. Hence, middle-power states, although perhaps lacking in hard power military capabilities, can use their diplomatic capacity and creativity to ensure compromise and therefore agreement. This supports the idea that middle powers are global stabilisers and that their leadership approach is usually multilateral as they focus on reaching a consensus on specific issues (Flemes, 2007).

Nonetheless, the pattern of interaction of middle powers both at the regional and global levels is important. At the regional level, the foreign policy choices of emerging and established middle powers are often restricted by the regional secondary powers, which purposely refuse to grant the hegemon the necessary legitimacy and acceptance (Flemes, 2007). For example, there exists a regional hegemonic conflict between Nigeria and South Africa, similar to how Pakistan opposes India's leadership on the Asian continent. Nigeria, with its economic, military, and political power, possesses traditional influence in Western Africa, while South Africa has similar power in its subregion. This competition, rather than consensus, extends to space activities. South Africa launched its first satellite before Nigeria and has a greater number of satellites than the West African state. Nonetheless, Nigeria's current investment in space technology can propel its influence on the continent.

Globally, regional power play is not as important as the state's internationalism and foreign policy behaviour. When it comes to collaborating and negotiating, actors from states with more military or economic power tend to have more influence than their counterparts. In the same way, a state's diplomacy, moral authority, legitimacy, efficiency, and the role of its representatives all give the state an edge in negotiations with other countries (Flemes, 2007).

On the basis of the analysis in this section, Nigeria falls within the category of a middle power. The Ravenhill (1998) five Cs characteristics of middle powers are evident in Nigeria's external relations. Nigeria's engagement in multilateral institutions and global space collaboration provides a path through which Abuja can contribute to international issues. For example, Nigeria is a major contributor to the UN security forces and has highly placed diplomats holding top positions in several international organisations, including the World Trade Organisation (WTO). In space technology, Nigeria was part of the DMC that supplied satellite data to

countries for disaster management. Nigeria will seek to strengthen its international alliances to justify its status as a middle power.

1.4.3 Small States

Gilpin's (1981) definition of great powers, as discussed in Section 1.4.1, indicates the presence of lesser states. These lesser states include the middle powers, the regional powers, and the small states. There is a lack of agreement in the literature on a common definition or criteria to classify "small states" (Maass, 2009; Baldacchino and Wivel, 2020). Nevertheless, while small states can be simply defined as states that do not qualify as great powers, Baldacchino and Wivel (2020) argued that small states are considered to possess a limited size of political, economic, and governmental structures, including a small population. According to the World Bank Group Report, small states are independent states with less than 1.5 million people (World Bank, 2023). These limitations are thus heightened by the power asymmetry in the systemic environment, impacting the states' ability to handle security threats and influence international negotiations (Ibid). Thus, a small state is often expected to take part in joint events or operations (Kassimeris, 2009), where it can reach consensus with other states. This is similar to the attributes of middle powers, as Keohane (1969) suggests that middle powers rely on collaboration with other groups or as members of international institutions to make a global impact. As established in the previous section, Nigeria is a middle power and has regional small states, such as Gambia and Sao Tome and Principe, that have benefited from its regional influence and alliance. This is particularly true in areas of political stability, peacekeeping, diplomacy, maritime security, and the extraction of oil and gas in the Bight of Bonny (a territory along the border of Sao Tome and Principe). Essentially, Nigeria, with its altruistic Afrocentric policy combined with its space capabilities, can provide support to small states, whether on the continent or globally.

1.4.4 Regional Powers

By definition, regional power refers to a state with unrivalled power within a geographical zone. The subject of regional power connects a geographic concept (region) with the idea of power in international relations theory (the order of power in the global system) (Nolte, 2010). As power is central to the realist tradition, Mearsheimer (2007) contends that survival is the

principal goal of every state and that the uncertainty that surrounds the intentions of other states eventually leads states to pursue regional dominance. Indeed, states tend to build their defences because of the inability to distinguish a state's intentions as natural or a potential danger to another state (Lubojemski, 2019). The defence, in this case, is regional hegemony. On this basis, we may assume that regional hegemons must primarily possess the material, socio-economic, and military strength to control and lead other states in their territory. Applying Susan Strange's theory of structural power, we could suggest that it is the state's ability to control the structures of wealth, production, knowledge, and security in a way that benefits subordinate states but gives it, the actor, more power.

In his 2010 article, *How to Compare Regional Powers: Analytical Concepts and Research Topics,* Detlef Nolte proposes an analytical concept that provides the scope for identifying regional powers and how to compare them with different regional powers. According to Nolte, regional power is defined as a state:

(a) *"which articulates the pretension (self-conception) of a leading position in a region that is geographically, economically and political-ideationally delimited;*

(b) *which displays the material (military, economic, demographic), organisational (political) and ideological resources for regional power projection;*

(c) *which truly has great influence in regional affairs (activities and results). In addition, it is expected that a regional power is a state;*

(d) *which is economically, politically and culturally interconnected with the region;*

(e) *which influences in a significant way the geopolitical delimitation and the political-ideational construction of the region;*

(f) *which exerts this influence by means of regional governance structures;*

(g) *which defines and articulates a common regional identity or project;*

(h) which provides a collective good for the region or participates in a significant way in the provision of such a collective good;

(i) which defines the regional security agenda in a significant way;

(j) whose leading position in the region is recognised or at least respected by other states inside and outside of the region, especially by other regional powers;

(k) which is integrated in interregional and global forums and institutions where it articulates not only its own interests but acts as well, at least in a rudimentary way, as a representative of regional interests." (Nolte, 2010:893)

On the basis of Nolte (2010)'s above analytical concepts, it could be argued that Nigeria qualifies as a regional hegemon. Nigeria prioritises Africa in its foreign policy and has been instrumental in the continent's development. Hence, this research argues that Abuja's space capabilities and activities (spacepower) can be leveraged to address its domestic environment, thus leading to a bolstered continental influence (see Chapter 2, Section 2.8, for Nigeria's Afrocentric foreign policy).

As set out in the introduction to the classification of power in Section 1.4, the aim of this discussion is to establish Nigeria's place in the global system. Hence, Nigeria qualifies as a regional power and a middle power. While Nigeria's power has consistently influenced and sustained its hegemony in Africa (Saliu and Oshewolo, 2018), it poses as a middle power in a global setting. To reiterate, however, Nigeria will have to form a coalition with other regional powers to gain the necessary balance in order to make an impact globally. This can be done through its membership in global institutions and on a bilateral or multilateral basis through specific collaboration.

To this end, for a state's regional and global position, whether as a great, rising, middle, or small state, to influence its foreign policy behaviour, NCR maintains that systemic pressures must filter through intervening variables (Rose, 1998; Schweller, 2004). To determine the foreign policy outcome, it is critical to analyse foreign policy and the state at the domestic and unit levels.

1.5 Foreign Policy

Foreign policy defines the general trends of behaviour and significant actions of a state or other joint actor, in focusing on other collective players in the international system (Beach, 2012). Hudson (2016:14) defines foreign policy as "the strategy or approach chosen by the national government to achieve its goals in its relations with external entities. This includes decisions to do nothing", and Carlsnaes (2002:335), define it as "those actions which, expressed in the form of an explicitly stated goal, commitments and/or directives, and pursued by governmental representatives acting on behalf of their sovereign communities, are directed towards objectives, condition, and actors–both governmental and non-governmental–which they want to affect and which lie beyond their territorial legitimacy".

The above definitions point to the fact that states have a pattern of behaviour and clear goals that guide their external relations. States' behaviour, actions, and approaches are shaped by their interests, intellect, and capabilities, and also by the control of established structures, such as security, production, finance, and knowledge. The joint actors identified by Beach (2012) are the agents acting on behalf of the state in making decisions and bargaining with other states or organisations. These agents include the elites, the media, and governmental and non-governmental institutions, among other actors. Thus, a country's foreign policy is based on mutuality and the involvement of key players in the policy domain.

Furthermore, the definitions highlight the existence and importance of the international system, where states relate. However, it should be noted that the definitions differ in focus and approach. For example, Beach (2012) emphasises the foreign policy-driven actions and conduct of a state. Hudson (2016) focuses on states' strategies for achieving their goals, while Carlsnaes (2002) stress the commitments of state actors and the directives that guide their actions in pursuance of the state's objectives. For this research, Carlsnaes (2002)'s definition is more applicable because it heightens the importance of representation in foreign policy, which equates to the institutions or agencies in Nigeria, for example, the National Space Research and Development Agency's (NASRDA) drive in the space sector and its impact on the state, including the enhancement of Nigeria's relations. Nevertheless, Beach's (2012) and Hudson's (2016) accounts of foreign policy are also relevant to analysing Abuja's foreign relations and the approach to actualising its goals, among other external counterparts.

1.5.1 Analysing Foreign Policy

There are several ways to analyse and explain the behaviour of states and other actors in terms of foreign policy. These can first be divided into two broad categories: actor-specific and actor-general theories (Hudson, 2016). The actor-specific theory allows for a more in-depth explanation and prediction of specific states' foreign policy behaviour, while actor-general theory is useful in conjunction with theories such as game theory (Ibid).

Those who maintain that actor-specific theory must be used to analyse foreign policy (Hudson, 2005) focus on the links between foreign and domestic policies. These are highlighted by many scholars, including those from the NCR school, who maintain that foreign policy decisions cannot be separated from domestic priorities (Rose, 1998; Lobell, Ripsman and Taliaferro, 2009). As discussed in Section 1.3.1, neoclassical realists pay close attention to domestic politics (state-level) and the leaders' and elites' perceptions at the unit level, which they argue are crucial in foreign policy decision making (Rose, 1998). Idahosa and Adebayo (2017) share the same view as the former, that foreign policy is essentially a reflection of domestic policy. Likewise, Beasley et al. (2012) define the topic of foreign policy as a distinct area of analysis that connects international relations with domestic politics. Additionally, Pham (2007) describes the shaping of foreign policy as a dynamic process that involves interaction between a state's internal and external environments.

Henry Kissinger, in his 1966 article: *'Domestic Structure and Foreign Policy',* emphasises the importance of domestic structures to foreign policy. He claims that domestic structure is never insignificant in history; at the very least, it determines the amount of total social effort that can be devoted to foreign policy (Kissinger, 1966). Kissinger opines that the more stable the domestic structure, the lower the need to adopt an adventurous foreign policy to achieve internal unity. He continues by claiming that the conceptions of what is 'just' at the internal level are also vital because when domestic structures are principally based on varied conceptions, it creates complexity in international affairs. Thus, domestic structures must align with their legitimacy to avoid conflicts (Ibid).

Kissinger further maintains that dealing with the issue of conjecture is the most difficult part of foreign policy, stating that "When the scope for action is greatest, knowledge on which to base such action is small or ambiguous. When knowledge becomes available, the ability to affect events is usually at a minimum." (Kissinger, 1966:505). Also, the process of decision-

making and the leaders' experience are crucial because the leaders' ideology and perception of their environment influence the interpretation of other states' actions (Ibid).

To analyse the factors that influence foreign policy in the Nigerian context and its external behaviour, this thesis focuses mainly on the state-level variable and slightly on the unit-level variable. Thus, the following sections examine the state actors' and elites' perceptions, the domestic economy, and the national interest.

1.5.2 Foreign Policy: State Actors and Elites' Perception

Foulon (2015) argues that foreign policy making considers domestic politics in response to obligatory structural incentives. The government is a state actor in foreign policy, as are other players who, through their actions, have influenced targets on behalf of the state. This includes multinational companies, ethnocultural groups, regional organisations, the media, and global organisations, among others, that support, interact with, and travel to states in developing their economies (Beasley et al., 2012). In relation to this thesis, the Nigerian foreign ministry and the space agency (NASRDA) and their staff—the administrative team, ambassadors, and space engineers—can be classified as state actors.

State actors influence international relations and negotiation outcomes because they play a more significant role than others in the process. Moreover, the economic success or military capabilities of the states that are represented by these actors, corresponding with their diplomatic efficiency, legality, moral authority, and peculiar functions, can be advantageous in international bargaining (Flemes, 2007). As noted in Section 1.3.1, to understand how states interpret and respond to the external environment, it is necessary to examine how systemic pressures translate through the intervening variables, which include domestic structures and the elites' perceptions.

Neoclassical realists maintain that constraints at the unit-level can affect foreign policy when state leaders react to external threats and opportunities (Foulon, 2017). Thus, as Schweller (2004:170) argues, "States do not make policy; governments through their leaders do", the role of leaders is crucial because they are responsible for making foreign policy choices and giving significant opinions. This aligns with Kissinger (1966), who claims that the leaders' ideology and perception of their environment influence the interpretation of other states' actions. Indeed, foreign policy is a reflection of the individual idiosyncrasies and objectives of a state's

leadership (Lawal and Aluko, 2016). Hence, the leaders must often deliberate on how the state should respond to external conflict (Mowle, 2003) because their agreement or divergence is the most proximate basis for a response or silence to external threats (Schweller, 2004).

However, what matters more is how the leaders perceive power, not physical resources. This is because relative material power partly forms the perception of threat (Rose, 1998). Thus, it is essential to understand how elites make their decisions. For instance, what are the factors that shaped their attitudes and opinions? How do they perceive external threats and respond to systemic pressures?

Nicholas Kitchen, in his 2010 article: *Systemic pressures and domestic ideas: a neoclassical realist model of grand strategy formation,* explicitly defines the importance of strategic ideas in how structural pressures of power in the global system translate into states' foreign policy outcomes. Kitchen (2010) suggests that ideas can be integrated at the unit level for making political judgements and in-between states. He suggests that ideas could serve as the framework through which interests can be pursued. Indeed, ideas form a crucial part in foreign policy formulation, and how much a state or society knows impacts their perception and pattern of relations. This aligns with Susan Strange's notion of power; that is, ideas in the form of knowledge, alongside other structures, can be vital to the acquisition of structural power. Thus, space knowledge and ideas can be institutionalised nationally and leveraged to strengthen Abuja's foreign relations.

Kitchen further identifies three specific types of ideas needed for policy formulation: scientific, intentional, and operational ideas. Scientific ideas explain how the world works and establish the associations between things in the global environment. It also defines and interprets the relationship between empirical realities to establish the boundaries of possibility for state strategies. Intentional ideas, on their part, are normative suggestions that seek to create goals for foreign policy and reflect ethical preconceptions. Advocates of these types of ideas articulate in foreign policy what a state should do just because it is the right thing to do. Lastly, operational ideas, which could either be scientific or normative statements, suggest what means should be used to pursue an end. For example, while intentional ideas could be based on ethical judgement, they often arise from having the specific causal belief of which policies produce which outcomes (Kitchen, 2010).

1.5.3 Foreign Policy and Domestic Economy

According to realists, states are the principal actors in the international system (O'Neill, 2017). The collaboration that exists between states is a diplomatic strategy that cuts across issues of peace, cooperation, and political and economic relations. Just as it is hard to separate the economy from politics, it is also impossible to detach a state's economic growth and stability from its foreign policy (Ubi and Akinkuotu, 2014). The debate on economic prosperity and sustainability has become a core national interest, invariably influencing foreign policy and reiterating the importance of foreign policy to the state's economic affairs. Economic affairs in this context entail both the internal and external aspects of the economy, such as inflation, price control, and foreign exchange, as well as power, which covers the military and technological strength of the state (Dougherty and Pfaltzgraff, Jr., 2004). Accordingly, the state must ensure that its foreign policy has an immense impact on the domestic scene because poor economic management could trigger volatile situations such as inflation and unemployment, among other issues.

Odigbo, Udaw and Igwe (2014) note that high youth unemployment in Nigeria constitutes a domestic danger to the state's peace and security because unemployment could unite people who share similar perceptions to attack the government. These conditions could then pressurise the state and weaken it, leading to political instability and the removal of the leaders from power (Kaarbo and Ray, 2011). As such, states must prioritise the attainment of economic growth and development as an explicit objective in their relations with foreign counterparts (Ubi and Akinkuotu, 2014). Visible in Nigeria's pursuit of space technology and its capabilities is the quest for socio-economic development (Boroffice, 2008; Agbaje, 2010; Tella, 2020), and this has influenced the national space strategy and foreign relations in a way that it sets a sustainable path for the actualisation of its goals. Furthermore, the level of the state's domestic economy and prosperity, to some extent, determines the type of state leadership and its successes. More so, it could have an impact on the leader's perception and ideas, which may influence the state's foreign policy.

1.5.4 Foreign Policy and National Interest

Morgenthau (1973) suggests that a state's national interest serves as a guide to what it must do and aims to do and are enclosed in its constitution, domestic structure, government's agenda, and external behaviour. Indeed, a state's national interest is the propeller of its foreign policy

(Ade-Ibijola, 2013). According to Ota and Ecoma (2016), national interest is the set of values and concerns that a state treasures and is ready to defend. Similarly, Ajetunmobi, Osunkoya and Omotere (2011) further argue that a state's foreign policy is formulated to pursue national goals and interests, while Oshuntokun (1987) maintains that foreign policy is the diplomatic or combative strategy for protecting a nation's interest.

Crabb. Jr, (1972) points out that foreign policy consists of two elements: the national objectives (national interest) to be achieved and the means for achieving them. It is therefore key to understand the national interest of a state if you intend to analyse its foreign policy. In the Nigerian context, understanding its national interest evolves around the civil war (Biafra War) that lasted between 1967 and 1970. This event demonstrates how a national interest can emerge and how strategies can be put in place to achieve the state interest.

In 1914, the British colonial powers amalgamated the underdeveloped and indirectly ruled protectorate of Northern Nigeria with the directly administered and more developed protectorate of Southern Nigeria, despite there being no clear evidence of nationhood (Pham, 2007). Nigeria has over 500 languages and 371 ethnic groups. This multi-ethnic composition raises the issue of national integration of all majority and minority ethnic groups as important to Nigeria's foreign policy. Without national and ethnic integration, minority groups often develop an impression of marginalisation by the federal government. This was one of the causes of the Nigerian civil war. On May 30, 1967, the governor of Eastern Nigeria, Colonel Chukwuemeka O. Ojukwu, declared the region an independent republic (Republic of Biafra). The declaration was mainly due to the belief, which still holds today, that Easterners are marginalised by the federal government. Other reasons were the economic, cultural, and religious tensions in the country. As Babalola (2019) notes, ethnic conflicts and tensions were contributing factors to the Biafran secessionist movement, which led to the civil war that killed over two million people (Pham, 2007).

As NCR focuses on the state's domestic structure and unit-level to analyse foreign policy behaviour, Nuamah (2003) contends that the effect of the civil war on Nigerian foreign policy was historic, causing the leaders to amass crucial lessons. The lessons became necessary due to the tensions and concurrent events of the war. For example, it was discovered that most of the French colonies in Africa, including those surrounding Nigeria, gave support to Biafra after

France openly threw its weight behind the secession move (Arseneault, 2017). This is because the European state aspired to gain access to Nigeria's oil (Nwachukwu, 2017).

Nonetheless, the Soviet Union and Britain backed Nigeria while the US maintained neutrality (Arseneault, 2017), and Israel was undecided on which side to support. Applying NCR to these events portrays the French involvement as systemic pressure because of its enormous material power capabilities and the support given to the successionist region. Thus, Nigeria's interpretation of this action at the unit level resulted in the four concentric circles of its foreign policy. That is, the leaders' response to the French and other actors' involvement prompted Abuja to act through its foreign policy (foreign policy behaviour).

The lessons learned from the Biafra war became not only the national interest and the guiding principles of Nigeria's foreign policy but also prompted the leaders to strategise on how to achieve the national interest. In other words, Nigeria's survival as a nation became the national interest, constituting a causal factor for changes in the domestic and foreign position, thus guiding successive governments (Pham, 2007) in the pattern of governance, domestic structure, and international relations.

In his 1989 book, *Theory and Reality in Foreign Policy Making: Nigeria After the Second Republic*, Ibrahim Gambari outlines the lessons from the Biafra War as four principles.

1. The Nigerian state's survival and unity must be the primary objectives of its foreign policy.

2. Nigeria must secure the collaboration of its immediate neighbourhood and the West African region to guard against major external forces backing the areas intending to break away from Nigeria.

3. Nigeria must commit to strong pan-African ties to strengthen its national security.

4. The nation needed to cultivate an extensive relationship with major international power blocs. (Pham, 2007).

These principles are rounded up as the four 'concentric circles' of Nigeria's foreign policy, as scholars and diplomats have often analysed Nigerian foreign policy in these concentric circles (Nuamah, 2003; Ojakorotu and Adeleke, 2018:45). The first, being the personal circle, are Nigeria's security, independence, and prosperity, which centre on its close neighbours—Benin, Cameroon, Chad, and Niger. The second circle is related to the first as it concerns Nigeria's relations with other West African neighbours, while the third circle concentrates on the issues of Africa's peace, development, and democratisation as they contribute to Nigeria's internal security. The final circle involves Nigeria's alliance with global organisations and non-African states (Gambari, 1989).

The current Nigerian constitution is that which established the fourth republic on May 29, 1999. It is similar to the 1979 constitution that established the second republic. Note that the third republic constitution, intended for the return of democratic rule in 1993, was aborted at the re-emergence of military power in the same year. Thus, the 1979 and 1999 constitutions provide documents that highlight the primary objectives of Nigeria's foreign policy, wherein the national interest can be perceived.

Chapter II, Section 19 of the 1979 Constitution states that:

> *"The state shall promote African unity, as well as total political economic, social and cultural liberation of Africa and all other forms of international cooperation conducive of the consolidation of universal peace and mutual respect and friendship among all peoples and states and shall combat racial discrimination in all its ramifications."* (FGN, 1979, Ch. 2)

Correspondingly, Chapter II, Section 19 of the 1999 Constitution states the national goals of Nigeria foreign policy as follows:

(a) Promotion and protection of national interest;

(b) Promotion of African integration (the total liberation of Africa from colonial rule) and support for African unity;

(c) *Promotion of international cooperation from the consolidation of universal peace and mutual respect among all nations and elimination of racial discrimination in all its manifestations;*

(d) *Respect for international law and treaty obligations as well as the seeking of settlement of international disputes by negotiation, mediation, conciliation, arbitration and adjudication; and;*

(e) *Promotion of a just world economic order* (FGN, 1999, Ch. 2).

Chapter II, Section 19, of the 1979 and 1999 constitutions, presented above, defines the objectives of Nigerian foreign policy, thus reflecting the national interest. As posited in Chapter 1, Section 1.5.1, using actor-specific theory necessitates the analysis of specific matters affecting the state and the impact on foreign policy. Hence, this research examines Nigeria's spacepower (space capabilities) in Chapter 2 and how it could be used to strengthen its foreign activities and regional influence based on the national interest. The next section considers the structure of power theory and its role in the acquisition of power on the continent through space capabilities.

1.6 Structures of Power

Susan Strange, in her classic text: *States and Markets,* defines the two types of power exercised in a political economy. The first is relational power, which is the influence of a state to move another state to do something they would not usually do (Strange, 1994, 2015). Azmanova (2018) notes that relational power indicates a comparison of a social actor's power to another actor. This form of power is the specific size of a state's capacity to influence other states' behaviour (Volgy and Imwalle, 2000). Relational power as a concept focuses on power as a causal factor among states (Pustovitovskij and Kremer, 2011). It was equivalent to the early centuries' politics and also fundamental to the war outbreak and the struggles for power during the global wars (Lieberman, 2017b). Thus, power originates from the connection between two or more actors and their setting. Here, the actor's capacity to utilise material and immaterial resources in a way that suits them helps in the accumulation of power (Pustovitovskij and Kremer, 2011).

The other type of power is structural power. Strange (1994, 2015) defines structural power as the power of a state to shape and determine the international political economy (IPE) structures in which other states, their political institutions, economic enterprises, scientists, and other professionals must operate. Structural power does more than establish rules that govern international economic relations and set the agenda for dialogue; more importantly, it confers the power to determine protocols and shape frameworks that enable the relationship between states, the state and its people, and corporate enterprises (Ibid).

Benjamin Cohen, in his 2016 book chapter: *Money, power, authority*, argues that "structural power appears to obviate the need to engage in purposive acts of coercion or bribery to get others to do what you want. Once structures are established, shaping incentives and payoffs, behaviour will follow naturally." (p. 116). And indeed, Strange maintains that structural power can be identified not in a single structure but in four distinct associated structures. These structures are security, production, finance, and knowledge. Each of these dimensions interacts with and influences the others, and those who possess them have structural power (Strange, 1994, 2015).

Volgy and Imwalle (2000:232) assert that Strange's structures are "the type of capability needed to create a new global architecture, shaping the rules and norms for the entire system." This stresses the need for and importance of the four structures for the power attainable in the international system. Strange emphasises the structures to show their significance to the successful pursuit of desired goals (David and Meersohn Schmidt, 2019), since states have national interests and can achieve them through the control of the four structures. As a common fact, states are the key actors, but Strange's idea also qualifies non-state actors to hold structural power (Culpepper, 2015). It is important to stress that power is not acquired from possessing resources; instead, it is amassed from the ability to regulate Strange's four structures, which shape the actors' settings and interactions (Azmanova, 2018). This appears to contradict the realists' belief that power is mainly garnered from the possession of MPCs. Indeed, as Tooze (2000) argues, among the several ways that power is expressed, power exercised in structures is more crucial than a direct alliance with entities.

This provides a different IPE framework that acknowledges the value of authority and power and should be investigated in the structural power analysis. For Strange, power is the foundation of the framework of analysis (Ibid); it is central to any explanation of the character and dynamics of the international economy (Cohen, 2016). On this view, it suffices to note, as Brassett (2016) does, that the global economy is not mainly for powerful states or a direct show of strength. Instead, it signifies the advent of the structures of power overlapping with their related possibilities and restrictions.

Furthermore, Strange's theory does not attach special primacy to any of the structures. Instead, each structure can become more significant in a specific situation or period (May, 1996). This again not only contrasts with the realists' emphasis on material capabilities but also diverges from the liberalists' promotion of fairness and cooperation and the Marxist approach that emphasises production as the basis of power. Thus, Haggart (2019) notes that the lack of preference for one structure over the other makes Strange's framework adaptable to any essential adjustments in the IPE. The following section examines the four structures of power.

1.6.1 The Four Structures of Power

Table 1: A summary of the four structures

Structures of Power	Summary
Security	A framework of power shaped by the provision of security by a group for others.
Production	The general measures that determine what is produced, by whom and for whom, and by what means and terms.
Finance	Government policy and its regulations on money, markets, and exchange rates/credits.

Knowledge	Knowledge is discovered and stored. Who communicates it, through what means, to whom and on what terms? Who gets the benefits and who pays for it?

Source: Strange (1994, 2015)

1.6.1.1 Security Structure

Strange describes security as the most significant human need—the security of lives and properties is central to every state. In this structure, the providers of security may eventually gain advantages in the production or consumption of wealth and enjoy special rights in society. "Thus the security structure inevitably has an impact on the who-gets-what of the economy." (Strange, 2015:49). In Nigeria, and as operational in other states, the government is the primary provider of security. Part of the reason for Nigeria's investment in space technology is the provision of adequate security (Agbaje, 2010), which includes military and defence operations. The security agencies in Nigeria use satellite data and applications to survey and provide safety where necessary within and outside the country. However, as is common, the state maintains stringent control over the use of space data for strategic and security operations (Rementeria, 2022). With space capabilities and applications, Abuja could enhance its provision of security on the continent.

Strange (1994, 2015) maintains that those with political power could control state machinery and institutions, using them to force conformity to their preferences and demands. The composition of Nigerian society and, by extension, politics gives an advantage to some regions and elites in governing due to their population, financial prowess, and affordability of security. This is pertinent to the government and Niger-Delta region issues, where the indigenes demand an improvement in the crude oil derivative allocation, among other agitations. However, the elites often view these as a challenge to their control of the region and its resources. Thus, in collaboration with multinational oil companies, the elites deploy the military to these regions to protect their access (Edigin and Otoghile, 2011).

Strange acknowledges that the analysis of the security structure is the traditional domain of realists in international relations. As highlighted in Section 1.3, realism covers how states

stabilise in the systemic setting and what they potentially gain at others' expense. Hence, security is crucial to states' survival because they must secure themselves in a world where nobody can be held responsible for their protection (Waltz, 2010). Therefore, states must accumulate power to realise their goals (Rathbun, 2008). However, where Strange's approach significantly differs from realists' analysis is that the security structure does not have automatic primacy (May, 1996). In IPE, conflicts among actors rarely resort to the use of force because "power in the security structure is not the conditioning structure" (Ibid:175), but when it does, it is because of pressures arising from the production, finance, and knowledge structures (Strange, 1994, 2015).

Power is essential to the provision of security, and Strange describes security as a framework of power in IPE, further suggesting the following questions as critical in analysing the security structure: Who provides security, and to whom? Is it to counter a perceived threat or threats? What are the costs and conditions demanded for this security? From the standpoint of the consumers of security, on whom does an individual, a state, or a corporation depend for better security? How much protection is provided, and on what terms? (Strange, 2015:49).

1.6.1.2 Production Structure

The production structure is what generates wealth in society because it is "the sum of all the arrangement determining what is produced, by whom and for whom, by what method and on what terms." (Strange, 2015:70). This structure is dependent on the system of work and how work is affected by the business and service industries, including the accessibility to resources and machinery, the availability of skilled suppliers, quality standards, internal operations and firms' external relations, commercial processes, and market trends (Rementeria, 2022).

The production structure highlights the global production system (GPRS) rather than the national, claiming that transnational corporations (TNCs) dominated and reshaped the GPRS. Strange cites how American and non-American enterprises transformed from national production for the national market to international production for a world market because many firms saw the approach as the only way to survive in the global competitive market. This implies a shift from state-dominated production to a production system dominated by organizations, thus enabling corporations to engage in relay affiliation and workshop affiliation. The relay affiliates refer to how foreign enterprises' plants in other countries

replicated production for cheap labour and production costs in less developed countries (LDCS) and collaborated with local partners (Corporate Partnership). The workshop affiliates are where the parent company organises specific operations in foreign workshops, perhaps due to the low taxes, cheap labour, and quick transportation of products. These are mainly done in advanced technology sectors where Research and Development (R&D) costs are high (Strange, 1994, 2015).

Strange (1994, 2015) argues that those who control the means of production and distribution of goods and services determine 'what and how' wealth is produced, as well as the terms that enable wealth production and distribution. When a group involved in production loses power, it activates a change in the responsibilities of what is produced, its organisation, and those that benefit from the productive enterprise. Likewise, any adjustment in the production process would likely cause a shift in the social and political power distribution (Ibid), thereby causing an alteration in the state's command over the market (May, 1996). As discussed in Section 1.2, states require sophisticated and comprehensive space capabilities to gain and maintain spacepower (Peter, 2010). The ability to design and produce satellites and other relevant applications is an element of modern space power's infrastructure and market, thus accruing power to the state through a state-run or private firm. For example, the US and China are space powers because of their independent or publicly funded space organisations' ability to develop cutting-edge spacecraft technology and conduct research at their respective space stations (Tepper and Shackelford, 2022). Hence, both states can determine the terms of production, including how and what is produced.

Nigeria's satellites were all fully or partly manufactured by international space corporations in their workshops with the participation of Nigerian engineers. Abuja has partnership agreements with Surrey Satellite Technology Limited (SSTL) in the UK and China Great Wall Industry Corporation (CGWIC) in satellite production, launching, and capacity building (SSTL, 2011; CGWIC, no date). SSTL is owned by Airbus Defence and Space and the University of Surrey, while CGWIC is authorised by the Chinese government. Both firms are well advanced in technology and influence production, driving down the cost of production and the swift conveyance or launching of the Nigerian satellites, including maintenance and insurance.

Strange contends further that the interaction of state policies, market trends, management techniques, and evolving technology may be proof that international business and collaboration

dominate the global production structure (Strange, 1994, 2015). Indeed, the emergence of private investment in the space industry transformed the traditional space sector from a government-dominated to a private-dominated sector with the advent of public-private partnerships (PPP). Thus, state policies on technology and space activities have either been adapted to or are entirely based on international collaborations. For instance, Nigeria's National Space Policy (NSP) makes clear the importance of foreign collaboration to the success of its space programme (National Space Policy, 2001:42-43). Evidently, the pattern of NASRDA's operations has gradually shifted from being the sole supplier of satellite services in Nigeria to accommodating private and international space companies and collaborators. This contributes to the development of Abuja's Assembling, Integration, and Testing Centre (AITC), which can constitute part of the state's spacepower, thus strengthening its regional influence.

1.6.1.3 Finance Structure

The finance structure is the role and power of the state, working through financial and industrial policies to regulate and refuse access to credit, production, and markets (Strange, 1994, 2015). The structure is partly national, despite being subjected to global influence. The world's major capital markets function as one system—markets are predominantly global while the authorities are mainly national. State governments, as a result, are the primary drivers of monetary policy in their respective states (Ibid). In sum, the finance domain focuses on the management of the monetary system, credit creation, and the provision of funds (Rementeria, 2022).

Strange (1994, 2015) suggests that, from a political point of view, money is an alternative to force as a means of economic growth and an instrument to provide collective goods. Collective goods are used interchangeably with public goods in the field of economics. And Strange claims that knowledge could be a public good, which implies that its possession by a group of people cannot reduce its supply to others (Ibid:134). These statements have two critical implications: first, products and services can be classified as collective goods because they benefit everyone. Generally, people cannot be denied access to space-aided benefits such as Internet access, mobile services, and public health care, nor can their use of basic services reduce their availability to others. Hence, money is needed to provide collective or public goods, whether they are pieces of knowledge or goods and services. The second implication is that the importance of knowledge as it relates to finance is underscored. As will be discussed

further in the next section, knowledge is crucial to the advancement of technology and space exploration (Lieberman, 2017a), including production and the provision of security, all of which rely on financial investment and equally generate revenue for the actor.

The cost of starting a space programme and its funding is a capital investment. The Nigerian government invested $93 million to implement its space programme (Space in Africa, 2019c) and has launched several satellites into space. To date, the space programme is financed by Abuja with an annual budget of between $50 million and $90 million (Way, 2020; Faleti, 2021a; Oneyibo, 2022), underpinning various national developmental projects. Indeed, when space-enabled products, services, and projects serve a purpose that profits the state and its citizens, it justifies two of Strange's assertions: first, that money can be a substitute for force through economic development and the provision of public goods, and second, that money is a necessary adjustment to liberty for any society wishing to enjoy freedom and wealth (Strange, 1994, 2015). This reiterates that money is power, and the control of the finance structure, including the other three structures, can confer structural power on Nigeria.

It is important to ask, as Strange did: *"Who has economic power?"* Strange responds that they are those who have money to spend (purchasing power) and sell what people need (monopoly or oligopoly power). Equally, those with the financial or investment capital that enables production or the provision of services have economic prowess. Strange claims that those with the most economic power are state enterprises or corporations whose chains of command and hierarchies of authority are set up to make more political than economic decisions (Strange, 1994, 2015). As previously stated, the Nigerian government is the main financier of space activities in the country, even though there are various foreign partnerships. Abuja, through NASRDA and the Nigerian Communications Satellite Limited (NIGCOMSAT), regulates the national space industry.

1.6.1.4 Knowledge Structure

"The place of knowledge in IPE is particularly significant" among Strange's four structures (Russell, 1995:111). Yet it is the "most overlooked and underrated. It is no less important than the other three sources of structural power in the international political economy but it is much less well understood" (Strange, 2015:131). The knowledge structure encompasses what is believed, including the conclusions and principles resulting from those beliefs, as well as what

is recognised and perceived as understood, and the medium through which ideas, beliefs, and knowledge are conveyed with the inclusion of some people and the exclusion of others. Thus, "analysis of the knowledge structure is therefore far less advanced, and has far more yawning gaps waiting to be filled, than analysis of other structures." (Ibid:131).

Space has an enduring history and relationship with knowledge. Space activities serve as a drive for knowledge conception and the development of scientific and industrial know-how (Lieberman, 2017b). This makes the knowledge power structure a crucial aspect of the analysis of space, as it reveals what is being discovered and how it could be used to acquire structural power. According to Rementeria (2022), knowledge in space is explicit knowledge made available in a variety of forms, such as knowledge gained through research or experimentation; knowledge in a material form or equipment; machinery; product design; and publicity. On this, Lieberman (2017a), who notes the significance of possessing knowledge as beliefs and ideas, further adds that the control of knowledge in scientific, technological, and production areas has an enormous power dividend for the actor. In other words, states or organisations can leverage space-derived knowledge to develop their space capabilities or maintain access to outer space, thus serving as a means of structural power.

Given the above, the conveyance of knowledge involving certain people and the omission of others (Strange, 1994, 2015) means that the proprietor of space knowledge can, according to Rementeria (2022), exercise structural power by reducing third parties' access to essential technologies crucial to space exploration or activities. This indeed demonstrates the control of knowledge in the form of space capabilities and the ensuing power in the knowledge structure, as Strange claims that key players in this type of structure are given power and authority, and that power is unquantifiable. She goes on to say that power based on knowledge structure is more of a voluntary agreement based on shared beliefs, and it is easier to keep if the authority can limit access to it while protecting against any threat of competition (Strange, 1994, 2015).

As highlighted in Section 1.6.1.3, Strange claims that knowledge could be a public good; that is, its possession by a group of people cannot diminish its supply to others, unlike in the production structure, where production and distribution can be quantified. Essentially, the knowledge structure determines what knowledge is discovered and stored, who communicates it, through what means, to whom, and on what terms. Likewise, who gets the benefit(s) and who pays for it? Nigeria prioritises the acquisition of knowledge from its space partners for its

space engineers. This knowledge and how it is communicated can be crucial to Abuja's structural power in Africa.

Overall, in line with the central argument of this thesis for the use of space capabilities for Nigeria's domestic and external activities, as discussed in Section 1.2, Peter (2010) suggests that structuring space assets and setting agendas for the execution of special missions reinforce spacepower. This shows the connection and how important the IPE power structures can be for the field of space technology. There is limited literature and contributions on the application of the IPE structural power theory to space technology.

Lieberman, in her 2017 book chapter, uses Strange's power structures from both a historical and popularisation standpoint. She demonstrates how states have leveraged their national space programmes to continually seek to exhibit power in the four structures for the purpose of acquiring greater advantage in relational and structural power. Citing the US versus the Soviet Union's space race, among other events, Lieberman argues that America's landing, walking, and planting of its flag on the moon demonstrates structural power. That is, the state determines how things would be done on the moon and more generally in outer space. Lieberman's work further shows that space exploration will always be important to international relations as long as people around the world depend on government and privately funded communications satellites (Lieberman, 2017a). In another of her works, Lieberman applied the IPE structures of knowledge, power, and hegemonic influence on the popularisation of space. She discusses the use of space and space activities by performers as inspiration, thereby promoting space and its cultural and artistic aspects. Lieberman also examined the improved use of space for communication as well as the downstream space technologies as common products (Lieberman, 2017b). Rementeria (2022) also applied the structural power theory from the perspective of the commercialisation of space. He examines the impact of developing the space sector on a commercial basis on the power structures. Rementeria claims that the structures have jointly impacted international affairs by contributing to the attainment of prestige, gaining an advantage, ensuring alliances, and restraining prospective competitors in space and global politics.

Further, taking into account the dearth of the application of structural power analysis to Nigerian space activities, Abolarin (2023) applied Strange's power structures from the aspect of the commercialisation of Abuja's space sector. The work examines the public-private partnership (PPP) scheme and the Chinese involvement in the national space programme,

linking the space roadmap and capacity-building. Focusing on the impact of the PPP and foreign collaboration, Abolarin draws attention to Beijing's influence in the commercialisation of the Nigerian space sector and its implications.

Taking this a step further and thus filling a gap in the literature, this study set out to examine space as a fundamental power structure from the perspective of foreign policy, particularly strengthening Nigeria's regional influence and space diplomacy. Paramount in Strange's theory is a crucial question: *'Cui bono?',* which translates to 'who benefits?' Who benefits from advanced technology? Who benefits from the newly discovered knowledge? Who benefits from the development of Nigeria's space capabilities? In what structure does the power or benefit emerge? For example, drawing on the discussions, it is clear that Nigeria's collaboration with its foreign counterparts (foreign policy) has involved the training of space engineers in the design and production (IPE – production structure) of satellites. This has enabled the acquisition of knowledge (IPE – knowledge structure) and its retention, proving vital to the development of indigenous space capabilities. The relevant expertise can be used to impact other states (NCR – foreign policy) in Africa, thus accruing structural and regional hegemonic power to Abuja.

The thesis projects the four structures of security, production, knowledge, and finance to strengthen Nigeria's regional influence through its space capabilities. That is, Strange's power structures are demonstrated in such a way that they enhance Abuja's continental influence and allow it to set the agenda on which other states operate. The justification for the use of structural power is the control of structures through space capabilities, thus excluding the use of force or coercion.

1.7 Theoretical Framework: NCR and Structural Power

The concepts of spacepower, Neoclassical Realism (NCR), and the IPE structural power analysis as conceptualised in this study are developed here. The thesis analyses the intersection between foreign policy and space technology. Foreign policy is the crux of the framework, and it involves analysing the domestic setting and the external environment. Space technology plays an intervening role in the framework since it underpins the capabilities that are proposed to address Nigeria's domestic challenges, for example, the economy and national security. Space capabilities also serve as a source for strengthening Abuja's regional power and

contributing to its space diplomacy and activities. This is spacepower. Spacepower strengthens the state's internal capacity and enhances the attainment of national interests while influencing other states' activities through its space capabilities (Peter, 2010).

Given that the domestic environment has a significant impact on foreign policy, it is imperative for the national setting to be stable in order to strengthen the state's external activities. This is where the NCR theory is adopted. The NCR examines the state-level (domestic issues) and the unit-level (elites' perception) variables that influence the state's response to international pressures, leading to foreign policy outcomes (Rose, 1998). The economy and national security are crucial to the Nigerian domestic environment, including leaders' awareness of international issues, all of which impact foreign policy. The study found that national security and the economy are the key aspects that affect the state's ability to function effectively in regional affairs. It is argued that these domestic aspects are connected because, where there is no security, the economy is expected to be affected. For example, insecurity affects the source of citizens' livelihoods, which is a contributing factor to national instability. The research identifies the importance of addressing these domestic issues through space technology: space gadgets and modern applications can enhance Nigeria's inland capabilities and border security, including aiding the national economy by capitalising on the potential of the agricultural sector. This will reduce Abuja's overdependence on crude oil. With the stability of its domestic environment, Nigeria can thus strengthen its regional influence and maintain power through its spacepower.

Complementing this framework are the regional segment (the African continent) and space diplomacy, which are both underpinned by the IPE structural power theory. It is the structural power analysis approach to foreign policy that will allow Nigeria to strengthen its regional influence and be able to control the four power structures of security, production, knowledge, and finance through its spacepower. Nigeria already uses its space capabilities for security and, to an extent, for social and economic purposes. This study, however, goes into more detail on how Abuja's space-enhanced structures can be used to gain and control power in Africa.

Taking into consideration that Abuja has an established space relations with China and the British space firm Surrey Satellite Technology Limited (SSTL), the research also analyses Nigeria's space diplomacy and how it can be enhanced. This is based on the combination of the NCR and structural power theories, linking the importance of having experienced diplomats

who understand Nigeria's national interest and can secure favourable agreements in space negotiations.

1.8 Research Methodology

1.8.1 Philosophical Assumptions

1.8.1.1 Interpretive Paradigm

This research aimed to obtain rich and in-depth opinions from participants and actors within the Nigerian space sector, academia, the government, and foreign affairs to do a critical assessment of Nigeria's space capabilities and its foreign policy. In the interpretivism paradigm, the researcher is believed to be subjective rather than objective, as obtainable in the positivism paradigm. The interpretive paradigm developed as a critique of positivism (Saunders, Lewis and Thornhill, 2019). Multiple realities characterise the interpretive approach as opposed to a single fact, which is considered to be achievable in positivist research (Robson and McCartan, 2016). Thus, an interpretive philosophy or paradigm, often combined and known as constructivism, informs this research and the quest to understand Nigeria's space capabilities and activities and how they can impact the state's domestic and external influence.

The main objective of the interpretive paradigm is to use the opinions of participants, or the interpretations of the phenomenon being studied (Creswell, 2014). Interpretivism focuses on understanding human behaviour or action, and its purpose is to describe, understand, and interpret (Merriam and Tisdell, 2016). The research carried out within the interpretive paradigm focuses on the way humans make sense of the world around them (Saunders, Lewis and Thornhill, 2019). Hence, interpretive research values interaction with people and the exact settings in which individuals live and work, with an emphasis on understanding the participants' historical and cultural backgrounds (Creswell, 2014). Interpretivist researchers also seek knowledge that originates culturally and is based on historical interpretations of the social world (Crotty, 1998). It is concerned with integrating stakeholders' perspectives (Easterby-Smith, Thorpe and Jackson, 2012). Furthermore, the interpretive paradigm in the words of Weber (1947), cited in Bryman (2012), is based on understanding social actions; Bryman further states that it respects people's differences (Ibid). Figure 2 outlines the research design for this study.

Figure 2: The research design for this study

Source: Author's design (2022)

1.8.2 Research Approach

1.8.2.1 Qualitative Research Design

The interpretive worldview is generally seen as an approach to qualitative research because the researchers make sense of the subjective and socially constructed meanings that are being expressed about the phenomenon being studied (Saunders, Lewis and Thornhill, 2019). Furthermore, using qualitative research, researchers tend to understand the way they construct their worlds and the meanings they give to their experiences in the world (Merriam and Tisdell, 2016; Castleberry and Nolen, 2018). Sometimes, qualitative research is referred to as naturalistic, which means that the researcher would operate in a research context or a natural setting to establish trust, ensure participation, and gain access to in-depth understanding (Saunders, Lewis and Thornhill, 2019). Similarly, qualitative research gathers empirical materials in a natural setting. This implies that qualitative researchers look at objects as they

are and do not influence the environment in any way. Additionally, the qualitative method uses text and image data. It allows the researcher to draw on different types of data sources and analyse the information gathered through multiple stages of data analysis (Creswell and Creswell, 2018).

1.8.3 Data Collection and Analysis

As discussed in the introduction, there has not been much research carried out in the area of space technology and foreign policy in Nigeria, specifically how space capabilities can strengthen Abuja's regional influence. This study seeks to explore the contributions of Nigeria's space capabilities to the state's domestic environment and regional hegemony, including space relations. Qualitative research adopts an inductive process (Bryman, 2012), and this thesis uses an inductive approach that involves the use of research questions and is generally concerned with the generation of new ideas from the data gathered. The research is a constructivist study, and its focus is on the NCR, spacepower, and the interpretations of Susan Strange's ideas about power; thus, the qualitative approach is better suited than the quantitative method. Likewise, considering the researcher's skills, the resources available (time and funding), and the aim and objectives of the study, the qualitative research design was useful in collecting comprehensive information from the actors and relevant personalities. The stakeholders come from various backgrounds, which include the space sector, foreign affairs, academia, the public, and government parastatals.

Data was gathered through primary and secondary sources. The primary data was collected through twenty (20) online semi-structured interviews with participants in Nigeria. The semi-structured interview approach was adopted because it provided an opportunity for participants to freely discuss the specific issues, even though the researcher moderated the discussions, ensuring that the questions and themes were well covered. In semi-structured interviews, participants can be involved in the monitoring, reflection, and resultant change processes (McKie, 2002, cited in May, 2011). This type of interview allows flexibility for researchers to pursue an idea in more detail in response. In this regard, I asked several important questions that explored newly derived information from participants. For instance, participants were asked, "To what extent are the national agencies and economic institutions involved with Nigeria's space programme?" "To what extent have foreign states or organisations collaborated with Nigeria in its space ambitions?" For a list of starting questions, see Appendix D on Page

267. In relation to the research questions, the interviews enabled the researcher to gain an in-depth understanding of Nigeria's space relations with its counterparts, especially China. This is a crucial benefit of the use of interviews in data collection, as the secondary data suggests entirely limited views of the partnerships. In addition, since the interviews were tailored to every participant based on their knowledge of their field and related issues, the participants were asked questions generated from the information they had already stated or written about in published papers.

Table 2 Interview participants

Participants	**Numbers**	**Segment**
National Space Research and Development Agency (NASRDA)	1	Space
Space Directors	2	Space
Space Analysts	1	Space
Space Technologists	4	Space
Space Ambassadors	1	Space
Foreign Policy Analysts	1	Foreign Policy
Ambassadors	3	Foreign Policy
Academics	6	Academics
Public Analysts	1	State
Total	**20**	

As Gerson and Horowitz (2002) suggest that it is only through a series of interviews that the significance of any interview can be fully understood, each of the interviews conducted significantly helped the researcher understand the core and contemporary issues in Nigeria's foreign policy and space relations, its domestic environment, and ways the challenges could be addressed, as discussed in this study.

Furthermore, considering that the interviews served as a means to acquire information about Nigeria's foreign affairs and space activities, purposive and snowball sampling methods were adopted. This sampling strategy involves purposefully selecting participants "to represent a type in relation to key criterion" (Ritchie *et al.*, 2014:113). This is to ensure that every relevant constituency pertaining to the topic is covered and to have sufficient diversity in each of the

criteria in order to explore the impact of the characteristic (Ibid). Thus, I started by identifying key participants in NASRDA, government agencies, and academia, including former ambassadors, using a purposive sampling technique. Snowball sampling was then employed as the initially arranged interviews proceeded, as a few participants suggested other relevant individuals that could be interviewed.

The interviews were conducted in English, which is Nigeria's official language. Similarly, the interviews were held in different locations, such as the participants' offices, university environments, and individual homes. Each session lasted between 30 minutes and 1 hour, 50 minutes. It is worthy of note that, contrary to the general belief that people do not keep time in Nigeria ("African Time"), all the interviews commenced as scheduled. This might be because it is a Zoom meeting and is already set up with the time notification.

Further, it is notable that the participants' separate locations may have influenced their responses. For example, most of the government and NASRDA staff had the interviews in their offices; hence, they were cautious about the nature and length of the comments made. This could be responsible for the brevity of the interviews held with the space actors. On the other hand, participants who attended the research interviews from their residences were at more liberty to discuss issues that could have been deemed confidential in the office, even though there were momentary distractions from domestic activities going on around them.

It is noteworthy to reiterate that all the interviews were conducted online. This was as a result of the global pandemic, when national and international restrictions were put in place in all sectors, including air travel and institutions, thus affecting mobility, recruitment, and the setting up of physical meetings with research participants. The collection of data, therefore, took place through the Zoom videoconferencing platform within the space of a year. Online meetings through platforms such as Zoom and MS Teams have become the norm to the extent that it is considered inappropriate to travel to conduct interviews or attend meetings.

Zoom is a cloud-based videoconferencing service that offers online meetings, social interaction, group messaging, secure collaboration, and recording of sessions (ZoomVideo Communications Inc., 2021). The choice of Zoom was based on its suitability for one-to-one communication with participants through several technology devices, such as the computer, mobile phones, and tablets. Further, the ability to record and store data without third-party

support makes it appropriate for research purposes. The Zoom application allows users to securely record both visual and audio content. Hence, to ensure that the interview discussions were well taken for analysis, the interviews were recorded (Merriam and Tisdell, 2016) synchronously on Zoom and with an external voice recorder. The Zoom platform also has real-time encryption of meetings, user-specific authentication, and the ability to save recordings to external storage, the cloud (accessible remote server networks), and local drives (ZoomVideo Communications Inc., 2021), in line with Canterbury Christ Church University's data protection and ethics policies. Memos and study diaries were also used to write notes and key points during the interviews. They were particularly useful during the interpretation of the data in my analysis.

It is widely noted that conducting interviews online may result in excluding participants who lack the required technical ability, gadgets, and Internet network needed for the meeting (Deakin and Wakefield, 2014). To prevent this, Archibald *et al.* (2019) suggest that a well-outlined set of instructions or checklist detailing basic technical issues and the provision of a Zoom user guide can be beneficial to participants, including how to resolve difficulties. Thus, participants were contacted prior to interviews and advised of the requirements for the online meeting as well as informed about the potential problems that may arise during the session, i.e., unstable Internet, pauses, low-quality audio and visual output. The few issues recorded throughout the interviews range from low audio quality to a poor internet connection, leading to a loss of visual function. However, it is important to note that the participants in the space sector had no problems with access to the internet or understanding how a videoconferencing tool works. This is because their operations are often based on the use of the internet and online engagement.

On the other hand, online interviews may prove crucial to gaining access to participants who ordinarily are unreachable due to their unsafe location, reduced mobility, social isolation (Deakin and Wakefield, 2014) and high-class status. For this research, interviews were conducted with high-ranking officials, and due to the interviews being online, it was easier to gain contact with the officials. Furthermore, participants' accessibility to technology was generally not a problem since they were knowledgeable about technology and how to operate Zoom. This might be because most organisations switched to the use of online communication platforms during the global lockdown. Thus, the officials were already familiar with the Zoom applications.

The interviews were transcribed verbatim to provide a database for analysis, as Merriam and Tisdell (2016:131) argued that "verbatim transcription of recorded interviews provides the best database for analysis", even though it can be time-consuming. The interview audio recordings were typed into words on Microsoft Office Word, producing approximately 105,000 words in text format. This stage was followed by reading to double-check and ensure the quality of the data and consistency between the audio recording and the transcription (Matthews and Ross, 2010). Thematic analysis was used in this study. The process of data familiarisation enabled the researcher to generate ideas and make sense of the interview data (Vaismoradi *et al.*, 2016) in keeping with the thematic analysis process.

Thematic analysis is a flexible technique that goes beyond counting explicit words to discovering, evaluating, and describing data patterns (themes) (Braun and Clarke, 2006). To do this, NVivo 12, a qualitative data analysis software, was used to categorise the data into themes and codes. The process involved uploading data to the software. This was for the purpose of storing and organising data to enable easy coding, arrangement, integration, and theorisation, as Saldana (2013) suggests. The coding and classification of interview data led to the derivation of the final themes for the research's findings (Braun and Clarke, 2006). The analysis offered a comprehensive account of the findings, and the researcher focused on choosing quotations that accurately conveyed what individuals said regarding the themes. NVivo 12 provided an opportunity for effective data management and analysis, which would not have been possible using a manual approach. I accessed this software as a researcher at the university and attended training sessions on how to utilise the analysis software.

Confidentiality was maintained throughout the data analysis and writing processes. The researcher made a concerted attempt to keep his personal views distinct from those of the participants. This is because the researcher was aware of his role as a researcher to interact only with the views of others, not his own view.

The thesis made use of document analysis to analyse secondary data. Document analysis is a qualitative and social research method that allows the researcher to interpret documents such as public records. Analysing documents provides an opportunity for further questions to be asked in data collection, serving as supplementary data used for recording changes in an area of research and for verifying the findings, including the setting of context and the acquisition

of background knowledge (Bowen, 2009). This methodology enables the researcher to give voice and meaning to the area of research. In the analysis, the contents of the document can be coded into themes in the same way interview transcripts are interpreted (Ibid). However, it is vital to ensure the validity of procedures and the accuracy of the researcher's findings, as this is key to adopting qualitative research (Creswell and Creswell, 2018). The use of document analysis was essential to carrying out a critical analysis of Nigeria's foreign activities and space capabilities. The documents analysed include the Nigerian Space Policy (NSP), the NASRDA Act 2010, the Nigerian Federal Constitutions of 1979 and 1999, and the foreign policy.

1.8.4 Access and Authorisation

The issues of access are often not straightforward; thus, there was a need to get a letter from the school to facilitate the process of collecting data for the research work. Before the commencement of data collection, I already had contact with some key figures and had created a database of prospective research participants. Hence, having applied the snowball sampling method, stakeholders in the space sector, NASRDA, and foreign affairs were contacted directly in order to arrange the interviews. During the collection of data, I remained in control and conducted myself well. I also maintained the status of a researcher from CCCU, UK. This enabled the participants to provide in-depth responses to the interview questions, as they were aware that the researcher is not locally resident and thus would need key information pertinent to the study. However, there were areas and participants that the researcher could not gain access to. For example, top officials at the Ministry of Foreign Affairs as well as the director general of NASRDA were not reachable due to their high status and would not grant access to people they did not initially know. Further, the researcher could not gain much information about the current state of Nigeria's space launch site. This is due to issues of confidentiality, which affect national security.

1.8.5 Research Ethics

The researcher complied with the essential processes of attaining ethics clearance before commencing data collection. This is important because it is necessary to take precautions to ensure that no research participants suffer any social harm and that their interests are protected (Denscombe, 2017). Thus, the first consideration was to get an ethical compliance authorisation from the Canterbury Christ Church University Research and Enterprise Development Centre. Throughout the research, the researcher was guided by ethical compliance. The researcher

ensured that the participants who wished for their identities to be kept secret remained anonymous. Archibald *et al.* (2019) suggest that researchers recording individual or focus group interviews on Zoom must, in line with their institutions, inform participants about their intention to record and obtain appropriate consent before the session commences. Thus, participants were provided with relevant information about the research, which was read before the interviews commenced. The information included the purpose and guides about the participant's involvement, which helped them decide whether they were giving their consent or not. As Denscombe (2014, 2017) argued that consent is voluntary and not a contract binding a person to assist in the research, participants were informed that they could withdraw their consent at any time should they wish to. This is because the participants' involvement should not negate their will. It is noteworthy that no participant withdrew at any time. In line with data protection, the data was stored on Zoom's secure platform and accessed through my password-protected laptop. The data was only used for research purposes and was not transferred for another purpose (Ibid).

1.8.6 Validity and Reliability

Validity is the level at which a finding is sound and correctly reflects the phenomenon being examined (Ritchie *et al.*, 2014). Easterby-Smith et al. (2012) define reliability as addressing the question of whether there is transparency in how the researcher makes sense of raw data. Similarly, across the study conducted, the researcher's approach should be consistent (Creswell, 2014). Furthermore, does the research gain clear access to the experiences of individuals in the research setting? (Easterby-Smith et al., 2012). The participants' responses to the interview questions validate the research focus and give an indication of the reliability of the data collection and analysis process. As stated previously, the researcher adopted a qualitative approach; thus, the general pattern of participants' responses reveals the currency of the study and the importance of the issues being addressed.

This chapter has laid out the theoretical foundation for this study. The NCR theory posits that the domestic environment is crucial to a state's foreign behaviour. Likewise, spacepower and structural power theories were examined to explain how space capabilities can be Nigeria's source of power and used in the form of four structures to shape and control other states' activities. The chapter also set out the thesis conceptual/theoretical framework and discussed the research methodology, both of which, along with other sections, are crucial to this study. The following chapter focuses on Nigeria's space activities and capabilities and its foreign policy.

Chapter Two: Nigerian Space Capabilities and Foreign Policy

2.0 Introduction

The central aim of this thesis is to show how space technology could be used to address national issues and strengthen Nigeria's regional influence and space diplomacy. Having established the theoretical framework for analysis in Chapter 1 (Section 1.7), this chapter focuses on Nigeria's space activities and capabilities, including its foreign policy. The chapter comprises five sections and starts by discussing Abuja's space experience, space programme, and capacity-building. Building capacity is crucial for the national space programme and the state's spacepower. The second section turns to the discussion on Nigeria's space capabilities, concentrating on the upstream and downstream sectors. This is followed by examining the types and functions of Nigeria's satellites, while the fourth section focuses on Abuja's space collaboration, including its relationship with China. The final part examines Nigeria's Afrocentric foreign policy as well as the domestic challenges that provided the impetus for this research.

2.1 Nigeria's Space Journey

Space technology facilitates the scientific and economic development of states, thus improving the lives of citizens through direct and indirect services, including revenue from space activities (Leloglu and Kocaoglan, 2008). Various projects that benefit the state and people, such as education, security, tourism, earth and space imaging, exotic specialised materials, real estate settlement, and research, have profited from space exploration and related investments. Every spacefaring state has different motives for investing in space technology and developing indigenous space programmes. In Africa, the security, research, and socio-economic benefits that space and its connected technologies offer are the drivers of government and non-governmental organisations' prioritisation, foreign collaboration, and investment in space policy (Oyewole, 2020).

This is certainly true of Nigeria, whose pursuit of space technology was based on the rapid socio-economic growth, development of new resources, environmental monitoring, and national security that space research guarantees (Agbaje, 2010; Tella, 2020). Boroffice (2008)

confirms this, stating that the crux of the Nigerian space programme is to boost sustainable national growth through space research and advancement. This reflects the National Space Policy's (NSP) vision statement, which calls for Abuja to "build indigenous competence in developing, designing and building appropriate hardware and software in space technology as an essential tool for its Socio-Economic development and enhancement of the quality of life of its people." (National Space Policy, 2001:1-2). The NSP, among other things, suggests that the Nigerian government's determination to invest in space is based on the desire to leverage its robust benefits to launch the state into the sphere of modern technology. It further suggests, as we might expect to see using the framework of neoclassical realism, that this proposed plan could benefit from international collaboration, especially in the implementation of the national space agenda: the domestic arena impacting upon foreign policy.

Prior to 2003, when Nigeria launched its first satellite, the state had used and hosted satellite-based infrastructure for various purposes and for other states. Most notable of these was the United States' (US) establishment of a tracking and manned spaceflight station in Kano (Northern Nigeria) between 1960 and 1966 to support Project Mercury following Explorer-1's launch in 1958. The station also monitored Apollo and Gemini satellites until the completion of Project Gemini in 1966 (NASA, 1962; Lichtenstein, 2019). However, due to the restructuring of the Apollo support network, Kano station was closed (NASA, 1962). Similarly, in August 1963, the world's first satellite communications ship, USNS Kingsport (T-AG-164), transmitted the initial live telephone conversation between Prime Minister Abubakar Tafawa Balewa in Nigeria and President John F. Kennedy in Washington through Synacom (Ajewole, 2011).

These two significant events that featured Nigeria in the historical space projects of the US provide evidence that Abuja has been on the trail of technological advancement for decades. Therefore, it is not surprising that in 1976, Nigeria officially declared its space ambitions to the Organisation of African Unity (now AU) and the Economic Commission for Africa in Addis Ababa (Tella, 2018). Despite the state's declaration, no tangible steps were taken until the late 1980s, when the National Centre for Remote Sensing (NCRS) and the National Committee on Space Applications were created. This committee was formed in 1987 by the Federal Ministry of Science and Technology (FMST) to guide the government on procedures for implementing a space science and technology programme.

In 1993, the Directorate of Science was established by the National Agency for Science and Engineering Infrastructure (NASENI), which later commissioned a nine-person committee of experts that produced a draft policy on national space science and technology (James, Akinyede and Halilu, 2014). On May 5, 1999, the National Space Research and Development Agency (NASRDA) was inaugurated by the Nigerian government. NASRDA was established to manage the national space programme and address the socio-economic needs of Nigeria (Adetoro and Aro, 2011). This was followed by the implementation of the national space policy (NSP) in 2001. Consequently, the NASRDA Act 2010 was endorsed by Abuja to attract more participation in the space sector and to serve as a guideline for space activities within Nigeria (Space in Africa, 2020b). Further, the National Space Council (NSC), headed by the president, became the national space regulator and was responsible for issuing operating licences to non-governmental innovators (Ibid). Through these, several private firms joined the space industry, contributing to its development. Overall, NASRDA implements all government-financed space projects and provides space services to other sectors.

The establishment of the space agency and the implementation of the space policy and NASRDA Act, as well as the NSC, represent the political backing that provided the drive for national space activities while cementing Nigeria's quest to capture the benefits of the space arena. This development paved the way for an influx of foreign partnerships spanning across various sectors of the country. Furthermore, among others, Nigeria hosts the UN's African Regional Centre for Space Science and Technology Education in English (ARCSSTE-E) and continues to be instrumental in Africa's space agenda. These all contribute to Nigeria's space capabilities.

2.2 Nigerian Space Programme and Capacity Building

Ziarnick (2021) suggests that the main essence of a state's spacepower is to increase its general power through space activity. Thus, this section examines Abuja's space programme and capacity building, which serve as the basis for the state's spacepower and its expansion and sustainability.

Capacity building is the development of people's and institutions' capabilities to improve their ability to sustainably solve problems (UNESCO, 2021). Capacity building is important to gaining, expanding, and retaining the knowledge, skills, and other essential resources needed to

achieve better results. According to Onuh *et al.* (2019), capacity building covers a state's human, scientific, technological, organisational, institutional, and resource proficiencies. In space and science technology, capacity building could, therefore, connote the transfer of knowledge and technology between the recipient state, agency, or individual and the party with advanced skills and experience. Through this exercise, the space scientists and technicians' acquired practical expertise and skills will contribute to the success of the national space agencies (Kganyago and Paidamwoyo, 2019), enabling the transfer of knowledge to home-grown institutions such as universities, research centres, and local businesses to ensure the sustainability of the space programme. Similarly, the cost of owning and running space-related programmes will reduce, while the benefits spread to other sectors in the region (Oyewole, 2017). The knowledge and skills acquired in developing the state's space infrastructure would contribute to the growth of various businesses, including those in non-space sectors. For example, the electronics and manufacturing industries will guarantee the progression and retention of highly skilled labour and the enhancement of domestic technology needed for new space trends (Scatteia, Frayling and Atie, 2020).

Capacity building is central to spacepower. This is because the acquisition of spacepower involves the development of a vibrant industrial base with highly competent technicians for the purpose of raising the state's economic competitiveness on the global stage (Peter, 2010), including security. Thus, it could be argued that Abuja's space capacity-building is a catalyst for the state's spacepower and quest on the continent of Africa. Moreover, Nigeria's efforts and desires for advancement in space technology provide substantial evidence that an African state can be a key player in the international space environment. This reiterates the need for capacity-building to ensure efficiency and sustainability. However, it is noteworthy that states are mere entities populated by people and run by the government. Hence, the space workforce needs to be trained, and institutions need to be equipped, because the ability of any state to follow a sustainable path is mainly dependent on the capacity of its citizens (United Nations Sustainable Development, 1992).

Capacity-building in national space programmes dates to the Vienna 1982 United Nations Conference on Exploration and Peaceful Uses of Outer Space (UNISPACE II). At this meeting, it was recommended that the United Nations Office for Outer Space Affairs (UNOOSA), through its space applications programme, should focus on indigenous capacity-building for the development and utilisation of space science and technology (Akinyede, 2012). On

November 8, 1996, participating African states at the second United Nations Conference on Space Science and Technology for Sustainable Development agreed that it was time for the national and regional leadership on the continent to adopt space technology as a developmental tool (Abiodun, 2012). These are mainly in the areas of resource management, the environment, information and communications, health, food, and capacity-building (Ibid). Therefore, among other reasons, in 1998, the African Regional Centre for Space Science and Technology Education in English (ARCSSTE-E) was inaugurated in Nigeria and affiliated to UNOOSA (Space in Africa, 2019b).

A year later (1999), as mentioned in Section 2.1, Nigeria established NASRDA to promote and coordinate its space programme, while the NSP serves as the government's guide for the space programme. The policy statements are:

1. *Nigeria shall vigorously pursue the attainment of space capabilities as an essential tool for its socio-economic development and the enhancement of the quality of life of its people. The Nation shall achieve this through research, rigorous education, engineering, development, design and manufacture of appropriate hardware and software in space technology, including transport and payloads, such as satellites, telescopes and antennas for scientific research and applications.*
2. *Government shall also foster bilateral and multilateral cooperation in all aspect of space science and technology to ensure that Nigerian Scientists and Engineers benefit from global development in the space enterprise.* (National Space Policy, 2001:2-3).

The second objective is further elaborated in Chapter One, Number 1.2 of the National Space Policy, which states that "Government shall develop a "critical mass" of Nigerians in the area of space science and technology to enable the country to realize its objectives for achieving technological, industrial, commercial and economic self-reliance." (National Space Policy, 2001:7-8). The objectives of self-reliance strongly correlate with the structures of power theory and the concept of spacepower.

In the knowledge structure, Strange (1994, 2015) alludes to the 'information revolution', which she terms the collective effects of the fields of swift technological change. Russell (1995) claims that technological changes are crucial for generating new knowledge, and knowledge in space technology forms the basis for continued innovations in technology with a direct impact on the lives of people and socio-economic development. This, therefore, can lead to industrial, commercial, and economic self-reliance, interlacing with the security, finance, and production structures.

As discussed in Chapter 1, Section 1.6.1.1, security is the most significant need for every society and certainly influences 'who-gets-what' in the economy (Strange, 1994, 2015). The safety of the state and its citizens guarantees socio-economic growth. Thus, Nigeria's space capabilities can be channelled further to safeguard society and for military and defence purposes, through which the goal of self-reliance can be attained. This is equally spacepower, because space capabilities and activities are utilised to strengthen the state's power.

Strange (1994, 2015) argues that money can be a source of power as it plays a pivotal role in the provision of public goods and economic growth. Similarly, Hays and Lutes (2007) suggest that an actor's economic competences can influence its spacepower. Therefore, since Abuja's space capabilities are public goods because they are funded by the government and used for the benefit of society, adequate funding and consistent investment are required to realise the ambition of self-reliance in the economy, technology, commerce, trading, and manufacturing sectors.

Equally, the emphasis in the NSP on the 'critical mass' of indigenous space professionals to aid self-reliance is crucially relevant to the production structure and spacepower. Kenton (2023) defines 'critical mass' as the level at which a developing company can sustain itself and generate profits without additional investment. While the production structure is dependent on the people at work and the wealth that they create by working, it is also the wealth generator in society (Strange, 1994, 2015). Thus, an increase in the number of trained personnel in Nigeria's space operations, including satellite manufacturing and launching, will strengthen the state's capabilities and accelerate its quest for self-reliance in space technology (spacepower). This reiterates the importance of capacity-building in the national space programme, as it guarantees independence and sustainability when indigenous capabilities are maximised to solve problems, leading to critical mass. This can confer structural power on Nigeria.

NASRDA's Objectives A, B, and E of Chapter One, Number 1.3 of the NSP, serve as a guide to the agency's strategy to develop its human resources through capacity building (National Space Policy, 2001:8). Likewise, the Nigerian 25-year space roadmap was programmed to achieve its goals through R&D and capacity-building in the fields of science, space law, engineering, and administration for sustainable national development (Boroffice, 2008). Zhao (2016) argues that for cooperation, sustainability, and national development, space agencies and non-space agencies, private organisations, space research institutes, and universities may pursue international space agreements. This is because, among other reasons, any state operating independently in the global economic conditions will see its capability weakened (Hertzfeld and Peter, 2007). Accordingly, NASRDA, in fulfilling its mandate, signed several developmental pacts with foreign counterparts, for example, SSTL and CGWIC. Further, a Memorandum of Understanding (MOU) was signed with space science and technology learning institutions and facilities in the US, Russia, and Japan.

Nigeria has since benefitted immensely from these partnerships, with the launch of five satellites and one replacement satellite. More than a hundred scientists and engineers in the space sector have been trained, and an additional two hundred professionals were domestically trained by the pioneer engineers (Chizea, Umunna and Ovie, 2019). NASRDA invests in the science-related academic development of its staff, resulting in over four hundred Master's and PhD degree holders working at the agency (Onuh *et al.*, 2019). These researchers and scientists can serve as the "architects of transfer pathways" (Venturini and Verbano, 2014:104) as the knowledge acquired can be retained, processed, transferred, and further developed nationally. Through this, Nigeria could create a knowledge structure that allows systematic knowledge transfer within the space community and to other sectors, aiding in the achievement of the national space plan and development.

The progress made by Nigeria in operating a space programme necessitates the continuous training, research, and development of human capacity in satellite design, building, testing, operation of the ground station, and data utilisation. This would further promote a domestic culture of innovation where Nigerian space professionals develop skills and gain technical knowledge for the state's benefit, thus creating a structure that allows the control of knowledge and its transfer to other sectors and within Africa. This relates to the concept of spacepower in connection with national power (Peter, 2010). That is, Abuja's purposeful effort to equip its space engineers for fortifying its capacity and thereby achieving its state goals is national power. Given these needs and the importance of developing research and sustainability in

Nigeria's space sector, NASRDA established six activity centres of excellence across the country.

The centres are: National Centre for Remote Sensing (NCRS), Jos; Centre for Geodesy and Geodynamics (CGG), Toro; Centre for Satellite Technology Department (CSTD), Abuja; African Regional Centre for Space Science and Technology Education in English (ARCSSTE-E), Ile-Ife; Centre for Basic Space Science (CBSS), Nsukka; and Centre for Space Transport and Propulsion (CSTP), Epe (James, Akinyede and Halilu, 2014). The CSTP was established to institutionalise Nigeria's pursuit of orbital launch capacity while it invests in rocketry (Oyewole, 2020).

These centres are operational and are under the FMST except for ARCSSTE-E, which was established through a tripartite agreement between UNOOSA, the Nigerian government, and Obafemi Awolowo University (OAU), Ile-Ife. Each of these parties plays a specific role. The OAU provides resources and the relevant academic members for the postgraduate degree programmes, while the government manages the centre's daily activities, and UNOOSA forms the curriculum and finances the participants' travelling expenses (Oladosu and Offiong, 2013). As part of human empowerment and knowledge transfer, ARCSSTE-E supports capacity building in space science and technology in Anglophone Africa while Morocco hosts the ARCSSTE for the French-speaking African states (Onuh *et al.*, 2019). Both regional centres offer students across Africa postgraduate courses (Martinez, 2012b). In essence, ARCSSTE-E improves homegrown capability in space science and technology applications through training and education, with the added objective of bolstering socio-economic growth in Africa (UNOOSA, 2008).

ARCSSTE-E's mandate aligns with NASRDA's agenda for space and socio-economic development through capacity-building. This would further promote a domestic culture of innovation where Nigerian students, space enthusiasts, and professionals, including those in related sectors, develop skills and gain technical knowledge for the benefit of the country. Indeed, a notable result of the Nigerian capacity-building programme was the actualisation of indigenously built satellites.

In 2011, twenty-six homegrown engineers worked with their foreign counterparts at SSTL to manufacture NigeriaSat-X (Tella, 2018). Likewise, the nanosatellite NigeriaEduSat-1 was built by the Federal University of Technology Akure (FUTA) in partnership with NASRDA (Space in Africa, 2018b) using the Assembling, Integration and Testing Centre (AITC) facilities of the

Japanese Kyushu Institute of Technology (KIT) in 2017 (Oyewole, 2017, 2020). NigeriaEduSat-1 was launched to domiciliate satellite technology in FUTA in order to improve capacity-building and knowledge transfer among students and staff. This explains NASRDA's involvement, not only because the project was in line with its capacity-building programme but also because the nanosatellite will ensure the university community becomes familiar with space technology for research purposes, sustainable socio-economic growth, environmental monitoring, and resource management, all of which are part of NASRDA's objectives. This fits into the tenets of the knowledge structure, linking the other three structures. The detection, storage, and communication of knowledge, based on who possesses it and on what terms, confers power on the key decision-makers. Knowledge is power and comes before production; it comes ahead of military strength (security) and usually precedes economic success (finance).

Finance is essential to capacity building; a lack of funding impedes space projects and development. Since space activities have grown around the world and become important tools for modernisation, more states are continuously investing in them (Peter, 2010). Money is, therefore, a determining factor in expanding capacity-building and providing relevant resources. Nigeria's annual space budget varies between $50 million and $90 million (Way, 2020; Faleti, 2021a; Oneyibo, 2022). Although this amount is relatively more than the spending of other spacefaring countries in Africa, it is significantly lower than the top non-African states' space budgets. For example, the US set aside $24.8 billion for the 2022 space budget (Weitering, 2021), while Europe spends approximately $10 billion annually, and China allocates between $6 and $10 billion (Rementeria, 2022). Hence, due to its limited economic prowess, Abuja is yet to develop its space launch facilities and satellite manufacturing industry, wherein capacity-building could further benefit. In terms of Susan Strange's notion of power, this suggests that Nigeria is not yet able, without manufacturing capability, to assert control over the production structure.

Alongside the production, security, and knowledge structures, the finance structure is fundamental to acquiring structural power. Since money is a means of economic growth and a tool for the provision of collective goods (Strange, 1994, 2015), money is a price for knowledge. Put differently, financial capital is important for the acquisition and transfer of knowledge. This connects to the concept of capacity-building in the national space programme because it involves the effective use of resources to gain, retain, apply, and transfer space-related information, all of which contribute to spacepower.

2.3 Nigerian Space Capabilities: Upstream and Downstream Sectors

This section examines Nigeria's space capabilities, part of which constitute the state's spacepower. The bedrock of development is tied to the upstream and downstream resources of space and its activities. Clark *et al.* (2014) argue that space investment has several economic impacts on the upstream segment as it supplies the space sector (backward linkages) while ensuring the provision of benefits to the downstream (forward linkages). Thus, these space segments provide vast gains for states and organisations, such as the maintenance of security and economic growth, direct services, revenues, and employment opportunities, including the development of associated technology in the agriculture, mining, and information and communication technology industries. Nigeria invests in its space capabilities and embarks on key projects. Some of these capabilities are captured in this section.

2.3.1 Upstream Sector

The upstream sector comprises the activities that involve the development of space infrastructure, such as the designing, assembling, manufacturing, R&D, launching of spacecraft, and ground stations (Strada, 2018). Essentially, the sector focuses on the propulsion of objects into outer space for space exploration. Thus, delivering "a range of services to both public and private customers and users, bringing scientific and economic benefits and providing critical information to the security, meteorological and environmental sectors" (GOV.UK, 2017:4), among other areas.

Nigeria has a ground facility and control station in Abuja, with a backup station for its communications satellite (NIGCOMSAT-1R) at Kashi in China (Aragba-Akpore, 2023). This centre is used for spacecraft tracking and control as well as payload management and operations. However, Abuja does not currently have its own spaceport, explaining why all the state's satellites were launched abroad. Thus, Nigeria aims to run a spaceport with the capacity to launch several satellites into geosynchronous equatorial orbit (GEO), low earth orbit (LEO), and interplanetary space by 2030 (Space in Africa, 2019f). This aspiration is declared in Nigeria's 25-year space roadmap (2005-2030). The strategic roadmap has four main benchmarks:

i. To produce an astronaut from Nigeria by 2015

ii. To launch Nigerian made satellites by 2018.

iii. To develop rocketry and propulsion systems by 2025

iv. To launch indigenously built satellites from Nigeria's spaceport through the state's launch vehicles by 2030. (Chizea, Umunna and Ovie, 2019)

As of the first quarter of 2023, only the manufacturing of a Nigerian satellite has been accomplished. Nigeria has not produced an astronaut, nor does it have a training programme in place. Nevertheless, other proposed future plans are still viable. Thus, to achieve objectives iii and iv, the CSTP was assigned to implement the development of rocketry and propulsion systems, including the launch vehicles. As discussed in Section 2.2, the centre is responsible for all aspects of rocketry and associated technology for Nigeria's space programme. The centre develops and acquires the technology that is essential for manufacturing rocket components, rocket propulsion fuels, and developing high-tech capabilities as well as the launching platforms for the use of civil and military applications (MacLeish *et al.*, 2015).

The CSTP is managed by indigenous engineers and scientists and is strategically located in Lagos, close to the engineering campus of Lagos State University. This is mainly to support R&D in the space propulsion system and transport vehicles. The centre has carried out over 30 rocket launch experiments at below 10km altitude to demonstrate its comprehensive research in formulating a hybrid of sucrose and sorbitol-based propellants and to establish the reliability of its newly built rocket recovery system (Space in Africa, 2019d). The centre has also been working on obtaining a solid rocket fuel with a higher precise impulse to enable the use of lighter Solid Rocket Motors (SRM). Further, CSTP developed advanced in-house software platforms for analysis, assessment, forecast, and estimation of datasets for optimising space rocket structure, SRM, and test flights (Ibid).

Lagos, where the rocketry and propulsion site is based, is 718 km (446 miles) from the equator and would thus be strategically advantageous in terms of satellite launches when they are ready. It is expected that the spaceport would attract enormous benefits for Nigeria and its space programme: clear benefits would be additional foreign collaboration and direct investments, but Nigeria would also be likely to see growth in terms of its international standing and regional power. Linking this infrastructural capability and benefits to structural power and spacepower, they represent a means for Nigeria to be a space power and control the security, production,

finance, and knowledge structures through which other states, corporations, and institutions operate.

The Assembly, Integration, and Test Centre (AITC) is another crucial ground segment of the upstream space industry (Strada, 2018). This is because the facility is the engine room for the designing and manufacturing of satellites. Nigeria's AITC is yet to be completed due to limited available funds (Chiedozie, 2019). The inability to complete the AITC contributed to the failure to accomplish Objective II of the 25-year roadmap (Amaefule, 2019). Similarly, the CSTP project has slowed due to limited funding despite the government's annual allocation to NASRDA (Oludimu, 2018). Fashade (2008) argues that establishing and operating CSTP is capital intensive and requires enormous financial investment for sustainability. On the basis of the finance structure, money is essential to the development of infrastructure. Hence, if Abuja aims to achieve its proposed roadmap for 2030 and acquire spacepower, including structural power, the government must prioritise the completion of the facility by injecting more funds into it.

Essentially, the upstream sector of the Nigerian space programme presents a great prospect for strengthening the country's regional influence. Through the lens of realists, Nigeria's spaceport, and its location (Lagos), as well as the AITC, are material capabilities that could be utilised, while they can also be used as a means of structural power in Africa.

2.3.2 Downstream Sector

The space downstream sector covers the commercial activities driven by the use of data produced by the space infrastructure, such as navigation, communication, broadcasting, and Earth observation (De Concini and Toth, 2019). The sector maximises research and upstream technology through various applications, where space data is transformed into value-added products for end-users and the distribution of products (Vongsantivanich, Ho and Verspieren, 2018), including security purposes. It is noteworthy that the largest number of opportunities and growth in space technology come from the downstream sector (EUSPA, 2019). Besides, the sector is where businesses and states, especially those with space programmes, utilise their capabilities and benefit immensely.

The government controls Nigeria's downstream space sector. Under the guidance of the FMST, NASRDA set up two companies to maximise the data from Nigeria's satellites. The companies are NIGCOMSAT and GeoApps Plus Limited. NIGCOMSAT was carved out of NASRDA by

the Federal Ministry of Communications and Digital Economy (FMCDE) in 2006 as an independent company and the service provider that manages the commercial operations of NIGCOMSAT-1R, including marketing (Adaramola, 2022). GeoApps Plus Limited was created in September 2007 to market the products and applications derived from Nigeria's Earth Observation satellites (James, Akinyede and Halilu, 2014). The company specialises in image acquisition, geographic information systems (GIS), geo-intelligence, and remote sensing.

These companies were mainly established to help NASRDA realise the commercial benefit of its investment in space technology, especially satellite operations. It is important to note that the companies' roles support the Nigerian space capacity-building agenda because they make sure that local expertise is used, and that staff and their relevant skills are further developed.

While GeoApps Plus Limited manages the data from the EO satellites, NIGCOMSAT's role in the downstream sector is enormous since the communications industry represents the busiest sector of the space industry. As the company that manages the commercial operations of the Nigerian space programme, NIGCOMSAT offers comprehensive information and communications services and applications in Nigeria and within reach of NIGCOMSAT-1R's footprints beyond Nigeria (Lawal, Chatwin and Hasan, 2018). NIGCOMSAT currently operates one communications satellite and offers, among other services, direct-to-home (DTH) services within 54 African states. Through this, customers and local TV stations have access to free TV channels that offer news, entertainment, sports, and religious events. This can serve as a framework for strengthening Nigeria's influence in Africa as it aligns with the IPE knowledge and production structures. That is, as Abuja's foreign policy focuses on the African continent (Oshewolo, 2019b), the space agency uses its capabilities to supply services to other states through NIGCOMSAT. Thus, Nigeria can set the agenda for these countries through TV and communications services.

Nigeria's satellites are also used for security through its space administration. The National Space Policy (NSP) states that the "government shall establish a Defence Space Command in the Ministry of Defence. The Command shall comprise representatives of the Defence, intelligence, security and law enforcement services and report through the Ministry of Defence" (National Space Policy, 2001:3). According to these provisions, on October 9, 2014, the government established the Defence Space Administration (DSA), and the DSA Act 2016 was signed into law in 2017 by the 8th National Assembly (Defence Space Administration,

2023). The DSA collaborates with NIGCOMSAT to supply the military with relevant data for national security purposes. This security capability and the uses of Abuja's satellites represent a tangible source for spacepower if they could be effectively utilised nationally and structurally adopted on the continent of Africa.

2.4 Types of Nigeria's Satellites

There are different types of satellites, just as there are several earth orbits. There are communications satellites, Earth observation (EO) satellites, and navigational satellites such as the Global Positioning System (GPS), which are used for mapping and locating targets, among other things.

A communications satellite is an essential infrastructure that connects people globally through its radio signal, which creates a channel of communication between a transmitter and a receiver regardless of the differing locations. Lubojemski (2019) argues that communications satellites serve as valuable systems that provide C4ISR (command, control, communications, computers, intelligence, surveillance, and reconnaissance) capabilities while leveraging the capacity of traditional operating effectors (tanks, aeroplanes, and ships). As noted in Section 2.3.2, Nigeria has one communications satellite that serves businesses, individuals, communities, and governments' needs through the provision of internet, cable TV, and mobile networks, among other services.

Nigeria also currently has two EO satellites in orbit (NigeriaSat-2 and NigeriaSat-X). Broadly, Earth observation (EO) is the process of viewing all that occurs in the world and understanding the changes and patterns in a way that cannot be observed from the terrestrial surface (Ecometrica, 2020). Thus, EO satellites are low-inclination, polar-orbiting devices used for continuous observations of the atmosphere, solid Earth, land surface, biosphere, and oceans (NASA, 2022). Similarly, Kganyago and Paidamwoyo (2019) describe EO satellites as custom-designed robot spacecraft that use remote sensing technology to serve specific users' needs, thereby possessing the ability to regularly collect information about the Earth with large areas covered in adequate detail while overcoming any traditional survey limitations. The collated data supports scientific research, national defence, meteorology, and diverse commercial activities (Angelo, Jr., 2003). Further, the EO satellites help improve our knowledge of ecosystems, including the control and provision of timely alerts about substantial changes (Clark *et*

al., 2014). They can also benefit society in agriculture and food security, resource and risk management, transportation, health, and air quality (Lafaye, 2017). Lubojemski (2019) argues that a state that possesses a meteorological satellite system can provide its military with information about the weather and imminent threats during operations. Indeed, Nigeria's DSA uses the national EO satellites to support the military in their operations and for national defence purposes. In addition to this, Nigeria launched its military satellite in December 2022 for the purpose of boosting the military's operational capability to combat insecurity (Moyo, 2022). The satellite will also aid in implementing Nigeria's sectoral strategies in response to threats to its national interests.

Generally, as stated in the National Space Policy (NSP), the essence of using remote sensing is that it "enables us [Nigeria] to understand our land, air and water resources and problems associated with these." (National Space Policy, 2001:3). Thus, two ground receiving stations are in operation in Nigeria (NCRS and CSTD). The NCRS is more active in remote sensing. With its three Space Application Laboratories, the centre collects, develops, records, and shares the satellite data derived from NigeriaSat-2 and NigeriaSat-X. These primary data's radiometric and geometric abnormalities are rectified first before being digitally stored (European Space Agency, no date b).

2.5 Uses and Benefit of Nigeria's Satellites

There are several benefits that the satellite system offers Nigeria. A notable benefit is space collaboration, which is further elaborated in Section 2.6. Early in the millennium, Nigeria's EO satellite partnered with Algeria, China, Spain, Turkey, and the UK satellites in the Disaster Monitoring Constellation (DMC) to supply images for the global management of natural disasters. The DMC is an assembly of EO satellites that provided timely and relevant information for the purpose of disaster management (Ikpaya *et al.*, 2016). NigeriaSat-1 supplied RESPOND, a European Space Agency (ESA) project, with over twenty images of the Southern Asian areas affected by the 2004 tsunami. A year later, NigeriaSat-1 was the first DMC satellite to provide images of the regions affected by Hurricane Katrina (George Etomi and Partners, 2018; The Economist, 2021). The satellite also monitored the California forest fire (Ikpaya *et al.*, 2016) and produced essential information for the management of Australia's bushfires in 2006 (Oyewole, 2017). Similarly, the constellation supplied quality images to track

the Greek forest fires of 2007 (Adebola and Adebola, 2021). Due to the importance of the DMC's data, the UN recommended it for the improvement of participating space agencies' harmonisation on the effective monitoring of natural disasters and the provision of support relief (Klinger, 2020).

Further, the Nigerian EO satellites have been instrumental in disaster management within the country. For example, to curb the rapid spread of COVID-19 in Nigeria, NASRDA partnered with the Federal Ministry of Health to utilise telemedicine remote terminals and mobile buses for testing the disease (Space in Africa, 2020c). Similarly, ESA's Sentinel-5P Precursor was used to ascertain the levels of nitrogen dioxide (NO2) in six Nigerian cities. The satellite maps showed a substantial reduction in NO2 in Abuja, Ibadan, Kano, Lagos, Onitsha, and Owerri during the pre-lockdown and lockdown periods (Olusola *et al.*, 2021). Further, in delivering timely estimation on aggravated poverty in Nigeria caused by the pandemic, a top-quality poverty map from satellite imagery and Big Data was used (Blumenstock *et al.*, 2021). Experts forecasted poverty through a comprehensive dataset matching ground-truth poverty indicators to geospatial data and imagery. The procedure involved the use of indicators such as building density, road quality, and terrestrial topology (Ibid).

NASRDA also provides satellite images, early warnings, and flood response to the National Emergency Management Agency (NEMA) (Oyewole, 2017). The satellite also facilitated the documentation of the patterns of climate change in Nigeria and updated the outdated national maps (Giokos and Whiteside, 2016). Electoral management, governance, and R&D are also among the vital areas that Nigeria's satellites support. During the 2011 general elections, NASRDA monitored the electoral process with its satellites and provided information about voters who were overlooked by poll workers. This led to improvements in the 2015 and subsequent national elections. Similarly, NigeriaSat-1, since its launch in 2003 (Wood and Weigel, 2012; Tella, 2018) up until the expiration of the satellite in 2011, provided suitable and accessible data, which stimulated indigenous R&D in many governmental institutions and the private sector. This valuable information also aided economic development planning in Nigeria (Akinyede and Agbaje, 2006), thus boosting sustainable national development. Additionally, the oil-rich Niger Delta, where there is oil drilling, theft, and spillage, is monitored by the national satellites. The Nigerian satellites also measure the impacts of the spillage on the environment and fully capture Nigeria's landmarks for national planning and development purposes (George Etomi and Partners, 2018).

Peter (2010) suggests that space capabilities provide support and give an advantage to military operations on land, sea, and air through communication, tracking, and positioning, thus proving strategically effective. Indeed, Nigerian satellites contribute to human security both within and outside the country. For example, the areas attacked and seized by the extremist group Boko Haram were observed by satellites while also tracking border movements (Okon, 2018). In 2014, the military used NigeriaSat-X and NigeriaSat-2 to track Boko Haram's activities, leading to the release of two hundred and seventy-three girls abducted by the group (Firsing, 2017).

The Nigerian satellites are also beneficial to the agricultural industry. Modern technology enables the use of applications for infrastructural development and aids the production of food and cash crops in Africa (Kganyago and Paidamwoyo, 2019). Agriculture is the secondary source of Nigeria's revenue; thus, Abuja could further use the satellite system to assist farmers in crop production, mapping swamps, erosion monitoring, and building storage (George Etomi and Partners, 2018), including identifying the best point for dam construction. Similarly, since Nigeria is an exporter of food, using advanced satellites for monitoring, food production, and related activities could make the agricultural industry more valuable and efficient.

The internet and telecommunications sectors are arguably the largest satellite-based industries. Nigeria's communications satellite provides internet services that enable online content and access in ways that no other terrestrial system could accommodate. Notably, the Internet, mobile devices, and broadband services have enhanced the prospects of the global e-commerce industry. For a highly populated country like Nigeria with vast economic potential, access to the internet translates to an opportunity to save money, invest, access online learning and primary healthcare, as well as local and foreign trade, which are all central to socio-economic development (Tuerk, 2020). As of 2020, there has been an increase in Internet usage, mobile applications, and subscriptions in Nigeria, making it the largest technology market in Africa (Umeh, 2020). Nigerians now have access to essential services using applications for banking, trading, travel, and shopping, which are the most common phone-enabled platforms available to consumers.

This section has so far examined Nigeria's space experience, its space capabilities, and the uses and benefits of the state's satellites. The main idea behind this approach is that the space assets represent the capabilities needed to solve domestic issues and, by extension, to strengthen Nigeria's international activities and regional influence. Nigeria can utilise its space resources as spacepower, thereby acquiring structural power in Africa through the control of the structures of security, production, knowledge, and finance. The following section focuses on Nigeria's foreign policy, its space collaboration and diplomacy, and its non-space Afrocentric foreign policy. The attention on the non-space foreign policy aspect is to have an idea of Abuja's regional hegemony and issues affecting its influence, thus laying the background for the need for this thesis' research.

2.6 Foreign Policy: Nigeria's Collaboration in Space Technology

Hertzfeld and Peter (2007) argue that cooperation in space activities has been an enduring tradition, with states principally collaborating for their own self-interests. This is reminiscent of the theory of realism as states engage in bilateral and multilateral space agreements as long as it suits their national interests. Hence, it is crucial to identify states' motivation and capacity to cooperate with other states, for instance, their political drive and technical contribution to the collaborative arrangement (Broniatowski *et al.*, 2008). Nigeria prides itself on being among the few African states projecting space technology, research, and collaboration. Among other reasons, as discussed in Section 2.2, Abuja's drive for space collaboration includes the need for capacity-building because it is seen as central to the development of indigenous space capabilities. Space collaboration is therefore crucial to Nigeria's spacepower, space diplomacy, and foreign policy, especially in possessing the capabilities required for the regional agenda and for prestige purposes.

Since the turn of the millennium, Nigeria has invested heavily in its space programme and has become active in Africa and in UN activities for space development on the continent (see Section 2.2). These have enabled Abuja to maintain a steady pace forward in space activities, allowing it to foster foreign relations and new partnerships. It is noteworthy to reiterate that the Nigerian satellite operations—manufacture and launch—were made possible via international cooperation. Nigerian satellites have either been built or launched from foreign facilities. Nigeria's first EO microsatellite (NigeriaSat-1) was developed by SSTL in the UK and

launched from Plesetsk Cosmodrome in Russia. Similarly, NigeriaSat-2, Abuja's first high-resolution (mini) satellite, was launched in Yasny, Russia (Nkordeh, Bob-Manuel and Oni, 2017; Tella, 2018). This satellite was a replacement for NigeriaSat-1 after its lifespan elapsed. The new satellite was also launched because there was a growing need for high-resolution images as well as a quest for improved technical knowledge and local satellite manufacturing capacity.

Furthermore, Abuja was part of the DMC, as mentioned in Section 2.5. Between 2002 and 2003, NigeriaSat-1, along with AlSat-1 (Algeria), Beijing-1 (China), BilSat-1 (Turkey), Deimos-1 (Spain), and UK-DMC and UK-DMC-2 (United Kingdom), provided several data (Ikpaya *et al.*, 2016). These independently owned and controlled EO satellites were the first-generation DMC built by SSTL (SSTL, 2021). In 2003, Nigeria was also involved in the creation and implementation of the African Resource Management Satellite Constellation (ARM). The project had Nigeria, South Africa, Algeria, and Kenya as co-founders (Oyewole, 2017). Under this venture, each state contributes one EO satellite and retains access to others' satellites within the constellation (Martinez, 2012a). The ARM is aimed at providing instant, unlimited, and cheaper access to satellite data to aid resource and environmental management (Adebola and Adebola, 2021).

Nigeria is also a pioneering member of the African Leadership Conference on Space Science and Technology for Sustainable Development (ALC). The ALC brings together Africa's space professionals for the purpose of sharing scientific ideas on the continent's sustainable development (Space in Africa, 2018a). Abuja hosted the inaugural event in 2005 and in 2018 and continues to play a key role in the conferences. It is important to note that it was in one of the meetings that participants suggested the formation of the African Space Agency (Aganaba-Jeanty, 2013). Nigeria's significant role on the continent shows evidence of its space prowess and the potential to further strengthen its hegemony with its spacepower.

2.7 Space Diplomacy: Nigeria and China Relations

As discussed in Chapter 1, Section 1.6.1.2, SSTL and CGWIC play key roles in the Nigerian space programme. The British firm manufactured Abuja's EO satellites while the Chinese developed the state's only communications satellite. Nigeria has also been instrumental to US

space diplomacy since it hosted its spaceflight station in Kano in the early 1960s. This section focuses on Nigeria's space relations with China. This is because of the significance of the Asian state to Nigeria's space sector and other areas, as well as how this relationship impacts the states' national and global ambitions.

Beijing has an established presence in Africa, even though it is often perceived as a negative influence from a global perspective. Nonetheless, it is not an aberration that China has a dominant influence with its security, economic, and technological capabilities. These have enabled the state to be a major source of foreign direct investment (FDI) and partner with several resource-rich African states, including providing development loans, trade, and economic assistance (Albert, 2017). The diplomatic relationship between Nigeria and China dates to February 10, 1971 (Chau, 2007) and today, China's investments, aid, and loans to Nigeria have rapidly increased, making Nigeria one of its largest African partners in the last decade (Klinger, 2020). This type of bilateral cooperation is what the Chinese term 'strategic partnership'. In their 2019 article: *China's emerging partnership network: what, who, where, when and why,* Quan Li and Min Ye argue that China has twenty-four types of partnerships, which they classify into three broad groups: comprehensive strategic partnership, strategic partnership, and regular partnership (p. 67-69). Li and Ye's study place Nigeria within the strategic partnership category. They maintained that:

> *"The term "strategic" means that cooperation between the two countries not only has an overall importance to the bilateral relationship but also is stable and long-term, overcoming the differences in ideology and political systems. Finally, the term "partnership" means that the two countries cooperate on the basis of mutual-respect, mutual-trust and equality."* (Li and Ye, 2019:68).

This suggests the level of priority China places on its relationship with Nigeria. In fact, both governments frequently label their association as a "'win-win' partnership" (Jun and Saliu, 2018), even though it is a general term used by the Chinese to define their affairs with African states (Oshodi and Uzodike, 2021). Nevertheless, it appears that the thrust of Nigeria-China relations is founded on the 'mutual respect, trust, and equality' that they share bilaterally. Toogood (2016) observes that both states clearly define their strategic investment opportunities, with Nigeria viewing the relationship "as one that also benefits its own export needs and its international negotiating prowess." (p. 5). Toogood further notes that foreign

investors now fondly know Nigeria as “Africa’s China” and that the “relationship will enable Nigeria to become a major player in both Africa’s and now Asia’s markets.” (Toogood, 2016:5). Indeed, it can be argued that since the two states entered into a diplomatic agreement, their relationship has been steady, cutting across diverse sectors, including agriculture, oil, education, construction, and space technology.

Beijing’s technological capabilities serve as a selling point in its association with developing states (Hertzfeld and Peter, 2007). In a White Paper released by Beijing, the government expressed their commitment to supporting the use of China’s mature space technology and space application technology to cooperate with developing countries on the basis of mutual benefit and provide services to cooperating countries (State Council of the People’s Republic of China, 2000). In practice, China views satellites as infrastructure investment in developing space programmes through its Belt and Road Initiative (BRI) (Way, 2020). Kuo and Kommenda (2018) explain that the BRI is “a state-backed campaign for global dominance, a stimulus package for a slowing economy, and a massive marketing campaign for something that was already happening – Chinese investment around the world.” Nigeria is a developing state (United Nations, 2022) with an evolving space programme; this perhaps explains China’s collaboration with the Nigerian space programme. Despite claims that the powerful East Asian state has motives for its altruistic actions, for instance, the quest for global power, which one could argue is propelled by BRI, Abuja is endeared to the Chinese partnership through the incentives that come with it. This is structural power at play as it enables a state to shape and determine the IPE structures through which other states, including their political institutions, economic enterprises, scientists, and other professionals, must operate (Strange, 1994, 2015). Thus, the BRI could be a Chinese strategy to set the agenda for collaboration with recipient states. With China’s space-derived knowledge transpiring into military uses and the production of new and mass products, including the private/state-owned space satellites construction and launching firms, and the state’s financial prowess, especially the ability to give loans, these are used to shape the frameworks for other states. China, with its capabilities and state firms such as CGWIC purposively wields power through its foreign policy to expand and strengthens its dominance.

Recalling the word ‘mutual’ in Li and Ye’s (2019) definition of the strategic partnership, which connotes bilateralism or cooperation, Chunsi (2008) argues that the mutual interests among states enhance their possibility of having sustainable collaboration on the space programme,

suggesting that collaboration would be a sensible economic choice for lesser-developed states hoping to rapidly develop their space technology. Tella (2018) therefore claims that apart from its resolute interest in Nigerian crude oil, China's cooperation with the Nigerian space programme rests on its broader ambition to become a top actor in global space, while similarly, the pursuit of international significance in the space sector, amidst other commercial and political reasons, is the motive behind Abuja's synergetic relations with China. Nigeria's space quest could be argued to be the enhancement of its spacepower.

Similarly, Olukotun (2016) argues that Nigeria collaborates with Beijing on satellites and launches because of the training and knowledge transfer involved for Nigerians, especially since the top space agencies, such as NASA, are unable to share practical knowledge with the emerging states for security purposes. Two implications arise from this fact. First, knowledge plays a particularly significant role in IPE because it underpins technological changes that generate new knowledge (Russell, 1995). Knowledge can be acquired through training and transfer programmes, but preceding production and economic success. Hence, knowledge transfer in the space sector is crucial to the advancement of the production of satellites and space applications. This capability gives power and authority to the key players in the knowledge structure (Strange, 1994, 2015). That is, the acquisition of knowledge, production, and satellite launching capabilities can confer power on Nigeria.

The second implication stems from Strange's argument that power from the knowledge structure is more of voluntary consent conferment based on shared belief systems, and it is more easily maintained if the authority can limit access to it and guide against any threat of competition. This reiterates the assertion that China uses its knowledge in space technology as a source of power, thus raises the question: why would China therefore want to train and transfer knowledge to Nigeria? The response may not be farfetched. Firstly, Nigeria, as a developing country, does not have the same level of financial and technological capacity that the East Asian state has. Secondly, as part of its hegemonic agenda, China may purposively limit the quantity of training and quality of knowledge transferred to Nigerian engineers. These, according to Strange, would ensure the control of power in the knowledge structure.

A significant area in which China has been supporting the Nigerian space programme is the manufacturing and launch of satellites. In 2004, NASRDA signed a contract with CGWIC to design, build, and launch NIGCOMSAT-1, to be based on China's DFH-4 platform. The communications satellite was then launched in 2007 at China's Xichang Satellite Launch Base

aboard the Long March 3B carrier rocket. However, NIGCOMSAT-1 was de-orbited in 2008 due to power exhaustion (James, Akinyede and Halilu, 2014). In response, CGWIC designed and built a replacement hybrid satellite, NIGCOMSAT-1R, with a fifteen-year lifespan. The contract was agreed in 2009 at no cost to Nigeria due to the insurance cover on NIGCOMSAT-1 (Clark, 2011), while the launching took place in 2011 aboard the Chinese Long March 3B rocket at the Xichang Satellite Launch Base (de Selding, 2011). Along with the launch, the city of Kashi in China hosts the backup station for NIGCOMSAT-1R.

The Sino-Nigeria relations also present Nigeria with the opportunity to acquire loans for launching satellites and forging partnerships. The Chinese Export and Import Bank (EXIM) lent Nigeria $200 million to launch its first communications satellite (Adebajo, 2020), including the building of control stations and training of technicians (Pons, 2020). This partnership symbolises a robust collaboration between both states and would further aid economic relations, capacity building, and infrastructural development in other sectors of Nigeria.

Nigeria's quest for an advanced space programme and capabilities will always drive it to strengthen its international relations. This is evident in Section 9.4 (e) of the National Space Policy, which reads, "Bilateral and multi-lateral relations/agreements should be established to achieving the following short-to long-term projects for the nations space programme…" (National Space Policy, 2001:28). With these facts, we may assume that Nigeria's collaboration with China in space technology is a crucial part of both states' space ambitions, national interest, and foreign policy.

2.8 Nigeria's Afrocentric Foreign Policy

This section analyses Nigeria's Afrocentric foreign policy to position or give context to this study. The focus on Africa and the discussion put forward in this segment draw upon the classification of power analysis and the national interest discussed in Chapter 1. As examined in Section 1.5.4, Nigeria's four concentric circles make Africa the centrepiece of its foreign policy. This is because three of the circles focus on Africa, while only one applies to non-African relationships (Gambari, 1989). Hence, the section is divided into three parts and begins by examining Abuja's regional hegemony and activities. The next section discusses Nigeria's domestic challenges that affect its external activities. This leads to the chapter's summary.

On the basis of the global power analysis in Chapter 1, Section 1.4, Nigeria falls within the category of a middle power and regional hegemony. Herrmann (2017) defines a hegemon as a supreme ruler that possesses economic, military, and political power over another state. Hence, a regional hegemon is a leader within a geographical setting where it is acknowledged as possessing more crucial capabilities than other states. The roots of Nigeria's material capabilities, which are seen as the source of its regional influence, date to the post-Civil War (the Biafra War) and the 1970s oil boom. Nigeria emerged from the civil war with a relatively better-equipped army of approximately 250,000 men (Global Security, 2022). Around the same decade, crude oil exploration became Abuja's primary source of revenue. The state moved from producing around 5 million barrels to approximately 600 million barrels of oil, earning over N10 billion from the initial N66 million (Watts, 2008, 2017). By the early 1980s, Nigeria had become a major power in Africa (Ota and Ecoma, 2016; Odubajo, 2017). Consequently, Nigerian leaders perceived the hegemonic status as a vantage position to order the national interest's priorities and pursue them with power (Okolo, 1988). As highlighted in Chapter 1, Section 1.5.2, the role of the leaders' perception, identified in NCR as a unit-level variable through which foreign policy outcome is determined, played a significant part in the history of Nigeria's foreign policy. Indeed, the subsequent leaders' awareness of Nigeria's status has influenced their pursuit of continental relevance.

Historically, Nigeria has been a leader on the continent of Africa, and its national interest rests on the grounds of actualising national security and maintaining state sovereignty (see Section 1.5.4). Therefore, Abuja prioritises its role in Africa, especially since it is connected to its national interest and strengthens its position as a regional hegemon. Oshewolo (2019) maintains that Nigeria's Afrocentric policy presents the state with an opportunity to express its interest as a regional hegemon. He goes on to suggest that Abuja's foreign policy priorities project the state as Africa's undeniable leading voice in international affairs, a position that naturally comes with responsibilities to Africa. Oshuntokun (1987) also observes that since most black people live in Africa, Nigeria, as the world's largest black nation, has the responsibility to take care of Africa. This adds to the explanation of why Nigeria approaches global issues based on how they affect itself, its immediate neighbours, West Africa, and Africa.

Since the 1970s, Nigeria has engaged in a more influential and activist role in Africa (Fayomi, Chidozie and Ajayi, 2015). Posen (2013) defines "activist foreign policy" as a state's comprehensive and ambitious foreign policy missions directly aimed at influencing other

states' politics and society. An example of this, among others, is Nigeria's voluntary donation of fifteen (15) cars and one hundred (100) motorcycles to the Republic of Benin electoral commission in 2016 (Premium Times, 2016). Indeed, Nigeria prioritises not only its internal sovereignty, stability, security, and economic growth but also those of West Africa and Africa. Thus, as highlighted at the start of this section, Ogunnubi and Okeke-Uzodike (2016) and Umezurike *et al.* (2017) also claim that Africa was declared the centrepiece of Nigeria's foreign policy, while West Africa occupied a special area of the centrepiece (Okolo, 1988).

Furthermore, with its military and economy in Africa and as the most populous black nation in the world (Oshewolo, 2019), Nigeria, with approximately 215 million people, contributes significantly to the continent. This capability is a reminiscence of Strange's IPE theory. Strange (2015:49) describes security as the most significant human need and argues that those who provide it have an advantage and enjoy special rights in society, further suggesting that the structure dictates "who-gets-what in the economy". Essentially, Nigeria's hegemonic status is not unconnected to its ability to influence the security structure and other structures. As discussed in Sections 2.2 to 2.5, Abuja's spacepower can be used to strengthen its influence on the continent. Indeed, Tella (2018) argues that with the fast-developing interest of African countries in space technology, Nigeria could use its position and experience in this area to serve as a role model. This suggests that Nigeria could switch from the direct provision of altruistic services on the continent to controlling the structures of power and setting agendas through space technology, thus serving as a means to acquiring structural power.

Nigeria's spacepower will allow the country to carry out its commitment to the four concentric circles on security and the promotion of peace on the continent. The third concentric circle focuses on Africa's peace, development, and democratisation. Likewise, Chapter II, Section 19, of the 1979 and 1999 Constitutions highlights the state's pledge to African unity, global cooperation, and dispute settlement through intervention. Thus, the following section briefly discusses Nigeria's activities in Africa.

2.8.1 Peacekeeping Missions

Nigeria is a major contributor to Africa's peacekeeping forces (Oyewole, 2020) and around the globe. As of April 2023, Nigeria provided the eighth-largest security personnel to the UN

peacekeeping missions (United Nations Peacekeeping, 2023). Essentially, the Nigerian army leads several missions in West Africa and Africa. In the 1990s, Nigeria, for example, was instrumental in the formation of the Economic Community of West African States Monitoring Group (ECOMOG) and had the largest troop contingents in peacekeeping missions in Liberia, Sierra Leone, and Guinea-Bissau (Ojakorotu and Adeleke, 2018). Nigeria accounted for 80 per cent of the troops and contributed 90 per cent of the ECOMOG operations' fund for Liberia and Sierra Leone (Obi, 2008). The funding of ECOMOG's peace interventions earned Nigeria and the monitoring body international commendations (Umezurike *et al.*, 2017; Saliu and Oshewolo, 2018). Similarly, the Nigerian military, in alliance with the AU and ECOMOG, helped restore constitutional order to The Gambia after the former president, Yahya Jammeh, held on to power despite losing the 2016 presidential election to Adama Barrow. It is noteworthy to reiterate that Nigeria's active involvement in the formation of ECOMOG and its continuous pledge to the group's success are driven by its foreign policy objectives (Ojakorotu and Adeleke, 2018).

Furthermore, Abuja collaborates with African states to combat terrorism on the continent. Nigeria is one of the most affected states by terrorism. According to the 2023 Global Terrorism Index, Nigeria ranked eighth, behind states like Iraq and Afghanistan, which ranked seventh and first, respectively (Institute for Economics and Peace, 2023). However, terrorism has prompted radical responses from easily targeted states and communities that are resolute in guarding against violent attacks. As a response, Nigeria strengthened its relations with the neighbouring member states of the Lake Chad Basin Commission (Odubajo, 2017) in combating the terror group Boko Haram and its network in Africa. The Lake Chad Basin Commission comprises the Republic of Niger, Chad, and Cameroon. With the AU's approval, these states deploy thousands of troops to the Multinational Joint Task Force (MNJTF) on counterterrorism to protect their shared borders with Nigeria as well as Nigerians and their properties. The joint force has promoted cross-border collaboration, learning, and idea sharing, leading to a better-coordinated strategy (International Crisis Group, 2020).

2.8.2 Leadership

Nigeria provides leadership and uses its influence to promote peace, security, economic growth, and stability on the continent. This gesture, among other considerations, led to the

creation of ECOWAS in 1975. At the time, Abuja collaborated with other states in West Africa to launch a practicable regional organisation that would benefit member states and their citizens (Odubajo, 2017). Thus, Nigeria maintains its leadership role and bears the majority of ECOWAS' financial burdens (Saliu and Oshewolo, 2018). Indeed, Abuja's leadership status in West Africa comes at the expense of its efforts to ensure peace, security, interstate free movement, and trade among ECOWAS member states. Nigeria was also instrumental to the African Union (previously OAU) establishment in 1963 and replicated the same role in the reformation of the continental body in 2001. Till date, Abuja is a major sponsor of the AU's activities. Nigeria, with South Africa, Egypt, Libya, and Algeria, individually contributes 15 per cent to the organisation's annual budget (Ibid).

2.8.3 The Economy

The Nigerian economy is the largest in Africa, while South Africa, a hegemonic rival, stands as the second (Ojakorotu and Adeleke, 2018). Abuja's economy became the most expanded between 2015 and 2019 due to the increase in oil output and the Central Bank's efforts to improve credit growth (Naidoo, 2020). With regards to Nigeria's major source of revenue (crude oil) in the global market, Abuja ranks as the twelfth largest crude oil producer (NEITI, 2022) and has states like India, Spain, the US, the Netherlands, and France buying its produce (OEC, 2023). This supports Jordaan's (2003, 2017) emphasis that middle powers are stabilisers and legitimisers of the global order because inter-state trade forms the basis through which states interact and collaborate on other matters.

On the basis of the above discussions, we may assume that with its economy, Abuja contributes to the economic prosperity of Africa through agriculture, trade, technology, direct relations, and funding of regional organisations such as ECOWAS and the AU. The country also provides leadership and contributes to the security aspect through its military, all of which add to Nigeria's influence in Africa. To justify Nigeria's Afrocentric activities and contributions, Ogunnubi and Okeke-Uzodike (2016) made three assumptions: first, Nigerian foreign policy throughout its history has been philanthropic and has facilitated its hegemonic credentials. Second, Nigeria's commitment to ensuring its status as Africa's voice is unfettered as it continues to command other states' respect. Third, Nigeria, through a well-designed and implemented foreign policy, has exhibited clarity in the principles and strategy governing its African diplomatic relations.

This section examined Abuja's influence on the continent. The state's power is underpinned by its military, funding, and leadership (material capabilities). However, as NCR predicts that, in the long term, the material power resources of a state will shape the size and motive of its foreign policies (Rose, 1998), to reiterate, Nigeria's spacepower can further improve its continental activities. The next section discusses the Nigerian domestic environment, thus buttressing the need for spacepower to strengthen the state's regional hegemony.

2.9 Nigeria's Domestic Challenges and Declining Regional Influence

Notwithstanding Nigeria's Afrocentric foreign policy, the state has experienced several challenges that affect its external influence. This correlates with the NCR theory, which emphasises the importance of the domestic environment and the leaders' perception and their role in the interpretation of external pressures. To understand the complex issues that have influenced Nigeria's foreign policy in recent years, it is crucial to examine the domestic setting. Edigin and Otoghile (2011) identify three critical internal factors that affect Nigeria's foreign policy. These are the damaged and weak economy; the character of the leadership and their perception of how to revive and nurture the economy; and ethno-religious diversity (Saliu and Oshewolo, 2018). Similarly, Nuamah (2003) highlights social security and Nigeria's corrupt reputation as significant factors affecting its foreign policy. It is noteworthy that the origin of corruption in Nigeria could be traced to the precolonial era, cutting across all regimes to date. According to Osoba (1996), the escalating problem of kleptocracy in Nigeria is aided by its oil revenues, thus becoming more prevalent since 1984. Indeed, corruption contributes to Nigeria's domestic challenges, as Ojakorotu and Adeleke (2018) also identify embezzlement of wealth accrued from the 1970s oil boom, poor leadership, and maladministration of natural resources. They argue that these issues have resulted in economic crises and substandard living conditions for Nigerians.

Furthermore, the fluctuation in global oil prices poses an enormous challenge to Nigeria's reliance on oil. Various scholars argue that the Nigerian economy is substantially unstable due to its overdependence on oil revenue and the fluctuation in the oil price (Yakub, 2008; Ojakorotu and Adeleke, 2018). The government must strive to address these issues to avoid a total collapse of the state's revenue and the domestic economy, which would affect its foreign activities.

Nigeria's inability to stop the influx of returning Jihadists to the West African region to support terrorists' operations also has a significant impact on its domestic environment. Okorn and Ndum (2020) argue that Nigeria's borders are porous, giving illegal migrants easy access. This suggests that the increased level of insurgency in Nigeria directly relates to the porosity of the state borders. Consequently, this has weakened the Nigerian military's war against terrorism. Khalid (2021) claims that the Nigerian military lacks sufficient weapons to combat terrorism and that its strategy is also ineffective. Ojakorotu and Adeleke (2018) further attribute the causes of Nigeria's security challenges, such as militancy, civil unrest, and the armed struggle, to the government's negligence, paucity of growth, and multi-ethnic grievances, which led to increased national instability. Other security problems include kidnapping, the herdsmen crisis, and banditry. All of these pose a serious threat to national security, which makes it hard for Abuja to perform its role as a hegemon in Africa. It is noteworthy to identify if the defence division is adequately equipped in terms of weapons, information gadgets, training, and strength orientations to challenge and resist threats from within and outside Nigeria. The role of space technology in enhancing national security and military surveillance is crucial and may provide a new trajectory for this critical issue. The application of space capabilities to Nigerian national security and military operations is discussed in Chapters 3 and 4.

As mentioned in Chapter 1, Section 1.5.4, multi-ethnic issues constitute a major causal factor in the national and economic crisis in Nigeria. Since the pre-colonial era, Nigeria has faced multi-ethnic problems. The state currently has over 450 languages and 400 ethnic groups: approximately 29 per cent Northerners (Hausa and Fulani tribes); 21 per cent are the Yoruba tribe in the South West; and the Igbos and the Ijaw tribes from the South East occupy 18 and 10 per cent, respectively. Other minority tribes comprise the remaining percentage. Nigeria does not, therefore, have a clear national identity.

The multi-ethnic composition of Nigeria raises the issue of national integration of all majority and minority ethnic groups as being important to Nigeria's foreign policy. Without national and ethnic integration, the majority and minority groups may develop an impression of marginalisation by the federal government. This is problematic in regions where crude oil is mainly extracted, for example, the Niger-Delta (South South), thus constituting an internal threat to hydrocarbon exploration and oil revenue. Nigeria's reliance on oil as a primary source of foreign exports and revenues may be jeopardised due to the ethnic tensions. Indeed, the Niger-Delta, which accounts for 86 per cent of Nigeria's hydrocarbon exports (OPEC, 2022),

often demands fiscal federalism and more inclusion from the government (Edigin and Otoghile, 2011)

Considering the strategic importance of crude oil to the economy, domestic environment, and foreign policy, it is not unexpected that tensions and conflicts of interest exist (Mayall, 1976) between the government and the oil-producing areas. Accordingly, the state and ethnic minorities "underline the building of a cohesive and self-sustaining political order without which Nigeria's regional and continental ambitions cannot be realized." (Nuamah, 2003:10).

As neoclassical realists argue, relative material capabilities are key factors that gradually shape a state's foreign policies. Hence, Nigerian military capabilities (security) and crude oil can be classified as material capabilities based on their contribution to the state. However, since no direct transmission belt connects material capabilities to foreign policy behaviour, the impact of Nigeria's security capabilities and crude oil on its foreign attitude depends on the intervening variables (Rose, 1998; Schweller, 2004). The intervening variable in the Nigerian context is the domestic environment. Hence, Nigeria must be ready to deal with its domestic issues, such as insecurity and irregular oil revenue, because a state's internal dynamics and socio-economic conditions, to a massive extent, determine the actualisation of its foreign policy agenda (Odigbo, Udaw and Igwe, 2014).

Adams and Ebegbulem (2016) contend that despite Nigeria's increasing internal challenges, it remains active in West Africa and some parts of the continent. It could, therefore, be safe to regard Nigeria as an aspiring hegemon in Africa (Ojakorotu and Adeleke, 2018; Saliu and Oshewolo, 2018), or rather, as this study portends, a hegemon that needs to strengthen its influence. This shows that, though Abuja is a respected hegemon, its status in Africa is declining due to its domestic instability. Hence, this thesis argues that Nigeria's domestic challenges can be addressed with space technology. The effective use of space capabilities can attend to the socio-economic needs of the country, thereby enhancing national stability and contributing to the state's continental influence. Tella (2018) also identifies the need for Nigeria to utilise space technology in addressing its domestic challenges, such as insecurity, unemployment (the economy), and border security, among others, claiming that the achievement of this would play a vital role in strengthening the state's hegemonic credentials. This author is crucial to this research, and this study builds on his work.

Several other scholars have identified the general contributions of space satellites to the Nigerian domestic environment but not in relation to the state's foreign policy. Akinyede and

Agbaje (2006) discuss the impact of Nigerian satellites on national development through sustainable enhancement of economic planning. Giokos and Whiteside (2016) examined the use of satellites for climate change and updating the national maps. Oyewole (2017), in his article, observed the importance of the provision of satellite images to NEMA for national disaster management. Okon (2018) notes the use of Nigerian satellites for tracking areas seized by the terrorist group Boko Haram and for border management. Similarly, George Etomi and Partners (2018) highlight the satellite's role in land surveying and crop cultivation across Nigeria. They further state that satellites can provide farmers with data on quality soil and the monitoring of large-scale food production, thus preventing shortages.

This section provided an understanding of Nigeria's foreign policy direction and identified the domestic issues affecting it, thus emphasising the need for the use of space applications and capabilities. This section also reveals that Nigeria's space capabilities are a catalyst for strengthening its regional influence.

2.10 Conclusion

This chapter examined Nigeria's space experience and spacepower. This includes the aspect of capacity building, which is crucial to the development and sustainability of the national space capabilities. The chapter also discusses Nigeria's space relations with China, outlining both states' motives for their collaboration. The latter part of the chapter focused on Nigeria's Afrocentric foreign policy. Evidence shows that Nigeria mainly prioritises its continent. The discussion also reveals the importance of the leaders' perceptions on Nigeria's foreign policy and the impact of the domestic environment, especially the factors that affect its regional hegemony. The section has shown that Abuja's foreign policy has been impacted by domestic tensions arising from security and economic issues such as unemployment, corruption, multi-ethnic composition, insecurity, irregularities in oil revenue, porous borders, and terrorism.

The domestic environment is crucial to the foreign activities of any nation (Kissinger, 1966). Hence, the internal issues in Nigeria have essentially weakened its external activities and influence. This particularly affects Nigeria's regional hegemony, where the state is portrayed as a leader. The state's continental power is declining, and scholars have argued for the need to strengthen the country's regional influence by finding an alternative means to solely depending

on crude oil as a main source of national revenue and power. The need to utilise space technology to solve Nigeria's domestic problems and strengthen its regional hegemony has been highlighted (Oyewole, 2017; Tella, 2018). Nigeria's space assets, such as EO satellites and communications satellite, and their usefulness were discussed in the first parts of this chapter. In addition, Abuja's ongoing construction of the AITC and spaceport, as well as other facilities, constitutes spacepower and can be used to strengthen its regional power.

On the basis that limited evidence exists in this research context and that the research problems have not been answered, empirical research is required to further understand how space capabilities can address Nigeria's domestic issues and contribute to strengthening its regional power. Thus, the following analysis chapter (Chapter 3) first examines the current issues in Nigeria's domestic environment and how space applications can address them. Chapter 4 explores how Nigeria can acquire power and strengthen its regional influence by controlling the four structures of power through its space capabilities (spacepower). The final analysis chapter looks at Abuja's space partnerships, with a focus on China, and how they enhance its space diplomacy.

Chapter Three: Nigeria's Space Capabilities and the Domestic Environment

3.0 Introduction

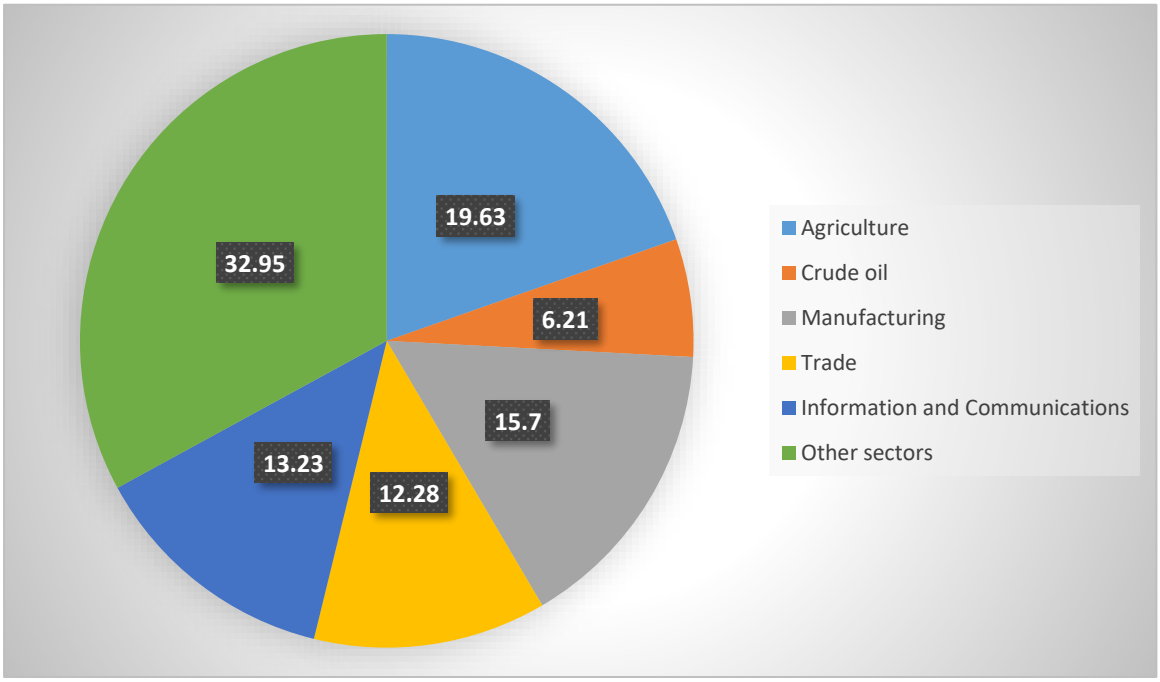
This chapter presents the analysis of the data linked to the first research question, which examines how space technology can contribute to the stability of the domestic environment in Nigeria and identifies the sectors that will be most impacted. The section has clear implications for Nigeria's foreign policy, as it requires that the domestic[1] environment be stable to enable the country to strengthen its regional influence. As established in Chapter 1, foreign policy is the clearly stated goals and actions pursued by a state beyond its territory (Carlsnaes, 2002). Thus, Rose (1998) argues that the capacity and aim of a state's foreign policy are first shaped by its global position and material power capabilities, and that external pressures must be interpreted at the domestic and unit levels in order for the material power capabilities to influence the state's foreign policy. NCR focuses on the state- and unit-level factors that determine a state's response to systemic pressures and, as a result, influence foreign behaviour.

Foreign policy is a reflection of the domestic environment, and as such, the national economy contributes to the state's external affairs (Ubi and Akinkuotu, 2014). Security is also crucial, not only because it is the most important human need (Strange, 1994, 2015), but also because it is essential for national development and how the state perceives and responds to the actions of other states (Rose, 1998). Thus, it is safe to state that an effective foreign policy requires stability in the domestic economy, national security, and other state-level functions. This would put the state in a secure position to respond to external pressures, leading to foreign policy decisions and outcomes. To understand the domestic context in Nigeria, it is necessary to examine the national economy and security situation of the country. This helps to identify the underlying factors that affect the state and, thus, create a path to address the issues. To do this, the chapter is divided into three main sections, which begin by providing an overview of the Nigerian economy, the distribution of the economy, and its drawbacks. The next section focuses on national security challenges. This leads to the final part, which concentrates on how space technology can address Nigeria's economic and national security challenges, including border control.

3.1 The Nigerian Economy

Nigeria is an emerging market and has a mixed economy with fast-growing sectors. Following the 2020 economic rebasing exercise, the Nigerian economy was the biggest in Africa (Akinsanmi, 2021), moreover in 2017, Nigeria's GDP ranked 32nd in the world, moving up to 29th in 2023 (CEBR, 2022). This is because, among other factors, Nigeria is endowed with diverse natural resources and rich economic sectors, such as agriculture, crude oil (Saliu and Oshewolo, 2018), and manufacturing industries. Table 3 reveals other contributing sectors to the economy. For example, energy, solid minerals, and raw materials make up the production industries in the economy. Other sectors include transportation, mining and quarrying, and public administration. It is worthy of note that the analysis in this section mainly focuses on agriculture and crude oil because of their crucial relevance to the economy and the importance placed upon these sectors by the interview participants.

Figure 3: Nigeria's GDP in Q1 of 2023



Source: Adapted from the National Bureau of Statistics (2023)

Nigeria's agriculture and crude oil are major contributors to the economy and GDP. In the first quarter of 2023, the agriculture sector contributed 19.63 per cent to the GDP, while the total contribution of crude oil stood at 6.21 per cent, with other sectors accounting for 74.16 per cent (National Bureau of Statistics, 2023). Figure 3 shows the 2023 first quarter GDP report. Furthermore, the agriculture and oil sectors play a crucial part in Nigeria's exports. In 2018, agriculture contributed 1.6 per cent to Nigeria's total export revenue, while crude oil accounted

for 82.3 per cent (Nevin *et al.*, 2019). As seen in Table 3, in Q1 2023, agricultural goods represented 4.31 per cent of Nigeria's exports and 8.48 per cent of the national imports. On the other hand, Nigeria's crude oil accounted for 79.37 per cent of exports in the first quarter of 2023 (National Bureau of Statistics, 2023). Despite contributing a relatively small fraction to the GDP, Nigeria's oil represents the highest percentage of exported domestic goods (Onuah, 2021). This shows that Nigeria is an oil-dependent state, and its crude oil represents a material capability through the lens of NCR, which measures power based on material capabilities and socio-economic factors (Mearsheimer, 2007).

Table 3: The export, import and total trade value by sectors for Q1 2023

Export					
SECTORS	January	February	March	Q1,2023	% Share of Total Exports
AGRICULTURAL GOODS	109,434.70	84,974.51	85,230.50	279,639.71	4.31
RAW MATERIAL GOODS	91,211.25	58,372.16	50,304.77	199,888.18	3.08
SOLID MINERAL GOODS	5,135.48	10,708.43	10,176.97	26,020.88	0.40
ENERGY GOODS	6,959.36	6,993.17	1,640.78	15,593.32	0.24
MANUFACTURED GOODS	36,570.85	37,549.98	57,024.50	131,145.33	2.02
Crude Oil	1,797,906.24	1,520,811.52	1,829,861.91	5,148,579.67	79.37
Other Petroleum Oil Products	238,857.66	196,674.18	250,639.95	686,171.79	10.58
Total	2,286,075.55	1,916,083.95	2,284,879.38	6,487,038.88	100.00
IMPORTS					
SECTORS	January	February	March	Q1,2023	% Share of Total Imports
AGRICULTURAL GOODS	146,983.75	156,539.96	167,868.21	471,391.92	8.48
RAW MATERIAL GOODS	186,520.92	171,166.48	197,782.11	555,469.51	9.99
SOLID MINERAL GOODS	17,886.19	9,835.90	17,107.08	44,829.17	0.81
ENERGY GOODS	1.00	54.72	14.25	69.97	0.00
MANUFACTURED GOODS	878,648.56	728,228.43	789,351.28	2,396,228.27	43.10
Crude Oil	-	-	-	-	-
OtherPetroleum Oil products	1,086,546.13	801,086.95	204,260.70	2,091,893.78	37.62
Total	2,316,586.55	1,866,912.43	1,376,383.63	5,559,882.61	100.00
TOTAL TRADE					
SECTORS	January	February	March	Q1,2023	% Share of Total Trade
AGRICULTURAL GOODS	256,418.45	241,514.47	253,098.71	751,031.63	6.23
RAW MATERIAL GOODS	277,732.18	229,538.63	248,086.88	755,357.69	6.27
SOLID MINERAL GOODS	23,021.68	20,544.33	27,284.05	70,850.05	0.59
ENERGY GOODS	6,960.37	7,047.89	1,655.03	15,663.29	0.13
MANUFACTURED GOODS	915,219.41	765,778.41	846,375.78	2,527,373.60	20.98
Crude Oil	1,797,906.24	1,520,811.52	1,829,861.91	5,148,579.67	42.74
Other Petroleum Oil products	1,325,403.79	997,761.12	454,900.65	2,778,065.57	23.06
Total	4,602,662.11	3,782,996.37	3,661,263.01	12,046,921.49	100.00

Source: National Bureau of Statistics (2023:39)

The wealth acquired from crude oil boosts Abuja's predominance in Africa (Fayomi, Chidozie and Ajayi, 2015; Odubajo, 2017) and contributes to the domestic economy, which is also

predominantly upheld by the agriculture industry. However, there are challenges in the crude oil and agriculture industries that affect Nigeria's economic stability and, by extension, foreign affairs.

Agriculture is a primary source of employment for Nigerians and contributes to food security and social stability. Nonetheless, while it seems that Nigeria's agriculture sector is active, the annual agricultural import bill is estimated at N2.49 trillion ($5.9 billion) (Schipani, 2020), with the export bill projected at N112.8 billion ($266 million) in 2021 (Ekugbe, 2021). This implies that Nigeria is a net food importer. That is, more agricultural products are imported than exported in the West African state. For a state that faces uncertainty in its oil revenue, its citizens still depend more on foreign farm goods than locally produced ones. Several complex and underlying issues have contributed to this. Nevin *et al.* (2019) argue that substandard agricultural products, low value-addition to farm products, insufficient storage facilities, and poor logistics and distribution networks are part of the challenges experienced in Nigeria's agriculture industry. Other issues might include climate change and land disputes, leading to food insecurity. The challenges experienced in the agricultural sector arguably contribute to the economic security lapses in Nigeria. Thus, considering the importance of agriculture to the country, the government must seek a sustainable solution to this salient problem in the sector.

Additionally, as stated in Chapter 2, Section 2.9, the economy is highly unstable as a result of its excessive reliance on oil revenue, which is susceptible to changes in oil production and global pricing. The inability of the Nigerian National Petroleum Corporation (NNPC) to adequately account for oil proceeds, as well as domestic oil theft, also adds to the challenges facing the national oil industry and the economy at large. According to an Al Jazeera report, the NNPC failed to account for 107.2 million barrels of crude oil in 2019, while approximately 150,000 barrels of oil are illegally tapped daily in the Niger-Delta region (Al Jazeera, 2022a). This makes the total annual value of oil theft in Nigeria estimated at $4 billion (ibid). These issues have substantially reduced Abuja's crude oil production below the quotas set by OPEC (Adekoya, Jeremiah and Nzor, 2022), thus affecting the country's rank in oil production and occasionally resulting in national fuel scarcity. This situation affects both the oil industry and non-oil sectors, such as road and air transport businesses, with a direct effect on the citizens' sources of livelihood (Salako, 2022). Nigeria might therefore need to engage in the use of modern technology to strengthen the oil sector and revive other sectors with economic potential in order to sustain its economy and, by extension, strengthen its regional influence.

When asked what the main priorities for Nigeria's foreign policy are, the state's dependence on oil was a prevalent issue raised by many research participants. The participants, who are foreign policy experts, express their feelings that the government prioritises oil revenues and ignores other sectors of the economy. Participant FP2, a retired career ambassador with four decades of experience in Nigeria's foreign affairs, states that:

> *"I think there was a little bit of confusion, we got our priorities wrong. We neglected the domestic economy. We relied mainly on revenue from oil and once the revenues started falling, and that has been the situation now for about two or three decades, the uncertainty in the oil revenue. So, that has had a profound effect on our foreign policy because we no longer have the economic strength to promote our national interests abroad."* (FP2, Career Ambassador, 25/01/21)

Similarly, Participant FP6, who is a professor of political economy and development studies with 23 years of experience in teaching and fieldwork, mentions that:

> *"In International Relations, how far you can go at the age of 60 [Nigeria's independence anniversary] is wholly dependent on how strong you are domestically. […] the image and capacity of a nation in international system is built strongly on the pillars of its domestic strength. Unfortunately, in Nigeria we play to the gallery of internationalism, we abandon the domestic realities."* (FP6, Academic, 02/03/21)

These quotes clearly underscore the importance of Nigeria's domestic setting and economic stability to its foreign policy. Participant FP6 sees Nigeria's domestic capabilities as a priority for Abuja to maximise in order to enhance its foreign activities. This is because, as Kissinger (1966) noted, the more stable a country is, the better its efforts are at promoting its interests abroad. However, the participant observes that Nigeria is neglecting critical national issues while focusing on external matters and seeking international prestige. One such issue is the reliance on crude oil revenue, as highlighted by Participant FP2. Abuja focuses more on the revenue from oil exports than maximising other sectors for income generation. Indeed, he suggests that the government prioritises the oil venture since crude oil is a natural resource that generates billions of dollars in revenue for Abuja. This view is supported by Umezurike *et al*.

(2017) who argue, the discovery of crude oil in commercial quantities gave the Nigerian government the impetus to neglect almost all other sectors of the economy to focus on oil. This is linked to the NCR unit-level variable. That is, Nigerian leaders' perception of its crude oil is crucial to the state's agenda and execution of regional activities (Okolo, 1988).

Nonetheless, Ojakorotu and Adeleke (2018) suggest that the Nigerian economy has become substantially unstable because of its dependence on oil revenue. It is noteworthy that Abuja was doing well in domestic and international affairs before and during the oil boom of the 1970s (Mayall, 1976). However, as stated by participant FP2, issues in the national and global oil sectors have hampered the government's oil exports and revenue, thus contributing to Nigeria's limited funding and passiveness in its altruistic African-centred foreign policy. This suggests that Abuja may not be prepared for a post-oil dependency era, which has backfired on the economy.

Participant FP2's statement below further confirms the fragile state of the economy due to its dependence on oil and the impact on Nigeria's foreign policy when he mentions that:

> *"The economy is wobbling; the economy is no longer as strong as it used to be. […] So, right now, we are not in the position really to pursue a strong foreign policy […]. We are continuing to rely largely on our oil exports, that is not a stable source of economic growth at all. By now, we should be exporting pharmaceuticals, cars, iron and steel, and what have you, at least to some African countries."* (FP2, Career Ambassador, 25/01/21)

This quote implies that the Nigerian economy is in a vulnerable state due to the unpredictable nature of the revenue from crude oil sales. The situation, including the domestic factors that contribute to the unreliability of the oil sector, must be addressed as a matter of urgency to ensure sufficient exportation, national income, economic stability, and the strengthening of Nigerian foreign policy.

Further evidence showing the lapses in Nigeria's dependence on the crude oil industry is the non-functional national refineries. Participant FP5, a professor of International Relations and a retired career ambassador with 45 years of experience, states that:

> *"The brain of the Nigerian economy is that we are exporting raw materials, whether it is gas or crude oil or cocoa or timber or cotton. Imagine a country that is about the eighth or ninth largest producer of crude oil in the world importing oil. This is a total failure of economic development."* (FP5, Academic/Ambassador, 20/02/21)

This extract is loaded with relevant pieces of information. The participant's opinion links back to the complexity of the Nigerian domestic environment discussed in Chapter 2, Section 2.9. Notwithstanding the raw materials and products that Abuja exports, especially crude oil, its inability to run government-owned refineries or support private refineries that could refine the oil needed for domestic consumption necessitates the state to export its crude oil and then import refined petrol back to Nigeria (Nnodim, 2021; Burns, 2022). This has implications for the oil sector and government expenditure. For example, Nigeria incurs approximately $50 billion annually in the cost of oil refinement and its importation (Anuforo, 2022). Although a multinational industrial conglomerate, Dangote Group, recently commenced the operation of its refinery in Lagos, Nigeria, with an estimated production of 650,000 barrels of oil per day (Onu, 2022). Similarly, in partnership with the private sector, Abuja has commenced the renovation of its existing refineries and hopes the plants will be 90% operational by 2023 (Nnodim, 2021). However, having such infrastructure in operation long ago would have reduced government spending and created substantial employment for Nigerians. Thus, participant FP5 believes that the lack of a national refinery, with the current arrangement in the oil sector, represents a significant decline in Nigeria's economic growth.

As previously discussed, the Nigerian oil industry has an enormous influence on the national economy. Failure to effectively maximise the sector's potential, for example, by putting in place refineries and other mechanisms needed for efficient oil exploration and distribution, would impact the government's revenue and, by extension, domestic activities and foreign affairs.

Nigeria's space capabilities can be adopted to address some of the issues raised in the oil sector, for example, the provision of security surveillance to counter oil theft or bunkering and identifying suitable locations for oil drilling. However, it must be noted that space technology cannot typically predict changes in oil prices because the prices are globally determined, thus constituting a major challenge for oil-dependent states and industries. Also, as participant

FP2's extract indicates, there is a need for Abuja to diversify into other potentially sustainable sources of revenue. This would strengthen Nigeria's economy and domestic environment and, consequently, impact its material capabilities. This affirms Kissinger's (1966) view that domestic structure is never insignificant and that it determines the amount of total social effort that can be devoted to foreign policy. In this case, addressing the economic issues falls under the domestic structure, and if these could be fixed, it would make room for a stronger foreign policy.

This section examined Nigeria's economy and its major limitations. It is evident from the discussion and extracts that there are issues that need to be addressed in the oil and agriculture sectors. The section also shows that having a vibrant economy is crucial to Nigeria's foreign affairs. This means that Abuja must secure its source of national revenue to fund its international activities. The following section will explore national security challenges.

3.2 National Security

National security is the capability of a state to provide for the safety and protection of its citizens, economy, and institutions within its territory. Chapter II, Number 14 (2b) of the Constitution of the Federal Republic of Nigeria, states that *"the security and welfare of the people shall be the primary purpose of government."* (Federal Republic of Nigeria, 1999). This confirms that, as it is common practice in other countries, the Nigerian government is responsible for the general security of the lives and properties of the populace within the confines of the state. However, as noted in Chapter 2, Section 2.9, Nigeria has experienced major security lapses in the last two decades. Terrorism, kidnappings, banditry, farmers-herders conflicts, and border insecurity are notable occurrences across the state (Olaiya, 2021).

The United Nations Development Programme 2021 Report suggests that approximately 35,000 people have been killed due to conflicts in the three most severely affected states in Nigeria (Borno, Adamawa, and Yobe states) since 2009 (UNDP, 2021). A further 314,000 people have died from the indirect effects of the conflicts as of 2020 (Ibid). Nationally, 2,334 people and 176 security personnel lost their lives to banditry and terrorism in 935 recorded attacks in 2021 (SB Morgen, 2021; Nextier SPD, 2022), while more than 320,000 citizens had become refugees due to violent clashes as of May 2023 (UNHCR, 2023). Further, according to a 2020 report on kidnapping in Nigeria, an estimated $18.34 million was paid to kidnappers as ransom

between 2011 and 2020 (SB Morgen, 2020). These statistics show the severity of the state of security in Nigeria and expose the critical areas that must be addressed by the government.

When asked a similar question to the one highlighted in the previous section about what Nigeria's priorities are, national security was frequently mentioned by research participants from various sectors. As stated in the methodology section (Chapter 1, Section 1.8.3), the participants are experts from the fields of foreign policy, academia, and the space sector. Examples of the comments on national security are represented as follows: Participant FP6 said:

> *"Every Nigerian leader, every Nigerian government, every Nigerian state in the past struggle to make sure that the national sovereignty of Nigeria is not compromised. The national security is not only a guarantee but enhanced and improved upon and the national welfare of citizens is provided. These provisions are measurable either positively or negatively. […] I believe what is fundamentally important or imperative in this current Nigerian government is the national security and how Nigeria can now engage other nations of the world at the international system to provide these gaps and missing links in our own national security."* (FP6, Academic, 02/03/21)

This participant's opinion suggests a continuous pattern of struggle on the part of the government to ensure state sovereignty, national security, and the welfare of the citizens. State sovereignty refers to a country's political freedom to decide its own internal affairs and foreign relations without external interference (Naidu, 2002). National security is vital to sustaining state sovereignty, unity, peace, prosperity, and confidence in the government's ability to maintain law and order and provide safety to the citizens. Thus, the extract highlights the importance of addressing national security and collaborating with other states in dealing with the issue of insecurity in Nigeria.

Nigeria is a middle power and a regional power, as established in Section 1.4.4 of Chapter 1. Flemes (2007) claims that middle powers are global stabilisers that pursue consensus on key issues. Hence, linking this to participant FP6's suggestion about Nigeria engaging other states to address its national security, Abuja can only reach agreements with states at its level, for example, middle powers or small states that do not necessarily possess the material capabilities (funds, military strength, and technology) that Nigeria requires. Considering this, Nigeria will

have to engage with superpowers such as the US, China, or Russia. On the basis of NCR, states are in constant competition for their own security, and this rivalry shapes the systemic pressures that are translated at the domestic and unit levels to produce foreign policy outcomes (Rose, 1998). Therefore, the superpowers will only give support to Nigeria for their own benefit. Evidence of this is the US assistance to Nigeria in fighting insurgency, primarily to protect American citizens in the country and to advance Washington's global priorities (U.S. Department of State, 2021). China is also a strategic partner of Nigeria, contributing to its space industry by providing loans for satellite manufacturing as well as giving technical support. Beijing is also keen on Nigeria's infrastructural development, which is argued to be part of its strategy to acquire global power. This is further discussed in Chapter 5 on Nigeria's space diplomacy.

Nevertheless, it is noteworthy that the leader's perception, which is an NCR unit-level variable, plays a key role. As participant FP6 mentioned, the Buhari administration prioritises national security, which confirms that the president's decisions and priorities are crucial to the domestic environment and the state's foreign policy direction.

As previously highlighted, Nigeria faces diverse security challenges that threaten its sovereignty and the security of its people and infrastructure. Some of the security issues in Nigeria were captured by participant ST10, a policy analyst and lecturer with 7 years of experience in higher education and the space sector. His response to the question of what Nigeria can gain from its investment in its space programme is:

> *"The border is very porous. […]. We have issues of banditry, we have kidnapping, we have piracy, we have insurgency, all these people who are occupying ungoverned spaces, these are spaces or locations that governments can monitor through use of satellites."* (ST10, Academic, 13/08/21).

Similarly, participant FP2 mentions that:

> *"Right now, we are faced with two major problems – the insurgency (the terrorism), the kidnappings. The widespread insecurity is the problem that has weakened Nigeria considerably."* (FP2, Career Ambassador, 25/01/21).

The participants' views imply that a national security crisis exists in Nigeria and that it has had a significant impact on the country. The extract further suggests that current efforts by the government and law enforcement agencies might have failed to yield results, hence the increase in the national crime rate. Among other issues, both participants mentioned terrorism, while participant ST10 revealed the condition of the country's borders as being insecure.

Nigeria shares land borders with French-speaking countries: the Benin Republic, Cameroon, Chad, and the Niger Republic. Due to historical antecedents (Biafra War), resulting in the four concentric circles of Nigerian foreign policy as discussed in Chapter 1, Section 1.5.4, Nigeria prioritises the peace and stability of its immediate neighbours to enhance its internal security. Hence, all the states' immigration control authorities work in partnership to secure the interconnected borders (International Crisis Group, 2020). Nonetheless, the borders are vulnerable to illegal migration (Okorn and Ndum, 2020). Furthermore, in Nigeria, border insecurity is strongly linked to terrorism. That is, immigrants with ulterior motives and weapons illegally gain entry into the state to cause unrest (Ibid). For example, Ojewale (2021) argues that the high porosity of the Nigeria-Niger border and the region's forest reserves increase the risk of terrorist actions from Mali, Burkina Faso, and Niger spreading into northwest Nigeria. Similarly, the presence of Boko Haram and Islamic State West Africa Province (ISWAP) in the country may give the terrorist global network reason to believe that Nigeria is a strategic base to coordinate attacks and enforce anti-government activities within the territory. In other words, the free movement of terrorists with their arms and ammunition within Nigeria's borders aids national insecurity. Therefore, participant ST10 highlights the need to monitor the borders with the use of satellites, as well as to curb the escalating menace of banditry, kidnapping, and piracy.

It is important to state that while the security of national borders is essential, other challenges that raise security concerns in the country should not be overlooked. Nigeria's internal security is as crucial as its border security and the security of its neighbouring states. In fact, the banditry, piracy, and kidnapping mentioned by participants ST10 and FP2 far more directly affect citizens and their livelihoods than the immediate impact of border insecurity (Tanko, 2021). In agreement with this statement, it is worth briefly examining the current internal security system in Nigeria.

The Nigerian Police Force (NPF) is generally responsible for internal security. However, the force has often been the subject of public distrust due to its limited capacity and old equipment to counteract and suppress insecurity (Alemika, Cheeseman and LeBas, 2012). In one of the popular Nigerian newspapers, Bola Bakare, a security expert, wrote:

> *"It is a sad reality that the Nigerian Police Force operates under the most harrowing human and logistical experience in the world. Apart from poor remuneration and inadequate welfare package, the Nigeria Police Force lacks the required modern equipment, technology and hardware to combat crime and criminality in the country. At the moment, crime detection, control and prevention by the police are still analogue-based in this age of technology."* (Bakare, 2021)

Participant ST9, a lecturer in space policy at ARCSSTEE with 12 years' experience in teaching and research, concurs with Bakare's opinion when he said, *"In Nigeria, we have a problem with security, our police, they are not so effective."* (ST9, Academic, 07/07/21). These observations paint a picture of a national security force that is underfunded and technically unequipped to proficiently provide adequate protection for Nigerians and the domestic infrastructure. Indeed, without the utilisation of advanced technology, modern equipment, and training, the crimes of banditry, piracy, kidnapping, and insurgency will be on the increase. Thus, the NPF requires sophisticated technology-enhanced equipment to perform effectively.

This section examined Nigeria's security challenges. The participants' opinions show that having a vibrant domestic environment in Nigeria involves maintaining national security and border control. This implies that the government must guarantee the security of its citizens before extending its support to other states on the continent. The maintenance of internal security requires security agents, such as the NPF, to be equipped with modern facilities to combat security challenges and for citizens to have access to technology-enhanced applications for security purposes and to report crimes. The following section explores how Nigeria's space capabilities can help address its economic and security issues, thereby strengthening the domestic environment and putting the state in a position to operate a strong foreign policy and enhance its regional influence.

3.3 Addressing the Nigerian Economy and National Security Issues through Space Capabilities

Scatteia, Frayling, and Atie (2020) argue that the space sector has demonstrated its potential to be a powerful driver of national socio-economic development. As discussed in the previous sections, the economy and national security are crucial to the Nigerian state. Thus, considering the importance of these sectors, Nigeria's space capabilities can be leveraged to address the challenges experienced in the domestic environment. The research interviews conducted, as highlighted in Sections 3.1 and 3.2, reveal some of the problems in the national economy and security setting that must be addressed. Participant FP2 agrees that it is vital to address these critical national problems in order to have an active foreign policy. He said,

> *"We got to get our domestic situation right. You cannot pursue a vigorous or dynamic foreign policy from a weak domestic political and economic base. […] I think the best thing is first to resolve your domestic challenges."* (FP2, Career Ambassador, 25/01/21).

Indeed, resolving the domestic challenges would strengthen Nigeria's capacity to operate an efficient foreign policy. Interestingly, some of the research participants who pointed out the problems also highlighted potential solutions to the issues raised. These can be captured under two themes and one sub-theme: the economy and national security, and border security.

3.3.1 Addressing the Economic Challenges

The key issues reported in Section 3.1 are the lapses in the agricultural sector and Nigeria's dependence on crude oil, including a lack of accountability, oil theft, and the inability to maintain national refineries. It is important to reiterate that this chapter's argument centres on the use of space technology in Nigeria. Hence, this sub-chapter offers potential solutions to the issues raised. A significant point expressed by participant FP5 when reflecting on Nigeria's internal issues was the need for the state to move beyond solely depending on oil and instead add value to what it produces or exports. The participant captured his view as follows:

> *"Unless a country is strong internally, and to be strong internally, it is not a question of having troops; strength really relies on economic strength. When you compare today, Russia and the United States, it is not the amount of nuclear weapons you have. The reason why people like Obama referred to Russia as the second power is because they were very weak economically and they are still weak. Russia today is almost a primarily exporting produce country (oil and gas). Whereas America can produce whatever it needs, so also can China. So, unless you are able to add value to whatever you have, it is going to be difficult to have leverage abroad.*
>
> *So, the point I am trying to make is that unless we are able to add value to our primary produce, we will have problems, and when a country is not strong economically, its leverage abroad will be very small."* (FP5, Academic/Ambassador, 20/02/21)

The participant suggests that adding value to Nigeria's primary products would help curb the nation's economic problems and improve the state's external influence. "Adding value" to something means improving its current state. This correlates with the thesis argument that space technology can be utilised to enhance Nigeria's domestic environment and foreign activities. The national economy consists of the oil and agriculture industries. Thus, the use of satellite applications and data can be adopted to boost the efficiency of these sectors. For example, Nigeria's EO satellites can be used to identify suitable locations for oil drilling and plantations of farm crops, including protecting the products against theft and substandard services from the production stage to delivery.

Further, on the basis of the Russian, American, and Chinese examples in participant FP5's extract, it can be suggested that Abuja could focus on developing alternative sectors for substantial revenue to crude oil in order to enhance its foreign activities and the realisation of its ambitions. This assertion is strengthened by Russia's economic struggles as a consequence of its invasion of Ukraine in February 2022. As highlighted by the participant, Russia depends hugely on oil and gas, but the economic sanctions from the West have had an enormous impact on the country, with the UK, US, and EU banning oil and gas imports from the Eastern European state (BBC, 2022). Hence, Nigeria can utilise space capabilities to "add value" to its economy and avoid suffering a similar fate to that of Russia. Achieving these will mean that

the non-oil sectors can become more efficient and be used as major sources of national revenue, contributing to the prosperity of the country.

As discussed in Chapter 2, Section 2.5, the agriculture industry is the secondary source of national income in Nigeria. Agriculture is a major source of raw materials, export business, and employment for Nigerians. Despite the country's dependence on oil, as highlighted in Section 3.1, agriculture contributes significantly to the national GDP as well as food security and social stability. Nevertheless, it was noted that Nigeria is a net importer of food. Therefore, considering the uncertainty in oil revenue, it would be advantageous to have a viable agricultural sector that can adequately cater to its citizens' needs and serve as a tangible means of national income.

Many of the participants highlighted the importance of space technology in addressing some of the salient problems experienced in the Nigerian agricultural sector. One key area that was mentioned was geospatial intelligence. Participant ST6, who works as a managing director for one of the National Space Research and Development Agency's (NASRDA) subsidiaries, reveals that:

> *"The GeoApps' key interest has been in geospatial intelligence because that's one of the major problems we are facing in the country now. So, our training of recent has centred mostly towards data mining for security applications and then of course, the other aspects of food security. And so, we are actively involved in providing services to organisations that are actually doing online satellite monitoring of farmlands and management of those farmlands for socio-economic benefits."* (ST6, Space Director, 22/10/21)

The participant's opinion shows that the use of geospatial intelligence for agriculture is beneficial for economic development. Geospatial intelligence involves using imagery and space data to characterise, evaluate, and visually display physical characteristics and geographically referenced events on Earth (European Union Satellite Centre, 2023). Thus, GeoApps Plus Limited has commenced training on data mining to serve as a platform for achieving general security as well as in the agriculture sector to ensure food security in Nigeria.

Food security is an indicator of socio-economic development. At the 1996 World Food Summit in Rome, it was agreed that "food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life." (FAO, 2008). This definition outlines four elements of food security: "availability, access, utilisation, and stability of food provision". These elements consist of local production and importation, nutritional value, physical quantity, and quality of food in a region, including its simultaneous availability, accessibility, and utilisation (Ibid). In Nigeria, food insecurity affects 79 per cent of low-income urban households and 71 per cent of rural households (Akerele *et al.*, 2013). This suggests that the four elements of food security have not been met in Nigeria. However, as highlighted in Chapter 2, Section 2.4, EO satellites can be used to enhance the agricultural sector, thus guaranteeing food security (Lafaye, 2017). Similarly, Kganyago and Paidamwoyo (2019) argue that modern technology aids the production of food and cash crops. Hence, as stated by the participant (ST6), GeoApps is taking the approach of training potential space experts that can utilise geospatial applications for the purpose of securing food for the nation and promoting food sustainability.

Furthermore, participant ST6's opinion indicates an ongoing collaboration between the national space agency and organisations that monitor and manage farmlands through the use of satellites. This partnership can widen the scope for the use of space applications for farming and related activities in Nigeria. The extract further suggests that the government is not the sole supplier of data services to farmers and other stakeholders in the Nigerian agriculture sector but that accredited private companies can provide the services on a commercial basis.

The use of satellites in the agriculture sector will improve the efficiency and output of farmers and businesses in the industry. For example, satellites can be used to measure the landmass, test, and understand the soil texture, and calculate the road distance and suitability for transporting farm products. Corresponding with these, participant ST10 suggests that space capabilities extend to understanding the land density suitable for agricultural plantations. He said:

> *"Nigeria has poor capacity to keep records and that includes the issue of agriculture. I am not aware of any way that Nigeria can gather accurate data on the size of plot of land used for cultivational value other than space technology.*

> *So, but space offer Nigeria the opportunity to assess what is the size of land used for plantation and the land use. Land cover has been a continuous project of the Nigerian space agency to assess the size of land that has been used either for construction or for agriculture and all those things for mapping."* (ST10, Academic, 13/08/21).

This extract reveals the pressing need for the agriculture industry to have a standardised measurement and record-keeping capacity that is backed by space technology. Farmers and stakeholders need to utilise satellite data to ascertain the accuracy of land size for their cultivation. Furthermore, the participant highlights the space agency's efforts to continually capture and analyse relevant data in determining the land cover and land used for farming and construction. In Nigeria, up-to-date data on land cover and land use are essential due to the issue of land disputes, which constitutes a security challenge. Nigeria currently faces a herdsmen crisis whereby nomadic Fulani herders from the Sahel region encroach on farmlands, especially in the South-West, for grazing and the provision of water for their cattle (Schipani, 2020). Edwards (2019) argues that environmental disasters such as climate change and lengthy dry seasons are the causes of the Fulani ranchers' migration, sparking regional conflicts and deadly land disputes. Notwithstanding the reasons for their migration, the herders' crisis represents a major concern for national and border security, as highlighted in Section 3.2. In particular, the crisis raises the question of "easy accessibility" for non-Nigerian herders and their livestock into the country.

Geospatial intelligence on land use and land cover for agricultural purposes can be a solution to this national crisis. "Land cover" data shows the extent to which forest, wetlands, impermeable surfaces, agricultural and other land and water types cover a region, while "land use" corresponds with the socio-economic dimension of an area, for example, which areas are used for housing, commercial, leisure, farming or forestry purposes (National Oceanic and Atmospheric Administration, 2021). When an area or region is mapped under satellite coverage, it creates a path for the security of lives, land, and agricultural commodities. This links to the use of space capabilities for national security, which is discussed subsequently in this chapter. That is, satellites can be used to identify and track community invaders and address insecurity generally.

Utilising modern equipment for farming and transportation of products can also increase productivity in Nigeria's agricultural sector. Participant FP4, a professor of political economy with two decades of experience, states that:

> *"We need to deploy technology to the agricultural sector to make the work of the farmer in the village easier both in terms of the quality of the seedlings, which has been proven through research, making the ridges, the mechanisation of soil, fertilisation—the use of fertilisers, which are all research-based, and then to harvest. Machine that they [farmers] can use to harvest to make it easier for them and, most importantly, storage. In Nigeria, even when they have produced so much, if they did not store them well, within one week or two, they would be wasted."* (FP4, Academic, 23/11/2021)

This extract shows that the use of technology for rural farming should be given priority. This is because agricultural products distributed nationally or exported are usually grown locally. Thus, if farmers could have access to modern equipment, it would revolutionise the agriculture industry in Nigeria. The participant also thought that advanced technological equipment could be useful in determining seed quality, soil preparation, and fertilisation. Likewise, combine harvesters can be deployed to farmlands because they considerably reduce the amount of time it takes to harvest products.

In agreement with participant FP4, participant ST9 adds:

> *"You can also use space applications to give information. Whether it's information to farmers, they are able to know, get information about when to plant crops, how their crops are doing and then even for commerce too, they know this is the current price of their commodities to the market."* (ST9, Academic, 07/07/21).

This quote affirms that farmers in rural or urban areas can benefit from space-enhanced devices to acquire the necessary data about specific products, market prices, and the latest trends for developing their agricultural businesses. Mobile applications for weather forecast and other common devices could be made available for free or subsidised for the farmers.

The latter part of participant FP4's quote indicates a storage problem resulting in product waste. Storage issues and other problems were noted in Section 3.1 as part of the challenges of the Nigerian agriculture industry. These issues, combined with the participant's opinion, suggest the need for the use of space technology to aid in the provision of sufficient storage facilities to prevent rapid and enormous food waste. Participant FP1, a retired Nigerian ambassador with 37 years in service, while agreeing that space technology provides a sustainable path to develop the Nigerian agricultural sector, also highlighted the problem with the lack of storage facilities. He said:

> *"Space technology will go a long way to help. Of course, it has already been helping, […] but our problem was that we don't have the technology to preserve fruits at the time you have everything."* (*FP1, Ambassador,* 30/08/21)

Indeed, among other challenges, inadequate food storage poses a significant threat to the Nigerian agricultural sector. Cairns (2021) argues that the problem in Nigeria's agricultural industry is not a shortage of food but an excess of waste due to a lack of storage facilities, as 40 per cent of the annual food produced in Nigeria perishes before it gets to consumers. Considering the massive scale of losses and its substantial effect on food security, space capabilities can be channelled towards addressing the issue of storing farm goods in Nigeria. In particular, to address participants FP4 and FP1's emphasis on storage, providing durable storage for small and large quantities of products in farmlands, within rural and urban areas, and during distribution will contribute to food security. This will, in the long run, reduce food importation and thus improve the national economy.

Furthermore, Cairns' (2021) assertion that *"40 per cent of the annual food produced in Nigeria perishes before it gets to consumers"* highlights the scope and importance of the agricultural value chain. For sustainable processing, packaging, and distribution of products from the farms to the consumers, good storage and logistics are essential. In Nigeria, families and businesses depend on revenues from farm products and their distribution. For example, 88 per cent of Nigerian farmers have small family farmlands on which they rely on various crops, livestock, and fish species (FAO, 2018). Thus, the use of space data can be of immense benefit. This correlates with the view of participant ST12, a space analyst, with 10 years' experience in space analysis, who says:

> *"Geo-navigation allows us to be able to estimate or plan how we can efficiently move goods, commodities within the value chain to derive economic value. So, all that to say, that is why we start asking these questions and we start saying okay, maybe space technologies would be the preferred option here.* (ST12, Space analyst, 08/09/21).

This quote reveals the importance of transportation and the use of geo-navigation for the distribution of agricultural commodities for commercial purposes. A sizeable percentage of farm products in Nigeria are derived from different regions and transported to other parts; for example, the North produces groundnuts, while the South-West is known for cocoa (Punchng, 2016). Thus, considering the state of the transportation networks and security in Nigeria, geo-navigation gadgets, such as the GPS tracker and satnav, can spot hazards and report potential delays while estimating the accurate time for delivery of products. This would increase the market value of products and guarantee income for the stakeholders.

Participant ST12's comment also draws attention to the significance of the means and conditions of transportation used in distributing the farm goods. Heavy-duty trucks are often used to transport agricultural products across the nation, and it could take days for them to arrive at their destinations. This could suggest the reason for damage to goods in transit. To avert this, conducive storage and refrigerated vessels can be used for the preservation of goods. The role of space technology in this is that it provides relevant information about the terrain's weather and the monitoring of goods, thus ensuring that the storage has the right temperature and is in good condition. Indeed, a key benefit of satellite applications is the easy route and direct dissemination of information, which reduces waste and fuel consumption (Salzgeber, 2009). For example, Aquafarm, an ESA application, supports farmers and agricultural stakeholders with information on water usage, the value chain, the development of crops, and eliminating factors that hinder sustainability (European Space Agency, 2023). Such an application can be adopted further and customised to the Nigerian agricultural industry and setting. This generally contributes to the management and quality assurance of the products.

This section examined Nigeria's economic challenges by focusing on the agriculture industry as a sector that can be developed due to its potential. With the proper application of all the suggestions in this section, the Nigerian agriculture sector can boast food security and become the primary source of national revenue. The oil industry also holds enormous importance for

Nigeria, but there are a few limitations to what space technology can do to solve the sector's challenges. Space technology, for example, may not be able to directly predict changes in global oil prices. However, it can help developing countries better manage their natural resources and reach out to remote areas (Hays and Lutes, 2007). Hence, satellite technology can be utilised for security surveillance to counter or curb oil theft in Nigeria. The possibility of curbing oil theft with satellites, as well as how it addresses national and border insecurity, is discussed in the next section.

3.3.2 Addressing National Security Issues

Following the discussions in Section 3.2, research participants posit that Nigeria is faced with issues of national security and border security. The national security challenges include kidnapping, piracy, and banditry, including terrorism linked to porous borders. Nevertheless, some participants propose potential solutions to the escalating rate of insecurity in Nigeria. Participant ST9 mentions that:

> *"With satellite, you can monitor an area, a large area over a period of time; you can even monitor people moving. Satellites are so sensitive now to know people moving, vehicles moving and things like that."* (ST9, Academic, 07/07/21)

The participant's key point centres around the application of high-tech satellites to survey the environment and track human and vehicular movement. A primary function of satellites is that they can be used for security surveillance, and as discussed in Chapter 2, Section 2.5, Nigerian satellites have been useful in providing data and mapping areas under security threat. In 2014, NigeriaSat-X and NigeriaSat-2 tracked Boko Haram's activities, leading to the release of two hundred and seventy-three girls kidnapped by the terror group in the Chibok area of Borno State (Firsing, 2017). However, since insecurity persists, this thesis argues that Abuja can invest more in building more sophisticated satellites and centres with trained experts who can work with the security agents to utilise timely data for security purposes.

Indeed, the use of space satellites and their capabilities by security providers was highlighted by participant ST3, who expressed his view on how the Nigerian space agency can support

military and police operations. The participant, who is also the director of engineering and space systems at NASRDA, said:

> *"All these problems we have, insurgency and all those things, we [NASRDA] are able to provide maps for the military […]. Our priority is socio-economic development. That is, the enhancement of the quality of life of the people of Nigeria. That is our main goal. So, anyway we can use the space assets to do that, we do. We train the law enforcement agencies, the police, we train them on how to use GIS (geographical information systems), which is used in all areas almost; it is everywhere."* (ST3, Space Engineer, 30/08/21)

Participant ST10 adds to this by specifying other areas where space technology can enhance the Nigerian security setup. He said:

> *"Under security, we have so many things that the government can tap into space technology to revolutionise in terms of precision weapon, in terms of command, control, communication, computer and the rest, intelligence surveillance and reconnaissance."* (ST10, Academic, 13/08/21)

The respective suggestions made by participants ST3 and ST10 indicate the benefits inherent in the use of satellites for the provision of basic amenities, mapping, and the deployment of space equipment for security intelligence, communication, and command. All these functions have the potential to enhance national security and intelligence, including guarding against crude oil theft, as highlighted in Section 3.1. Furthermore, participant ST3's comments show the significant role of training and collaboration. The participant's opinion reveals that NASRDA does not only provide satellite data for security stakeholders but also places importance on the training of security agents. This is because, without proper knowledge of how to use satellite data, the data would become ineffective, and the need for the security uses of satellites would be unnecessary. Therefore, if the police and the military, as well as other security personnel, could be trained to utilise GIS and other space applications, including interpreting data, it could improve public safety and protect national infrastructure. Likewise, the acquisition of space knowledge by the security forces can enhance the retention and transfer of knowledge within the security setting. This could also contribute to the welfare of the

citizens and boost international confidence in the peace and stability of Nigeria, thereby improving local businesses and foreign investments in the country.

Similar to this, participant ST10 mentioned the use of space capabilities by the Nigerian military for its weapons and national security, noting that:

> *"Nigerian Centre for Space Transport and Propulsion (CSTP), which has a base in Epe, has actually contributed to the capacity of the Nigerian military. The Nigerian military has collaborated with them in the design of guided missiles, and this has saved the country a lot of money that would have been spent abroad to purchase that equipment."* (ST10, Academic, 13/08/21)

As discussed in Chapter 2, Section 2.2, and equally indicated in the above quote, the activities of the Nigerian space agency and the resources of its activity centres are not only essential for research but are also crucial to the provision of national security. The CSTP has been of immense support to the Nigerian military, especially in the aspect of capacity building and the construction of guided missiles, thus cutting down on what would have been paid to foreign organisations. The accumulated funds can be used to develop the space transport and propulsion centre in order to provide more services and produce modern, custom-built machinery in the long run. This will also have a positive effect on the police force's operations and the military capabilities and devices that are used nationally and on continental missions. It is noteworthy that the military makes use of satellite data in its peacekeeping mission in Africa. This is discussed in the next chapter. This generally emphasises Nigeria's spacepower and the potency of its space assets to strengthen its national capabilities and amass devices that could be used internationally.

In addition, the partnership between the space centre and the Nigerian military could guarantee the protection of confidential information on national security. This information may include knowledge about secret missions, the locations of prime suspects, maps of terrain, and military hardware. Nonetheless, in a case where the military partners with non-governmental space organisations on national security, there may be a risk of leakage of confidential information to external parties. Thus, in this type of collaboration, knowledge must be protected by the parties. As established in Chapter 1, Section 1.6.1.4, Strange (1994, 2015) argues that the key players in the knowledge structure acquire power and authority, and this power is more of a

voluntary consent conferment based on shared belief systems, and it is more easily maintained if the authority can limit access to it and guide against any threat of competition. Nigeria's use of indigenous space capabilities and expertise can ensure that knowledge is retained domestically and further utilised for the security benefit of the state.

This section examined the importance of space capabilities for addressing Nigeria's security challenges. The next section discusses space-enhanced security surveillance systems that can help curb the menace of insecurity in the country.

3.3.2.1 Sensor Smart Shoes

Kinnan *et al.* (2011) suggest that inadequate geographic information, poor communication networks, and unfeasible nano-tracking devices for individual use, particularly in remote and high-risk areas, are part of the key challenges confronting the Nigerian security forces, including the military. Thus, the Nigerian space agency partners with the Nigerian Institute of Leather and Science Technology (NILEST) to provide leather shoes, which are fitted with sensors by the space agency in order to track security agents during their missions. It is worthy of note that, for this analysis, the sensor shoes will be termed "sensor smart shoes" or "smart shoes." This is because the research participants gave varied names even though they referred to the same object.

Two participants identify the use of sensor smart shoes for security as a significant achievement in NASRDA's contribution to national security. Participant ST4, a spatial scientist at NASRDA and an expert in the application of space technology to hazards and environmental management, states that:

> *"We [NASRDA] recently developed a set of shoes in which we embedded GNS (Geomagnetic Navigation System) sensors in them and then with those sensors in the shoes, you can monitor the location of the person wearing the shoes at any point in time, using navigational satellite. This is applicable to the military where we want to know where the military is at any point in time and then it's also applicable to kids who go to school, and their parents would want to know where the children are at any point in time. So, once the children put on the shoes, the*

parents from an app on their phone can monitor whether the child is still in school or whether the child is not in school." (ST4, Spatial Scientist, 24/11/21)

This extract shows the various benefits inherent in space technology. The navigational satellite is used as an enabler through which the tracking device (shoes with sensors) gives a signal to the corresponding receivers or operators. NASRDA engineers have developed the sensors that are fitted into the shoes and are used to observe the movement and location of specific individuals. This is similar to the significant functions of the Global Positioning System (GPS) in strategic operations. The military, international financial markets, and transport networks, including the universal trading system, depend on GPS for operations (Lieberman, 2017a), as the satellite-based technology has become essential to modern-day intelligence acquisition (Rementeria, 2022). Carter and Johannsen (2005) argue that the military forces were the pioneering users of GPS in the 1980s. Indeed, GPS's provision of free position, navigation, and timing (PNT) services globally (Lubojemski, 2019; Bowen, 2020) is crucial for security operations. Therefore, the participant believes that the sensor smart shoes would enhance the military's strategies in their missions by providing detailed and mobile information about each combatant, especially in remote terrain. For example, the Nigerian military often embarks on specific security missions in territories seized by terror groups. These territories are mostly rural areas that require modern technological gadgets for smooth operations. Hence, it can be argued that the sensor-equipped smart shoes will be valuable for the military and national security generally. These recently developed space gadgets add to Nigeria's spacepower, which enhances both its national capabilities and its regional influence.

In Participant ST4's view, the sensor smart shoes are also efficient for monitoring school children who may be vulnerable due to the security lapses in the country. Once the shoes are worn, they send signals to a corresponding mobile app where the receiver can track the person's location. If this is accomplished on a national scale, each community could act as an active watchdog in their environment, providing security agents with critical and timely information. Community participation through the use of technology would indeed be of immense benefit to national security and the security forces, for example, the NPF's local and nationwide operations.

Participant ST6 further confirms the significance of the sensor smart shoes. He thinks that the device can be used to track human beings or technically mobile objects.

> *"We [GeoApps Plus Limited] are working on certain components. For example, of recent, the agency introduced the Quick Win Programme, and within the Quick Win Programmes, many products have been developed. The agency developed what you call the GPS smart shoe, which was meant for tracking security agents and is used even in vehicular or human monitoring. So, it actually monitors and it's a support system that is supposed to help assist or track any person or moving object".* (ST6, Space Director, 22/10/21)

This extract suggests direct positive implications for security and economic development in Nigeria through space-enhanced projects. The Quick Win Programme is a research project organised by NASRDA to address specific issues in the country. The programme focuses on human security, food security, climate change, disaster management, data management, and space science educational packages, especially as they relate to Nigeria's recovery from the effects of the COVID-19 pandemic (Space in Africa, 2020a). As affirmed by participant ST6, the smart shoes initiative originates from the NASRDA-funded programme (Quick Win) for the purpose of national security. Venturini and Verbano (2014) argue that space agencies are responsible for funding and organising space research programmes for technology transfer, R&D, and integration systems. Thus, it could be suggested that NASRDA organised the Quick Win Programme to explore ways of practically utilising new technology and developing technology for the security and economic benefit of Nigeria (Krishen, 2011). In this case, the technology developed is "smart shoes".

On the other hand, participant ST6's quote indicates that smart shoes would benefit Nigeria's entire security operations. The security setup in Nigeria includes the military, navy, police (inland), and customs and immigration service (border). The sensor smart shoes can augment the security forces' strategies and devices that are put in place to curb insecurity in the country. For example, as discussed in Section 3.2, the NPF, which is in charge of inland security, requires modern equipment to provide adequate security. Thus, it can be suggested that the NPF can massively benefit from technology-enhanced smart shoes for its operations.

Participant ST9's opinion below affirms that satellite technology will be of huge benefit to the NPF.

> *"With satellite systems now, you can do a lot more policing. With satellite system, you can even reduce your prison population. You can decongest your prison. It's not everybody that needs to go into prison or jail, so to say. Some people that their crime is not so criminal in nature, you can put them in a location, maybe even at home, and then you put some chips [microchips], maybe on their hands or on their legs, and you tell them that they can't go outside behind the particular radius. That decongests your prison, and you also restrict their movement or their freedom, so that's one way of decongesting the prison."* (ST9, Academic, 07/07/21)

This participant's view implies that space-enhanced applications and devices such as micro-chips or smart shoes can offer solutions to the constraints of the NPF regarding the provision of adequate security. In particular, smart shoes can be useful for tracking lawbreakers. This is comparable to the electronic tags that prosecutors can employ to keep an eye on offenders. Indeed, as stated by participant ST9, *"it's not everybody that needs to go into prison or jail"* when technological devices are utilised. This will be very applicable to Nigeria, where the high rate of crime has given rise to prison congestion and led to numerous jailbreaks. Egbejule (2021) claims that over the last decade, Nigerian jailbreaks have occurred outside the large cities but in overcrowded prisons. He did, however, give recommendations for securing the prison facilities. These are: installing scanners and security cameras; and integrating other technology that is yet to be implemented (Ibid). This correlates with the use of space capabilities, as this study proposes. That is, if convicts are implanted with microchips or presented with smart shoes, it can give them a bit of freedom while they are monitored in their respective jurisdictions rather than being housed in a congested facility. It is important to reiterate that the training provided by the space agency to the security operatives, as mentioned by participant ST3 in Section 3.3.2, will contribute to the security effectiveness of Nigeria's prison system through the use of smart shoes and other tracking gadgets.

More broadly, the effective use of EO satellites and images or other types of security satellites can be adopted by the police force to gather intelligence and distribute data to relevant divisions for optimal use. This can be used to combat piracy, oil theft, kidnapping, terrorism, and illegal immigration, among other security concerns in Nigeria. The application of satellite imagery in Rania Alayed's murder case in the UK provides good evidence of the importance of space technology to policing. After several failed attempts to locate where Rania's body was buried

by her husband in 2014, crime investigators adopted the use of satellite imaging and achieved a breakthrough within a short period of time (Monks, 2014). The Nigerian government can prioritise the acquisition of sophisticated security satellites for comprehensive surveillance and crime-fighting in the country. In the short term, the government can continue using its EO satellites on a dual-use basis for security purposes but must invest in acquiring modern satellites in the long run. This will make the services of trained police officers in satellite data and management essential in various strategic units where they can understand the data and act promptly with it.

3.3.2.2 Surveillance Gadgets

GeoApps Plus Limited is involved in several projects and the design of new products for improving security in Nigeria. This is mainly to expand the scope of security surveillance and tracking. Participant ST6 states that:

> *"We [GeoApps] are involved in promoting the head tracker. You know, of course, most of these things just come up. People go to the market, buying tracking devices and putting them on facilities. But we are also at the forefront of actually marketing some of these products. The agency has designed security surveillance systems which is in-house because we feel that there are things that we don't really need to buy from outside [abroad]. So, because we see a lot of CCTVs and the rest of that coming from outside, these are things that we are actually promoting."* (ST6, Space Director, 22/10/21)

This quote reveals the extent to which the space agency is committed to enhancing national security through the development of indigenous security equipment. Head trackers are a type of technology that can be used by security forces to capture raw data in a location or during missions as part of situational awareness. The participant's view indicates that tracking devices such as head trackers are offered on the market in Nigeria. This means the product is accessible for public and private use and not restricted to security agents only. There are two implications to this.

The first is that, like the smart shoe application, the public can make use of the head tracker for their own safety and could also voluntarily release information to the NPF or other security agents when necessary. This is linked to the community participation discussed in Section 3.3.2.1. Space gadgets can enhance public security when people have access to the devices and are trained to use them effectively. This leads to the second implication. As the national space firm provides the technological products to the market, there might be a need for government regulations for the public, private, and commercial use of security devices such as the head tracker. This is important for confidential purposes and to maintain the significance of the security-sensitive gadgets.

Further, in an attempt to develop homemade security products, GeoApps Plus offers domestically designed security surveillance systems to serve as alternatives to foreign products. These surveillance systems, including the head tracker, smart shoes, and CCTV, have the potential to promote indigenous technological capabilities while enhancing national security. As discussed in the next chapter, this reiterates the need for Abuja to prioritise the completion of its space laboratories (AITC), where space applications and products can be developed and produced. Nonetheless, two major security surveillance systems were designed and developed through NASRDA's Quick Win programme. The first is a prototype multi-wing copter, useful for data and image acquisition, monitoring and surveying, and remote sensing technology (Space in Africa, 2020a). The second is a surveillance system with RFID (Radio-frequency identification) and an image processor. The idea behind developing these surveillance systems is to get real-time video feeds that correspond with the database for an entrance system using RFID stickers that can set off a boom barrier for individuals (Ibid). This can be useful in highly sensitive areas and locations in order to spot security threats and guarantee the security of lives and properties.

The use of security systems such as sensor smart shoes and head tracking devices designed for security agents and vulnerable school children, including general surveillance systems, can be beneficial to address Nigeria's security challenges as well as decongest the prisons. The prototype multi-wing copter and the surveillance system with RFID can also be valuable for national security and, by extension, border management. This sub-chapter shows the extent to which space capabilities can be utilised to enhance security in many different areas, thus aiding domestic stability. The following section examines how space technology can be used or further adopted to strengthen border security.

3.3.2.3 Border Security

Participants highlight the need to secure the national borders, as this will contribute to national security. Following the discussion in the previous sub-chapter, Nigeria's space capabilities can be further deployed to shore up its borders. This opinion was shared by participant FP6, who highlights the importance of utilising space technology for border-related security.

> *"If Nigeria uses space technology, Nigeria can man its border perfectly well and all these inter-border, cross-border complexes and crises will be a thing of the past. And Nigeria will have a peaceful country and a peaceful land to plan development and prosperity."* (FP6, Academic, 02/03/21)

The participant's view suggests that applying space technology and its applications could tighten Abuja's border security and curb the threat of violence that is allegedly sponsored by foreign contingents across the borders. For example, a secured border will enhance the efforts of the Nigerian Immigration Service (NIS) in their efforts against unlawful entry and the infestation of terrorists fleeing other regions of Africa to support their counterparts in North-East Nigeria. With this, the participant believes that peace would be restored to the country and various national developmental projects could begin to thrive.

Similarly, participant ST10, who mentioned the porosity of the national borders in Section 3.2 states that:

> *"We have crisis management, disaster management, and early warnings from satellites. Those are the things Nigeria can actually benefit from space sector, including border monitoring […]. The government can actually use the Earth Observatory satellite to monitor all those borders and settlements."* (ST10, Academic, 13/08/21)

Apart from identifying the benefits of satellites for the management of disasters, this quote underlines the need to monitor Nigeria's border through the use of satellites. The participant observes that Nigeria's EO satellites can be deployed to secure the borders and relevant

communities in order to aid the security operatives' fight against crimes such as banditry, kidnapping, terrorism, piracy, and ungoverned residency. Indeed, EO satellites support scientific research, national defence, meteorology, environmental monitoring, and diverse commercial activities (Angelo, Jr., 2003). The use of EO satellites in Nigeria is not new. As discussed in Chapter 2, Section 2.5, Nigeria already uses its EO satellites for various purposes. However, what this study suggests is that the government can increase its investment in space capabilities to acquire more security satellites for the purpose of effective national and border security. Nigeria's border is of strategic importance to its domestic environment, West Africa, and Africa at large. This strengthens NCR's postulation on the condition of the domestic environment and its impact on foreign policy. That is, the application of satellites and other space-enhanced applications can contribute to the stability of the state. Thus, Nigeria can perform effectively on the international scene. Furthermore, NASRDA's prototype multi-wing copter and the surveillance system with RFID developed, including drones and other space-enhanced devices, can be used for border monitoring and capturing illegal activities such as the supply of illegal arms into Nigeria. This will be of great benefit to Nigeria's immigration control and national security.

3.4 The Need for More Advanced Satellites

On the basis of the discussions in this chapter, it seems that Nigeria's space capabilities and activities hold enormous potential for the country. However, there is a need for Abuja to acquire more advanced satellites in order to reap tangible and comprehensive results in the quest to provide adequate national security, border monitoring, and economic development. As discussed in Section 3.3.2, NigeriaSat-2 and NigeriaSat-X were instrumental in the release of the abducted Chibok girls in 2014. However, Firsing (2017) argues that despite the satellites' role, there were lapses in the effectiveness of the rescue mission. The lapses were due to the limited capabilities of the satellites to fully track the terrorists and provide quality images of their terrain (Akinyemi, 2021).

It is important to note that in a newspaper article, NASRDA's Director-General, Dr Halilu Shaba, while admitting that Nigeria's satellites may not comprehensively capture the terrorists' activities, commented that:

> *"The [Nigerian] satellite is not static where the insurgency is taking place. That is why one satellite is not adequate. What Nigeria has; there are some two satellites doing two different things. We have a High-Resolution imaging satellite and Medium Resolution imaging satellite. The activities of the bandits could be when the satellite was away from Nigerian borders, so that is why we are advocating for more satellites for Nigeria,"* (Shaba, 2021)

Dr Shaba's comments are not surprising: as discussed in Chapter 2, Section 2.5, NigeriaSat-2 is a mini satellite, while NigeriaSat-X is a microsatellite, and they are both stationary satellites with a 2.5-metre resolution (European Space Agency, no date b). A 2.5-metre-resolution satellite cannot trace an individual's movement except for mapping locations at intervals (Firsing, 2017). Moreover, since satellites move from one location to another, taking over 90 hours to position and capture photographs, it may prove challenging to find mobile targets in terms of security surveillance. In view of Dr Shaba's statement, this suggests that the current Nigerian satellites are not built for complex EO operations because they can only cover a small part of the country at a time as the Earth orbits. The implication of this for Nigeria's spacepower is that the state needs to invest more in developing modern satellites that can serve vast and multidimensional purposes.

Overall, considering the highlighted satellite limitations, with the national security issues and the quest for the development of the agricultural sector, the landscape of Nigeria's remote areas, and the complex transportation networks, having more modern and effective satellites would be an advantage. Synthetic Aperture Radar (SAR) can be of benefit, especially in combating insecurity in Nigeria. SAR is a type of active data gathering in which a sensor produces its energy and records the volume of the energy reflected after relating to the Earth (Herndon *et al.*, 2020). SAR satellites differ from optical imagery satellites because their signals are receptive to surface features such as structure and moisture (Ibid). Unlike the limitations of the generic tracking function of Nigerian satellites, the SAR can obtain images in any weather regardless of the light conditions, and its images are beneficial for cloud-prone and disaster-prone areas (Kganyago and Paidamwoyo, 2019). The satellite will curb some of the limitations of the optical satellite while it supplies relevant data on geospatial information and mapping to decision-makers in addressing crucial national issues (Faleti, 2021b).

It is worthy of note that Abuja signed a US $250 million agreement with MENASAT Gulf Group in 2015 to deliver a SAR satellite (NigeriaSAR-1) to Nigeria (Adugbo, 2015). It suffices to mention that Nigeria was the first country in Africa to secure the acquisition of a SAR, even though the project has yet to come to fruition. The modern satellite will have an impact on technological and economic advancement in the country. The images derived will be suitable for internal and border security and military use, aiding the fight against terrorism, kidnappings, oil theft, and banditry that are currently ravaging the country. Further, the satellite will benefit agriculture, weather, and waterway monitoring, including the oil and gas sector. These developments have the capacity to transform Nigeria into a space innovation hub in West Africa and Africa.

3.5 Conclusion

This chapter explored the importance of space capabilities to Nigeria's domestic environment and its relations to foreign policy. The section focused on the use of space applications to address Nigeria's economic and security issues. The chapter has therefore offered a suggestion to the first research question as laid out in Chapter 1 on the subject matter. Addressing this question not only helps analyse data and provides a background to answer other questions, but also gives readers an idea of Nigeria's domestic setting, particularly the economy and the state of security, all of which have implications for the use of the state's satellites and the strengthening of its foreign policy.

NCR places emphasis on the state/domestic- and unit-level variables through which external pressures are translated, thus influencing the state's foreign activities. The state-level variable involves ensuring that the domestic environment is stable, while the unit-level variable is the leader's perception, all to put the state in a position to respond to the systemic environment. Hence, the use of space technology to address economic and security issues could strengthen Nigeria and its influence abroad.

A significant issue that was observed was Abuja's prioritisation of the oil sector at the expense of other sectors with potential. This is linked to the NCR unit-level variable, where the leaders' perception is crucial to the state's agenda and execution of regional activities (Okolo, 1988). The focus on oil is a major problem facing the Nigerian state and its economy, originating from

the government's inability to forestall the fall in global prices, combat oil theft, and operate national refineries. Thus, this contributes to the weakened state of the economy and Nigeria's external influence. This is because the home ground must be secured before an effective foreign policy can be achieved (Kissinger, 1966). Moreover, in the sphere of NCR, for a state to respond internationally in a way that promotes its national interest, the intervening variable must be effective. In view of this, Nigeria's external influence can be strengthened if the economic challenges are addressed. As highlighted in this chapter, a potential solution to Nigeria's economy is to invest in the use of modern technology in its agriculture sector.

The agriculture sector and how space capabilities could enhance it were key issues discussed in this chapter. As gathered from research participants, some of the challenges facing the industry in Nigeria include poor storage and logistics and land disputes, which result in food insecurity. Satellite applications and data can be used to improve food availability, accessibility, utility, and stability in provision and distribution. In addition, modern farm equipment can be extended to rural and urban areas in the quest to enhance the agricultural value chain and socio-economic stability of the country.

Furthermore, a critical issue highlighted in this chapter was national and border security. With the issues of terrorism, kidnapping, herdsmen crises, and jailbreaks, Abuja's internal security is under threat. If Nigeria is to guarantee its security, it must adopt modern technology and contribute to the stability of its immediate neighbouring states. This, in turn, rests on the government's ability to utilise space technology and space applications to provide overarching security in society and at the borders. The NPF, the military, and the immigration service (NIS) will be major beneficiaries of the space-enhanced applications. Security surveillance systems and devices can be used to revamp or improve Nigeria's current security setup. The use of sensor smart shoes and head trackers, as well as EO, navigational, and SAR satellites, can help Abuja improve its national security. The sensor smart shoes are designed for security agents to provide adequate security, while the head tracker can also be used on security missions. The chapter found that these gadgets can promote community participation in the provision and maintenance of security nationwide. The smart shoes can also help in decongesting Nigeria's prisons, while the prototype multi-wing copter and the surveillance system with RFID can be beneficial for border management.

The data analysis in this chapter is based upon the responses from the participants. It is noteworthy that participants highlighted the contribution of space technology to Nigerian military operations. The findings further highlight the significance and the need for knowledge protection among collaborators on national military engagements. Likewise, the importance of training for security operatives was emphasised to enable the full utilisation of space data and applications among security agents.

It is important to note that though satellites and other technologies have been generally used in various sectors in Nigeria, they have not made significant improvements to the country's economic and security issues. This chapter highlighted the key areas that needed to be addressed in the national economy and security setting in Nigeria. These are agriculture and crude oil, national security (which includes military operations), and security at the borders.

Against this background, the following provisional suggestions can be made: First, based on the participants' responses, which highlight the state of security in Nigeria, the government needs to place a priority on national and border security by utilising space-enhanced surveillance systems, which include sensor smart shoes and personalised tracking devices. Second, advanced satellites are required for effective security operations in Nigeria. This is particularly important for border security. Hence, the government should prioritise the acquisition of modern satellites and other relevant equipment for border security. Besides, for foreign policy and regional influence, intelligence-sharing on security between Nigeria and its neighbouring states should be the prime focus of the government. This can be enabled by space technology.

Third, military operations can be further improved with the rapid development of indigenous space activity centres such as the CSTP, as this can also guarantee knowledge protection. This suggestion is not meant to discourage foreign military collaboration on national security, but attention should be given to the protection of confidential information. Finally, for a sustainable agricultural sector, the use of space-enhanced applications and data with precision should be encouraged. To ensure food security, accurate space data for cultivation and modern equipment for storage and distribution are essentially important for Nigeria. The satellites must also be relied upon for regular information and surveillance of farmlands in order to curb land disputes and theft in the oil industry.

It is noteworthy, however, that these proposed recommendations would be effective if the government could support and train more experts on space satellites and GIS in the respective fields to enable them to analyse data and transfer it to relevant agents for swift action. Overall, this study has demonstrated the use of space capabilities for the purpose of addressing Nigeria's economy and national security. Thus, it is safe to say that the national economy and national security are the sectors that are predominantly impacted by the use of space technology.

There are two sides to foreign policy. The first part is the domestic environment, which was considered in this chapter. The second aspect is external relations—Nigeria's regional influence and space diplomacy. Therefore, the next chapter focuses on the strategic importance of Nigeria's spacepower to its regional hegemony. In particular, the chapter examines Abuja's space capabilities that could enhance its acquisition of structural power in Africa. This will be done under the key themes that emerged from the data analysis and were analysed using Strange's structural power theory.

Chapter Four: Nigeria's Space Capabilities and Regional Influence

4.0 Introduction

This chapter begins by building on previous discussions on Nigeria's influence in Africa. Nigeria has acted as, and been portrayed as, a regional hegemon. However, as this thesis has demonstrated, Nigeria has faced many domestic and international challenges in the way of this position. Nigeria's domestic challenges mainly include its domestic economy and national insecurity, which were addressed in Chapter 3. The chapter examined how space capabilities could address the issues in Nigeria. In furtherance, Chapter 4 focuses on the significance of Nigeria's spacepower capabilities and their contribution to its regional hegemony.

Nigeria is one of the main contributors to security and the economic sector in Africa (Umezurike *et al.*, 2017; Saliu and Oshewolo, 2018). Nevertheless, the security and economic challenges faced by the country have had an impact on its continental influence. Hence, as this thesis suggests, the use of space technology can enhance Nigeria's regional power. The West African state launched its first satellite in 2003 and currently has satellites in orbit, including a functioning space agency. As discussed in Chapter 1, these capabilities enhance Nigeria's quest for spacepower. Despite these capabilities, the state does not claim to be a regional leader in space technology, even though it has acted as a hegemon on various occasions. Nolte (2010) argues that regional powers have a special responsibility to ensure security and order in their territory. On this basis, Nigeria's material power mandates it to act hegemonically, despite not clearly defining its use of space technology in its foreign policy objectives (Tella, 2018). Thus, NCR is adopted to examine and make sense of some aspects of this chapter in line with the central focus.

Strange (1994, 2015) defines structural power as the power of a state to shape and determine the IPE structures in which other states, their political institutions, economic enterprises, scientists, and other professionals must operate. Strange further suggests that structural power can be identified in four distinct associated structures: security, knowledge, production, and finance. Each of the four structures is related, and a state could influence other states by controlling the four structures. Thus, with the strides achieved so far in the space sector as well as its future potential, Nigeria can leverage its space capabilities through the structures of power

to strengthen its foreign policy and shape the framework within which it relates to other states, the people, and corporate enterprises.

Strange's four structures of power are mainly used to analyse the discussions in this chapter. The chapter starts by discussing the current state of Nigeria's status in Africa. This is followed by the security section, which focuses on Abuja's use of satellite technology for its security operations on the continent. The next section looks at the knowledge Nigeria can gain from its space activities and how it can be used to strengthen its regional hegemony. Following this, the production section analyses the space ground infrastructure needed for spacecraft production and its potential benefits to Nigeria's regional influence. The final part centres around economic and funding issues and the need for investment in the Nigerian space agenda.

4.1 "Giant of Africa"

Nigeria is generally termed the "Giant of Africa". That is to say, Nigeria is the most influential state on the continent of Africa. However, this status has often come under scrutiny by Nigerian citizens and stakeholders who feel that the state is performing below its capability on the continent. Participant FP5 appeared to agree with this notion when he mentioned that:

> *"We are punching below our weight in the region [West Africa] and in Africa because we are so absorbed with this so-called problem of internal security—the Boko Haram problem, the herders' problem, the general insecurity in the country. We have bogged down completely, unfortunately, in fact, so bogged down that many intelligent people and former occupiers of important national positions are even openly talking about dividing the country. That should demonstrate to you that the internal problems are so many that we don't even have time again to think in a global way."* (FP5, Academic/Ambassador, 20/02/21)

This extract points to the level of Nigeria's performance in Africa. The participant believes that Abuja is underperforming, and that national insecurity is responsible for its lacklustre efforts on the continent, with domestic issues restraining the state from effectively participating in global affairs. It is worth reiterating that the internal problems raised by the participant were

addressed in Chapter 3. However, the key point from this excerpt is the dwindling influence of Nigeria, despite being the giant of Africa.

Participant FP1 shared the same opinion on the current state of Nigeria's regional influence when asked about the state's foreign relations in the area of technology. He said,

> *"There is no doubt, if you are going to be hegemony, you must be influential. But we [Nigeria] are becoming less influential. In those days, Nigeria speaks, and the rest of the world keeps quiet."* (FP1, Ambassador, 30/08/21)

This extract shows the extent to which Nigeria's hegemony in Africa is declining. The participant's viewpoint is based on Nigeria's inability to effectively carry out its altruistic foreign policy and address regional concerns as it would have been able to do a few decades ago. An example of the critical issues in Africa is the security and economic challenges (Selassie and Hakobyan, 2021; Bosman, 2022). Thus, the participant referred to the era when Nigeria's economy and military were powerful and could boldly contribute to addressing continental issues. This suggests that the most populous black nation is losing its grip as a regional power. Indeed, this corresponds with Ojakorotu and Adeleke's (2018) assertion on Nigeria's declining hegemony, as discussed in Chapter 2, Section 2.9.

Similarly, when asked about the impact of technology on Nigeria's hegemony, participant FP3 states that:

> *"Nigeria is a giant of Africa already. You know the word giant is old, it's obsolete, we are still maintaining it in terms of big and vast. By the time we make use of this [space] technology as a leeway, you know other African countries love this country, they believe Nigeria is more or less like US of Africa and when you look at the Nigerian foreign policy, the interest. So, if Nigeria can embark on technology, technology development, other African countries will key into it."* (FP3, Academic, 03/04/21)

This quote underlines Nigeria's hegemony and how other African states view the country. Several African states regard Nigeria as the giant of Africa (a regional power), and the participant indicates that the term "giant of Africa" could be based on the history of Nigeria's altruistic foreign activities, the size of the nation, and other material capabilities. As discussed in Chapter 2, Section 2.8, Nigeria has a formidable military and crude oil as a natural resource.

However, the extract suggests that these capabilities may be failing, and that Nigeria needs a source of power to augment its influence on the continent. Chapter 3 addressed how space applications could contribute to the agricultural sector in order to provide an alternative to Nigeria's dependency on crude oil and serve as a sustainable source of national revenue.

The participant further highlights the potential prestige and advantages inherent in Nigeria's use of technology (spacepower) and their extension to Africa, which might have an impact on its regional hegemony. Indeed, Tella (2018) suggests that Abuja's position and experience in space technology could serve as an example for African states. This affirms that Nigeria's space capabilities and activities represent a source of power that could be garnered through the control of structures and the provision of significant support and infrastructure to African states. Hence, given Nigeria's space capabilities and its Afrocentric foreign policy, African states may follow its lead in utilising space technology, especially as it directly benefits them.

An important area where space technology has been effectively deployed is security. As discussed in Chapter 1, Section 1.4.4, Nolte (2010:893) suggests that a regional hegemon "defines the regional security agenda in a significant way". Thus, part of Abuja's responsibility as a regional power is the provision of security and the maintenance of peace and stability on the continent. It is, therefore, crucial to examine the effect of Nigeria's space capabilities on the provision of security in Africa. This is spacepower. Peter (2010) claims that it is the use of space systems and other infrastructure to influence the activities of other states or actors. The next section will be analysed using Strange's security power structures.

4.2 Power Structure 1 – Security

Strange (2015) argues that security is the most essential need in society. This is because the protection of lives and properties is fundamental to the existence of any sovereign state. As discussed in Chapter 1, Section 1.6, the security structure, as well as production, knowledge, and finance, are the four structures that a state requires to acquire structural power. Strange claims that the providers of security may ultimately have an advantage in the production or consumption of wealth, including enjoying special rights in society. "Thus the security structure inevitably has an impact on the who-gets-what of the economy." (Ibid:49). This

implies that the contribution of security apparatus, such as satellite data and modernised weapons for military use on the continent, could generate economic benefit for Nigeria.

In Nigeria, the government is the primary provider of security. As established in Chapter 1, Section 1.6.1.1, part of Nigeria's investment in space technology is for the provision of adequate security (Agbaje, 2010; Tella, 2020), which includes the military and defence. Thus, based on Nigeria's space capacity and prospects, the state can extend its technology and expertise to provide adequate security on the continent. This is especially true because of its recently reduced capacity to contribute to the peace and stability of African states. It is noteworthy that this reduced capacity is caused by Abuja's focus on combating domestic challenges, such as insurgency and the economy.

Several participants noted the decline in Nigeria's military prowess in Africa. For example, participant FP2 mentions that:

> *"Our ability to influence development even among our neighbours here in ECOWAS has dwindled. I mean, 4 to 5 years ago, we were able to put down a rebellion in the Gambia. Somebody won the election, and we sent in the armed forces. But we are not in a position to do that now. We are not. We are still battling with Boko Haram."* (FP2, Career Ambassador, 25/01/21)

This quote affirms that Nigeria's influence in Africa is waning, particularly in security matters. The participant cited Nigerian military involvement in ousting Yahya Jammeh from power when he refused to step down after losing the 2016 Gambian general election. Indeed, Mojeed (2017) claims that despite the shortage of soldiers due to internal security operations, Nigeria sent its army to Gambia to ensure that President Jammeh handed over power. This example demonstrates Nigeria's military capability in Africa over the past decades. Ojakorotu and Adeleke (2018) argue that Nigeria had the highest number of soldiers on African peacekeeping missions in the 1990s. However, participant FP2 believes that the military has been significantly weakened by the insurgency in Nigeria. Hence, the participant doubts Nigeria's ability to potentially provide security and promote peace in Africa. This shows that Nigeria's position on the continent is weakening and that there is a need for Abuja to resuscitate its hegemony with the application of space capabilities to provide, for example, security and technical support to military operations in Africa.

It is noteworthy that Chapter 3 examined how Nigeria's space-enhanced gadgets could be utilised by the military and other security forces for national and border security. In line with using space technology for regional security, participant FP6 mentions that:

> *"Nigeria bought helicopters or jets to be augmented by space technology in order to identify insurgent hotspots. I think it is an encouraging development that even other countries are now engaging in this space technology."* (FP6, Academic, 02/03/21)

This comment implies that Nigeria's use of space technology and relevant gadgets for security purposes may have prompted other African space new entrants to adopt the technology for domestic benefits. Since Nolte (2010) argues that a regional power's influence is acknowledged within and outside its territory, Abuja's space activities and decisions may have been perceived by other states as the right choice. According to Onyango (2021), 21 African countries now have space programmes. Algeria, Egypt, Morocco, South Africa, and Nigeria are among the leading states that have launched their satellites into space (Space in Africa, 2022). Although Nigeria collaborates with several states on space applications, it could further utilise its space-enhanced applications and other gadgets to extend its capabilities in addressing security situations in Africa. Therefore, we may assume that further combining the national space capabilities with military operations for the promotion of regional security could strengthen Nigeria's hegemony.

Consequently, there are three potential implications for Nigeria's use of space capabilities for security and military operations in Africa. First, more states, especially the less capable countries, would develop an interest in space technology, for example, using satellites for security and socio-economic functions. Second, the increasing involvement of states in the use of space capabilities could enhance space collaboration in military operations between Abuja and other counterparts. The third is that the first and second implications present an opportunity for Nigeria to control the security structure by providing satellite data and knowledge for relevant production, including expertise for training purposes for other states.

Furthermore, participant FP5, who believed that Nigeria possesses the strongest security capacity that can be utilised in West Africa, suggests that:

> *"In the whole of the sub-region, we are the only country that have had a strong Navy, a strong Air Force that can be deployed. No other country in West Africa has that. So, if we add the question of space technology to it, it will make us much more formidable at home, and formidable abroad. The whole idea of power is that, power confers influence. You don't have to use force, but when your neighbours know that you have enough force to threaten them, then you have influence, and sometimes influence can be more diplomatically satisfying than brute force. Because if diplomacy is not backed by the threat of power, we will not achieve anything."* (FP5, Academic/Ambassador, 20/02/21)

This excerpt has two parts and is loaded with important meanings. The first part explains the strength of Nigeria's security forces within the sub-region. As a regional power, Nigeria holds superior military capabilities in West Africa (Mayall, 1976), despite the impact of its war against terrorism. Thus, the participant believes that with the application of space capabilities, the Nigerian security and military would become stronger internally and externally.

The second part of the extract focuses on the possible impact of Nigeria's space-enhanced security operations. For example, satellite applications for security operations may reduce the need for military aggression, thus paving the way for the use of more subtle but accurate weapons such as drones or precision-guided missiles for launching attacks. Nigeria uses the Chinese-made Wing Loong II drones and the locally made Tsaigumi drones, as well as other relevant weapons, in its military operations (Reuters, 2022). The Nigerian Air Force developed Tsaigumi to boost the military's capacity for reconnaissance, intelligence, and surveillance (News Agency of Nigeria, 2018). Additionally, in December 2022, the Defence Space Administration launched a military satellite (DELSAT-1) to combat insecurity (Moyo, 2022). With these capabilities, other states' perceptions of Nigeria's military capabilities could drive them to become dependent on Abuja for a supply of security and technical gadgets. This aligns with the tenets of structural power because it excludes the voluntary use of force or incentives by Nigeria to get others to do what it wants (Cohen, 2016).

This section examined the importance of space-enhanced military operations and the need for the provision of security in Africa. The participants believe that the Nigerian military could benefit from comprehensively utilising satellite capabilities for its operations in the region.

Thus, the following section focuses on Nigerian military operations in Africa and the use of space technology.

4.2.1 Nigerian Military Operations in Africa

Strange (1994, 2015) acknowledges that the analysis of security structure is the traditional domain of realists. As discussed in Chapter 1, Section 1.3, realism covers how states stabilise in a systemic setting and what they potentially gain at others' expense. Thus, every state is expected to look after itself through the accumulation of power for the realisation of its goals (Rathbun, 2008). As established in Chapter 2, Section 2.3, Nigeria has a dedicated and operational space arm for security and defence in the country and Africa. Part of Nigeria's responsibilities as a regional hegemon is to provide security, and power is essential to the provision of security. In this case, Nigeria's space capabilities represent a source of spacepower. Hence, it is crucial to ask, as Strange did in her classic text, *States and Markets*: "Who provides security, and to whom? Is it to counter a perceived threat or threats? What are the costs and conditions demanded for this security?" (Strange, 2015:49).

To provide an answer to the question, "Who provides security, and to whom?" as part of Nigeria's quest to maintain peace and stability, the military works in collaboration with the Defence Space Administration (DSA) to provide national, sub-regional, and regional security. Part 1, Section 1 (c) of the DSA Act 2016 states that the Administration is to *"Support Nigerian Military operations both within and outside the country as well as Security Agencies responsible for internal security through the use of satellites."* (Defence Space Administration, 2016). This quote demonstrates that Nigeria uses its space capabilities to enhance its military operations in the region of Africa. Hence, apart from the internal use of space applications for security purposes, African states can be argued to be the beneficiaries of Nigeria's space-enhanced security provision.

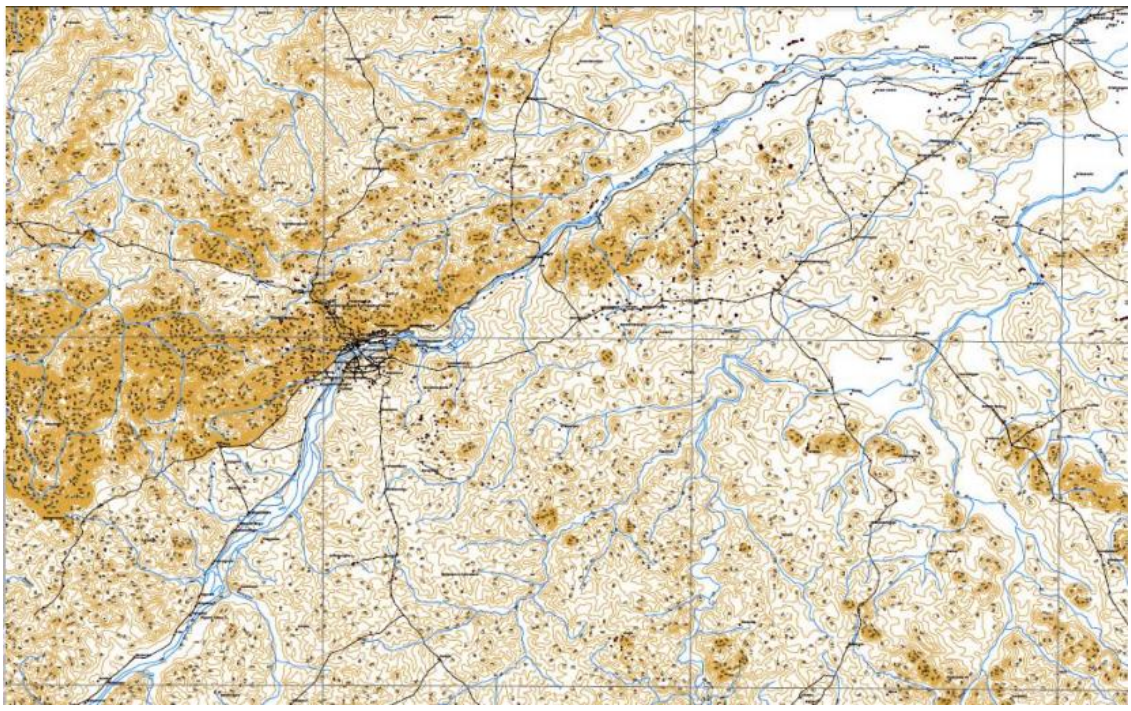
The military use of space satellites for regional security was highlighted by participant ST3, who expressed his view on how the Nigerian space agency has supported military operations outside the country. He notes that:

> *"All these problems we have, insurgency and all those things, we [NASRDA] are able to provide maps for the military. We were able to even provide map for our*

military when they had operation in Mali. Mali is not in Nigeria, its West African country, far away. So, we were able to support in those areas." (ST3, Space Engineer, 30/08/21)

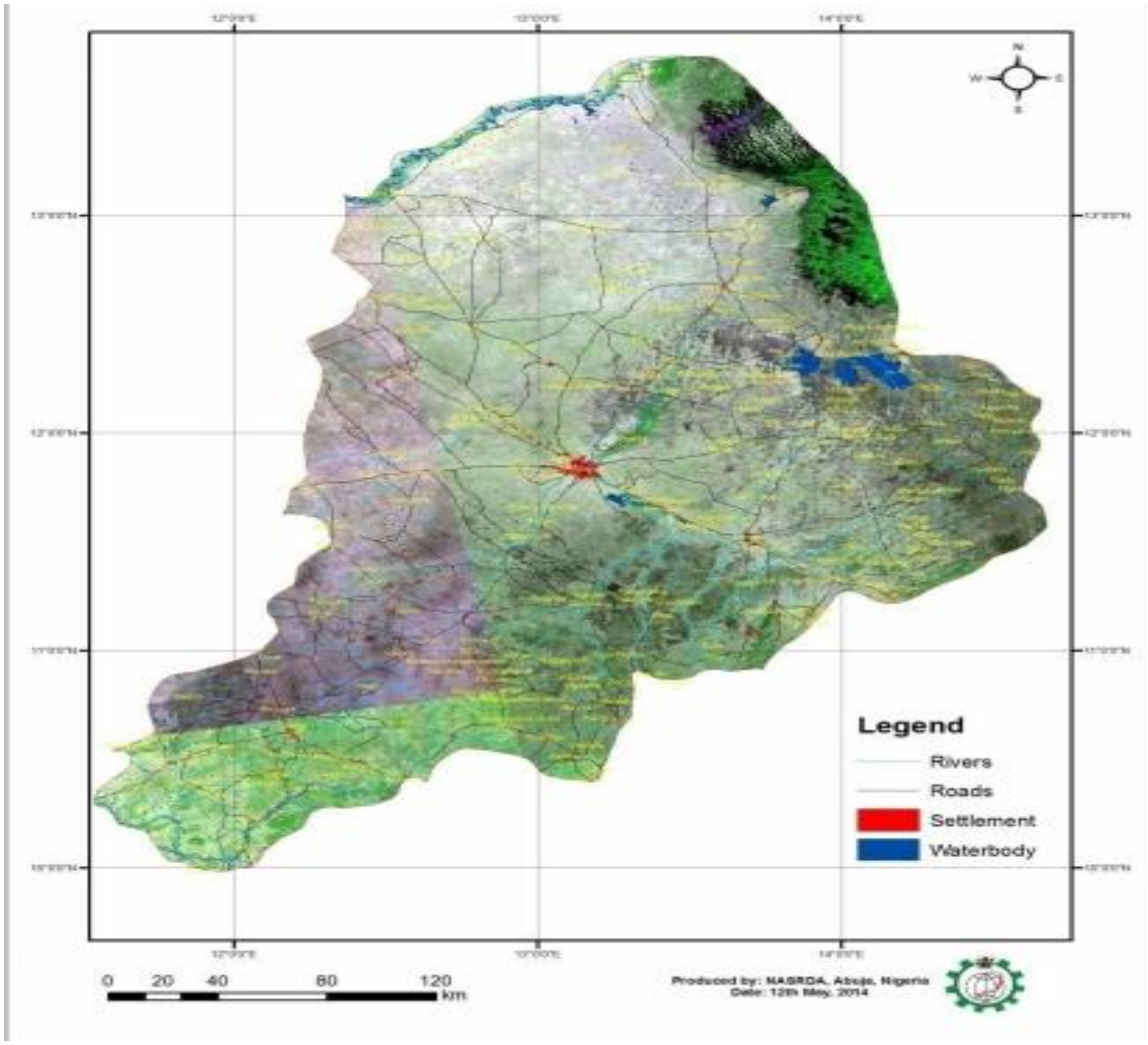
This comment explains the importance of satellite technology to Nigerian military operations and interventions in Africa. During the 2012 Malian civil war, NASRDA supported the military peacebuilding forces with satellite data and images, including a map of the country's South-West region (Space in Africa, 2019) (see Figure 4). This proved crucial to the restoration of peace in Mali. As discussed in Chapter 2, Section 2.5, space capabilities provide support to military operations on land, sea, and air by enabling communication, tracking, and positioning, thus proving strategically valuable to security missions (Peter, 2010). Largely, space is a realm that enables terrestrial military functions (Townsend, 2019). For example, satellites enable a connection between military components and weaponry platforms to locate targets across terrestrial distances (Bowen, 2020). Indeed, when a warplane heading for Mali crashed in the Niger Republic with Nigerian soldiers on board, the Nigerian space agency tracked the crash site and provided the military with satellite mapping of the area (see Figure 5). These are foreign policy and security issues where Nigeria's spacepower has been used on the continent and could be used more in and out of security functions.

Figure 4: Topographic Map of South-West Mali



Source: Defense News Nigeria (2020)

Figure 5: Image mapping and terrain analysis of the Nigerian Airforce Alpha Jet crash scene in the Dargol Area, Niger Republic.



Source: Defense News Nigeria (2020)

The second question about whether Nigeria's use of space technology for providing regional security is to counter a perceived threat or threats could be argued in two opposing ways. The first argument stems from the term "threat". A threat signifies fear or danger arising from an external force or party. Thus, a threat can be alternated with competition in this discussion. For example, the question can be rephrased as "Is Nigeria's use of space capabilities for security in Africa meant to compete with other powerful states with space capabilities?"

Participant ST10 does not see Nigeria using its space capabilities to compete. He says,

> *"[…] In terms of Nigeria's hegemony, Nigeria is not competing with any country in Africa. I don't see Africa as being competitive. As we are competing, we are also collaborating."* (ST10, Academic, 13/08/21).

Participant ST3 also shares the same opinion when he mentions that:

> *"We are in collaboration with South Africa. We are in collaboration with Kenya. We are in collaboration with Algeria, and we are in collaboration with Egypt. Those are the people that are doing space in Africa. We have what they call the African Leadership Conference (ALC). It was started by Nigeria and rotated among all these countries. So, it's a collaboration with all countries in Africa, and Africa also has an African Space Agency (AfSA), jointly started by Nigeria and others, and the headquarter is in Egypt."* (ST3, Space Engineer, 30/08/21)

Participants ST3 and ST10's extracts show that Nigeria's use of space capabilities for its regional activities is not intended to claim an advantage but rather to complement other states' space contributions. For instance, Nigeria was not the only country involved in the defensive intervention during the Mali crisis of 2012. The Nigerian military supervised the African-led International Support Mission to Mali (AFISMA) with the involvement of other non-African states, including the French military (Kwiatkowska, 2016). However, it is important to note that the French utilised Nigeria's remote sensing satellite on this mission due to the satellite's sophisticated capability (Defense News Nigeria, 2020). This emphasises Nigeria's spacepower, the potential impact on the continent, and international collaboration on security.

Nonetheless, participant ST3's comments about Nigeria's role in establishing ALC and AfSA align with the tenets of the structural power analysis. That is, Nigeria may appear not to be countering a perceived threat but might have indirectly pushed for the formation of the regional space agency and the leadership conference in order to control or shape the framework other states must operate within. Interestingly, as discussed in Chapter 2, Section 2.6, it was at an ALC meeting that Nigeria and other states advocated for the establishment of AfSA (Aganaba-Jeanty, 2013). Besides, Abuja contributes to regional space activities through a significant number of its space experts serving in the organisation and contributing to ALC engagements. On this basis, Nigeria's role and impact on member states could be enormous and contribute to the advancement of space on the continent. This does not only enhance security but also

knowledge, leading to production and economic benefits as well. Generally, since these structures determine the structural power of a state, Nigeria's activities are significantly enhancing its position and increasing its power in Africa.

Furthermore, Nigeria may not yet possess an adequate level of space capabilities to counter regional threats. Considering the number of satellites that Abuja owns and the lack of operational space infrastructure, such as satellite manufacturing and launching facilities (discussed in Section 4.5), it can be argued that the state's space-enhanced regional military operations may not be sufficient to counter any threats.

In view of the participants' opinions and discussions, it can be suggested that Nigeria's use of space technology for regional security functions is not to counter any threats, but rather the state is playing its part for the betterment of the region.

Conversely, Nigeria's use of space capabilities for regional security could be to counter a perceived threat or threats. This premise is based on the realists' view that states' actions in the international system are a means of securing themselves. For example, participant ST8, an associate professor of space law with 16 years' experience in academics, mentions that:

> *"The trend is just that it is getting cheaper to launch satellites and the satellites are getting smaller. You could launch more of them. So, there is more innovation around technological tools. But you still have the problem from a sovereignty standpoint and from a national security standpoint whereby if you don't have your own technological tools that are the instruments of power, but other people have them or are in control of them, then you are in a weaker position."* (ST8, Academic, 05/08/21)

This statement demonstrates that the possession of space capabilities could be a tool of power, whereby the inability to have the technology where other powerful regional counterparts do can have significant implications. In other words, Nigeria's spacepower in military operations in Africa can be a way to showcase the state's strength amidst its hegemonic contest with countries such as South Africa. This aligns with participant FP5's assertion in Section 4.2 that acquiring influence does not necessarily require using physical force but that when other regional powers are aware of the state's capabilities, it is enough to counter their potential

threats. Hence, we may assume that Nigeria may be intentional in the application of space capabilities to its security functions in Africa, while the state's action may also be interpreted as a form of "self-help" by other regional powers. To realists, self-help is a state's accumulation of power for the purpose of security and the realisation of its goals (Rathbun, 2008).

Consequently, there might be stringent implications in the military use of space technology in Africa. Participant ST10 voiced his concerns about the military use of space on the continent when he said:

> *"It [military dimension of space] may define so many things that we are not really taking seriously currently. The military dimension may change so many things, although I'm still optimistic that there will not be any serious complications that will lead to any unfriendly attitude among African space players. But the military dimension may change so many things, it may raise threat boundaries and cause many things; and with the growing militarisation of the space programme in some countries, there may be a reason to think through all those things." (ST10, Academic, 13/08/21)*

The issue highlighted by the participant shows that states with advanced space technology and space-enhanced military capabilities could have an advantage over other states, especially non-spacefaring countries. For example, Nigeria is the only West African state and one of the few spacefaring states with a substantial space programme and satellite capabilities in Africa. In addition, the state's recently launched military satellite adds to its spacepower potential. Algeria, Egypt, and South Africa are the other states with several launched satellites. Thus, Abuja may be leveraging its space capabilities to support its military operations in maintaining security in Africa to counter any rising threat to its hegemony. This is equally linked to the concept of spacepower.

Further, the issue highlighted by participant ST10 points back to Nigeria's foreign policy aims. As discussed in Chapter 2, Section 2.8, Abuja's foreign objectives include providing security and maintaining peace in Africa, as well as establishing security architectures that guarantee sustainable unity and development (Madobi, 2022). Thus, participant ST10's opinion raises the question of why and in what way is the Nigerian military utilising space capabilities in Africa.

This also relates to Strange's third question, "What are the costs and conditions demanded for this security?"

To provide a response to the question, it is vital to reiterate that Africa is the centrepiece of Nigeria's foreign policy (Okolo, 1988), while the maintenance of global peace and stability is part of Abuja's international goals as a middle power (Flemes, 2007). Thus, applying the space dimension to enhancing Nigerian military operations or other joint military actions in Africa aligns with its regional obligations. Consequently, we may assume that there are no direct costs demanded for Nigeria's military involvement in the provision of security on the continent since it is part of its foreign policy agenda. However, the overarching conditions for the provision of security might be the acknowledgement of Abuja's hegemony and space capabilities (spacepower) by other states and their reliance on Nigeria as a reliable security provider.

Conclusively, the potential implications of the military dimension of space, as highlighted by the participant, could be related to the issue of security regulations on the use of space technology. To avoid conflict, states must adhere to the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) laws on the peaceful use of space. Similarly, there should be clarity in the specific rules governing the use of space by the military on an inter-state level. For instance, states must be aware that encroaching on other states' airspace or terrain without due process or approval from relevant authorities may trigger international conflict and sanctions.

4.3 Power Structure 2 – Knowledge

Strange (1994, 2015) argues that a state could influence other states through its control over the four structures, in this case, the knowledge structure. Russell (1995) argues that among the quadruple structures of power, knowledge has a significant place in IPE, even though Strange suggests that it is mostly underestimated (Strange, 2015:131). Knowledge generates innovation and technology and precedes production, military strength, and economic success. The acquisition and distribution of knowledge can confer power on the possessor (Ibid). Thus, space knowledge and its applications can be a powerful asset that enables Nigeria to set the terms of engagement on the continent.

A key theme that emerges from the data collection suggests that Nigeria has an essential role to play in disseminating knowledge to other African states and helping them utilise the benefits of space applications. Examples of such quotes are presented as follows. Participant ST9 highlights the importance of Nigeria's knowledge and experience in space technology to Africa when he said:

> *"ECOWAS is trying to develop a satellite; I think they call it ECOSAT-1 and Nigeria is doing the initial studies on behalf of ECOWAS. So, for West Africa, we are at the forefront. We are helping technically while they are sourcing for the fund. At the larger African end, we are also very strong there. Nigeria was represented in the African Union (AU) space working group that developed the space policy and strategy. We are very much involved, and we assisted in developing that document. So, we have contributed to that. So, right now, of course, because of COVID, things are a bit low right now, but we give technical support, advice, and things like that."* (ST9, Academic, 07/07/21)

This quote shows the direct impact of Nigeria's space expertise on the sub-regional and regional space agendas. The knowledge and technical capabilities of Nigerian engineers are utilised on behalf of the state in ECOWAS (Economic Community of West African States) and the AU (African Union). As discussed in Chapter 2, Section 2.8.2, Nigeria is West Africa's most powerful state and has financed various ECOWAS projects (Saliu and Oshewolo, 2018). However, its contribution to the West African space project further demonstrates its prowess in the key sectors of the sub-region. As Strange (1994, 2015) suggests, the medium of communicating ideas, beliefs, and knowledge is significant to the knowledge structure. Hence, Nigeria's dissemination of knowledge through its space engineers represents a landmark achievement, as it plays a vital role in the sub-regional pioneering satellite system, which, by extension, accrues power to Abuja.

Further, Ravenhill (1998)'s creativity component, as explained in Chapter 1, Section 1.4.2, suggests that Nigeria, as a middle power, can adopt structural leadership to provide space knowledge in a specific way that dictates the conditions to other partners. Therefore, since Nigeria is the sole handler of ECOSAT-1, the satellite project could be regarded as an extension of NASRDA's capabilities. This means that the recipient ECOWAS states cannot benefit from the satellite without Nigeria's input—expertise and infrastructure. Through this, Nigeria would

be setting the pace and the extent to which other states can utilise the space satellite and its applications.

Generally, Nigeria's involvement in developing AU space policy and strategy could only be based on its space knowledge and capabilities. The growing number of national space programmes across the continent necessitates the need for a regional space policy through which established space states such as Nigeria could strengthen their grip on the region. Thus, as noted by participant ST9, Nigeria contributes to the advancement of the utilisation of space in Africa through technical and intellectual support. Nolte (2010:893) argues that a regional power exhibits "ideological resources for regional power projection". Thus, it could be stated that Nigeria's role in the African space plan is part of its regional hegemonic gestures. Further, as a middle power, Abuja's contribution to Africa's space policy and strategy could be seen as part of its diplomatic duties, allowing it to share ideas and show off its knowledge capacity (Ravenhill, 1998).

Nigeria also uses its space satellite and international collaboration on space applications to impart knowledge to its African counterparts. Participant ST7, who is a space engineer at the Nigerian Telecommunications Satellite Limited (NIGCOMSAT), states that:

> *"Cameroon is actually demonstrating and even organised SBAS [Satellite-based Augmentation System] events to get people to preach to stakeholders there what SBAS can do. The same thing we [Nigerian engineers] did in Congo, the same thing we did in Togo. This we didn't do alone. It is in conjunction with ASECNA, it is in conjunction with Thales Space Alenia, it is in conjunction with the French space agency, it is in conjunction with the European Space Agency (ESA), that actually facilitated the funding, which is invariably the extension of EGNOS, the European geostationary navigation overlay service to Africa, but utilising NIGCOMSAT-1R because we do not have the infrastructure of our own. We are just trying to, like, see how far we could go with the demonstration that has happened."* (ST7, Space Engineer, 05/09/2021)

This extract shows the impact of Nigeria's space-enhanced projects and capabilities on its regional influence. Bowen (2020) argues that states and other actors extend their power in space, acquire power from it, and may attempt to restrict others from the advantages. Hence,

participant ST7's opinion indicates Nigeria's leadership in space knowledge and its applications in Africa. The SBAS is a project funded by several European space agencies in conjunction with NIGCOMSAT. Despite Nigeria's limited space infrastructure, the international support it receives enables the state to expand its reach and capabilities in space knowledge to other African states, such as Cameroon, the Republic of the Congo, and Togo. For example, the participant mentions that Cameroon organised SBAS events to demonstrate the importance of the application to stakeholders in the country. This capability and the event organised were made possible through Nigeria's impartation of knowledge to its Cameroonian counterparts. On the basis of the knowledge structure, the communication of knowledge conferred power on Nigeria and partially on Cameroon. As Strange (1994, 2015) claims, power is voluntarily granted based on a common set of beliefs and is simply preserved if the institutor can protect it from the danger of competition. In order to keep its power in the knowledge structure, Abuja could decide to limit the amount of information it makes available to the recipient states.

In 2020, NIGCOMSAT teamed up with the Agency for Aerial Navigation Safety in Africa and Madagascar (ASECNA), Thales Alena, Space and Geoflex in a joint venture (JV) to develop the SBAS signal over Africa and the Indian Ocean (Thales Alenia Space, 2021). The partnership involves the SBAS payload on the NIGCOMSAT-1R satellite broadcasting the signal with an uplink station positioned in Nigeria (Ibid). The role of Abuja's satellite and the hosting of an uplink station, including the contribution of indigenous expertise, reiterate its control of the knowledge structure among the recipient states. This is reminiscent of Nigeria's spacepower, as it uses its space capabilities to influence other states' decisions and national events.

The SBAS services will improve flight safety and efficiency, as well as boost safety-related applications in Africa. It will also benefit the economy through mass-market applications that support user safety and sustainable development (PM News, 2020). Further, the satellite service backs up applications in several sectors, such as precision agriculture, sea and land transport, railway safety, drone navigation, and surveying and mapping (Thales Alenia Space, 2021). Since the SBAS connects virtually all sectors, the crucial role of Abuja in this project connects to Strange's assertion on structural power. That is, SBAS creates an avenue through which Nigeria dictates the operations of other states and their key sectors. To this end, as revealed by participant ST7, Nigeria and its partners have carried out flight demonstrations in Lomé

International Airport in Togo, Brazzaville in the Republic of the Congo, and Douala in Cameroon to ensure the SBAS services' accuracy and readiness to commence full operations in 2024 (Iderawumi, 2021). It is important to note that the EU funded the preliminary stage of the project and awarded Thales Alenia Space, which had a JV agreement of 67%, and Leonardo 33% (Ibid).

The EU's collaboration with Nigeria's space project involving other African states suggests that Nigeria is not only playing the role of an African space patron but also still depends on advanced space states and firms for the development of its space capabilities. This is because, as participant ST7 mentions, Nigeria lacks the essential space infrastructure to individually execute the SBAS project. Hence, the state must build its space infrastructure if it intends to comprehensively use its spacepower to enhance its regional influence. The next section discusses the production structure and addresses the need for an operational space infrastructure in Nigeria.

Generally, Nigeria's role in the SBAS project aligns with the concepts of structural power and spacepower. This is because Abuja's foreign policy focuses on its influence in Africa (Oshewolo, 2019a), and since the state partners with foreign space organisations, its goal may be to set the agenda for other African states in space technology. For instance, space knowledge is crucial to innovation in space applications. Hence, the acquisition of knowledge by Nigerian engineers through collaboration with other counterparts to develop the SBAS will not only improve space applications but also confer power on Nigeria in the knowledge structure. That is, possession of information, including the production and operation of SBAS, places Abuja in a leadership and advantageous position within Africa. The evidence of this is the regular visits of Nigerian engineers to participating African states for demonstrations and training purposes. This connects back to a part of Nigeria's agenda for investing in space technology, which is to strengthen its influence on the continent of Africa. This is spacepower.

4.4 Power Structure 3 – Production

The production structure is what generates wealth in society because it is "the sum of all the arrangement determining what is produced, by whom and for whom, by what method and on what terms." (Strange, 2015:70). This structure is dependent on the people at work and the

wealth they create by working. However, those who control the medium of production and distribution of goods and services determine 'what and how' wealth is produced, as well as the terms which enables wealth production and distribution (Ibid).

Space infrastructure includes space-based activities and groundwork that support the utilisation of space technology. The designing, assembling, manufacturing, testing facilities, R&D, launching of spacecraft, and ground stations are part of the space infrastructure that makes up an operational space industry (De Concini and Toth, 2019). Since the space sector and space infrastructure are essentially underpinned by technology, participant FP5 sees technology and knowledge as the bedrock for Nigeria's sustainable future. He said:

> *"Technology and knowledge are what is ruling the world. You don't even have to have resources. I tell my friends, I said, 'all the crude oil you are talking about, give it 20 years, nobody will be talking about it, people are talking about electric cars. In 20 years, your crude oil, your gas will be useless'. So, we don't have a government that is forward-looking, that is planning ahead and that is saying, 'Oh! Suppose our markets for crude oil is diminished, what else can we tap'. No, nobody is saying things like that."* (FP5, Academic/Ambassador, 20/02/21)

This extract pinpoints the advantage of technology and knowledge over resources. As discussed in Chapter 3, Nigeria can gain more than just a reliance on crude oil if it invests more in technology and knowledge, leading to increased production. Technology can widen the scope for more sources of national revenue and equally serve as a means of extending Nigeria's influence on the continent. Participant FP5 further gave an example of when cars will run, potentially on electricity rather than fuel, to show that Nigeria's dependence on material resources (crude oil) could become insignificant and thus affect its regional influence. Indeed, the top global car manufacturers are prioritising the production of electric cars over fuel-consuming automobiles (Rowlatt, 2021). Hence, the participant's opinion strengthens the argument for utilising space technology as a backbone for Nigeria's regional influence.

Furthermore, the participant's opinion about technology and knowledge aligns with the Nigerian space agenda and knowledge and production structures. Technological changes are crucial to the knowledge structure because they develop from knowledge and help in generating new knowledge (Russell, 1995), including enhancing production. Moreover, if technology is

the application of scientific knowledge, then technology, in this context, is the space infrastructure needed for applying space-derived knowledge to, for example, producing and launching satellites. Knowledge, on the other hand, is the set of skills acquired by Nigerian engineers from the processes of satellite manufacturing (production) and launching, among other non-material activities. We can, therefore, assume that technological infrastructure is essential to the utilisation of space knowledge leading to production in Nigeria.

Concisely, technological infrastructure is the space ground facilities needed for the production and launching of satellites and rockets into space. According to Strange (1994, 2015), the production structure produces affluence in society because it is the total arrangement that determines the product produced, by whom, and for whom, including the procedure and conditions for production. This implies that Nigeria can acquire wealth and power through its space infrastructure by manufacturing indigenous satellites and space-enhanced products, as well as for other states in Africa. However, Abuja lacks the infrastructural capacity to indigenously build its satellites and launch them into space from the country.

Several participants stress the importance of having space infrastructure for the benefit of the state. Participant ST13, a space technician with 15 years of experience with NASRDA, mentions that:

> *"We talk about capacity building, but the infrastructure development is lacking behind. Human capacity building, fine, we are not doing too badly in that regard. But where the people will use the knowledge they have and translate it into tangible sub-component of satellites, build sensors that could go on missions and things like that, we don't have them. We don't have that facility. These are the challenges; these are the areas of capacity building that we are lagging behind.*
>
> *"Now, look at this, the number one infrastructure that a space agency should have, is the Assembly, Integration, Design and Testing Centre (AIDTC). That is where all the human capacity that you have built over time, that is where they experiment and they create and you know their ingenuity, then come up with one thing or the other."* (ST13, Space Technician, 08/12/21)

This extract suggests that Nigeria's priority should be the development of space infrastructure rather than human capacity building. As discussed in Chapter 2, Section 2.2, NASRDA has hugely invested in human capacity building to the extent that Nigerian space experts are many and are left with no space laboratories to utilise their knowledge. Hence, the participant believes that Nigeria is making progress in human capacity building but requires space infrastructure to maximise the potential embedded in the trained staff and the organisation. In other words, the space ground structures would complement the human potential of the country's space industry. For example, the AITC can be utilised by trained scientists and engineers to translate space knowledge into reality. Indeed, the space experts can design and construct satellites and sensors at the facility as part of the national space strategy. Basic and advanced or customised spinoffs can also be produced for the benefit of the state and thereby extended to the continent. An example of such a spinoff is the smart shoes designed by NASRDA for security and military use, as discussed in Chapter 3. Thus, having an operational production infrastructure will enormously contribute to national security.

Participant ST10, while acknowledging the impact of human capacity building, expresses similar sentiments when he comments:

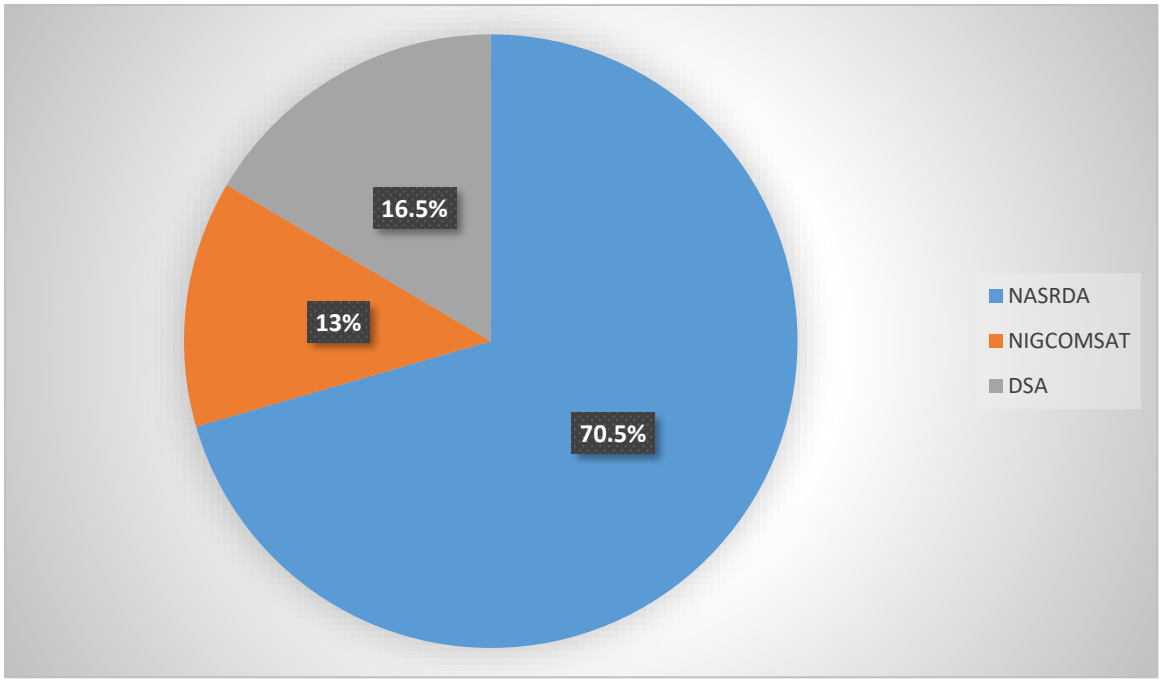
> *"Nigeria does not have the capacity to provide a satellite of its own currently. Although the country has trained a number of engineers but that does not mean that the country has its capacity in terms of facilities. The Nigerian AITC is yet to be completed; that's the assembling, integration, and testing facility. It is yet to be completed. So, we still need the collaboration of all those countries to develop satellites. Collaborating with Surrey Satellite Technologies Limited (SSTL) in the UK and China is still one of the ways that the country can develop a satellite. Although putting things together to complete the AITC should be the priority to reduce the dependence of Nigeria."* (ST10, Academic, 13/08/21)

This extract buttresses the value of possessing Nigerian space infrastructure for satellite manufacturing and for the benefit of space engineers to utilise their knowledge. The absence of the infrastructure means that Nigeria would continue to depend on other state-owned space firms, such as the CGWIC or the privately run SSTL in the UK, for the production and launch of satellites. As discussed in the next chapter, a significant implication of Nigeria's dependence on other space firms is the lack of free or adequate access to space knowledge. This is as a

result of playing by the rules set by the principal, who sets the agenda. Therefore, the participant's viewpoint suggests that Nigeria should concentrate on completing its AITC and spaceport to reduce its reliance on foreign space firms.

The Nigerian AITC and spaceport are currently under construction, but the level at which the projects are progressing is not publicly noticed. This is due to the lack of clear information and available reports on the state of the projects. Roberts (2019) argues that several space stations were originally built while their exact locations were concealed due to the diplomatic risk associated with developing missiles and conducting space launch testing. This implies that information concerning Nigeria's space infrastructure may have been deliberately concealed for diplomatic and security purposes. What is evident, however, is that there are annual allocations by Abuja for the development of space infrastructure in the country, even though there are claims that the funds are inadequate (Chiedozie, 2019).

Figure 6: 2023 Budgetary allocation for the Nigerian space sector.



Source: Budget Office of the Federation (2023)

In 2022, the total budget for Nigeria's space programme was N35.7 billion ($86.8 million) (Oneyibo, 2022). This is similar to the 2023 budget of N37.7 billion ($81.6 million), with NASRDA receiving 70.5 per cent of the allocation, the Defence Space Administration (DSA), 16.5 per cent, and Nigerian Communications Satellite Limited (NIGCOMSAT), 13 per cent

(Budget Office of the Federation, 2023) (see figure 6). To put this in context, given the global trend where space actors invest huge capital in space infrastructure and exploration, Abuja's space budget might be deemed minimal. For instance, the cost of constructing Spaceport America in New Mexico was $220 million (Burrington, 2018), and when added to the state investment in Virginia and California spaceports, it will total $455 million (Space Foundation, 2019). Similarly, the Sutherland Spaceport project in Scotland was estimated at £17.3 million ($21.2 million) (Orbital Today, 2021), while the Prestwick Spaceport, also in Scotland, had a budget of £80 million ($98 million), which includes a government donation of £32 million ($39.1 million) (UK Government, no date). It is noteworthy that these spaceports differ in size and purpose. However, the valuations provide a general idea of the cost of building a standard spaceport.

For Nigeria, the 2023 national budget shows a contribution of approximately N224 million ($485,671) to the construction of the AITC and launch site (see Tables 4 and 5). It is noteworthy that Abuja allocated N428 million ($930,000) for these similar projects in the 2022 budget. The reason for the high figures in the 2022 allocation could be because the projects were newly initiated that year and thus required huge capital. However, the projects have "ongoing" as their status in the latest budget, thereby evidencing the reduction in the budget. Nevertheless, Nigeria's space infrastructure spending can be argued to be low compared to other top states. As the space infrastructure would contribute to Nigeria's spacepower, Hays and Lutes (2007) suggest that an actor's financial competence is crucial to its spacepower. Hence, if Abuja is to complete its spaceport on time, accomplish its space plan by 2030, and, by extension, enhance its spacepower, adequate and timely funding must be secured.

Table 4: 2023 Budget allocations for Epe space launch site.

No.	Name of Project	Status	Total Allocation
1	Rocket system guidance navigation & control (GNC) and firmware development for launch system	Ongoing	N3,500,000
2	Launch site and rocket IT/DC development	Ongoing	N7,193,829
3	Research and development of tactical aerial object launch system	Ongoing	N4,250,000
4	Mission operation mobile ground station, launch and monitoring and recovery system	Ongoing	N120,005,000
5	Ground control facilities development	New	N1,530
		TOTAL	N134,950,359 ($292,332)

Source: Budget Office of the Federation (2023)

Table 5: 2023 Budgetary allocations for the AITC project

No.	Name of Project	Status	Total Allocation
1	Laboratories equipment and machines - heavy equipment needed for manufacture, assembly, integration and test and placement in clean room facility, other needed accessories, and consumables	Ongoing	N10,000
2	Development of spacecraft stability platform and design, fabrication of a deployable solar array structured panel and adaptive robotics for space	Ongoing	N17,235,640
3	Design of an extended ground station for testing engineering model spacecraft and upgrade of ICT infrastructure	Ongoing	N47,006,292
4	Research Laboratory Complex at NASRDA Headquarters	Ongoing	N25,000,000
		TOTAL	N89,251,932 ($193,339)

Source: Budget Office of the Federation (2023)

Furthermore, participant ST11, a professor and director at the Centre for Space Research and Applications (CESRA) with 31 years of experience in space policy implementation, said:

> *"Nigeria is yet to develop a launching facility; we don't even have a clear route facility to even build our own satellite even up till now. […] If you go there [NASRDA], they will tell you they have trained about 100 PhDs, over 150 MScs, and so on. But I am yet to see the impact of those who are trained. They are not receiving facilities, no infrastructure, nothing! If you train people, you expect them to go back home to have clean room laboratories to work and then to be able to put those things into practice, but they are handicapped. I don't blame them; I blame the Nigerian government that is not ready to put money there again. […] You don't just develop knowledge or think of development without utilising them.* (ST11, Academic and Space Director, 10/08/21)

This excerpt confirms participants ST10 and ST13's opinions on the importance of having a space satellite manufacturing facility (AITC) and a launching site (spaceport) in Nigeria. Without these infrastructures, the participant sees Nigeria not effectively utilising the knowledge gained through its investment in human capacity building. This is because NASRDA's trained staff and engineers lack the essential facilities they require to put what they have learned from their international collaborators into practise. Fitting this into the tenets of the production structure, NASRDA's engineers and the wealth they will create through their operations is crucial. Hence, the construction of space infrastructure cannot be trivialised. If Nigeria is to utilise its space capabilities to strengthen its regional influence, it must have adequate and functional space infrastructure that can be utilised by space experts. In other words, the absence of the AITC laboratories and spaceport will affect the production structure and, by extension, the knowledge structure, thus weakening Nigeria's spacepower.

Additionally, participant ST11's quote highlights the need for government support in developing space ground infrastructure (SGI) in Nigeria. As seen in Tables 4 and 5, there is a necessity for Abuja to increase funding for the swift completion of the space infrastructure. This would contribute to the utilisation of space production and the acquisition of knowledge in Nigeria. This is examined further in the finance structure in Section 4.5. However, the discussion of finances as well as knowledge within the production structure shows how the four structures are interwoven, as stated by Strange (1994, 2015), and that each of the structures interrelates with and influences the others.

This section established the need for space infrastructure in Nigeria. Participants suggest that the space facilities would be essential for utilising space knowledge and manufacturing space-enhanced products such as satellites and spinoffs, including launching satellites in Nigeria. Indeed, the space facilities are crucial to Nigeria's spacepower and its potential contribution to its influence in Africa. Thus, the following section will examine the significance of the AITC and the spaceport for Nigeria's external influence.

4.4.1 Production: Developing Nigeria's Space Infrastructure and the Impact on the State's External Influence.

In the previous section, the participants reported that space infrastructure is essential to the

Nigerian space agenda, especially for the purpose of utilising space knowledge and translating it into practice. The participants' opinions mean that Nigeria must accelerate the completion of its SGI. Nigeria's SGI is the AITC and the spaceport, which would be of enormous benefit to Abuja's spacepower and its regional influence.

Participant ST2, the spokesperson for NASRDA for over 16 years, acknowledges the significance of the national space infrastructure and its impact on Nigeria's regional hegemony. In his statement, he said:

> *"Our engineers will be able to swing into action and replicate what they have done in the United Kingdom [built satellite] here in Nigeria. […] I can tell you that it [AITC] is going to serve as radical, as a catalyst for radical development in our great nation and it will strategically position Nigeria as a leading nation in Africa.*
>
> *We want the situation whereby even countries like America [USA] will come to Nigeria to launch. Don't forget that we are close to the equator, so it is easier for us to even launch satellites here than going to a country like Russia or the United States of America […]. So as far as we are concerned, we believe that by the time we finish our assembly, integration, and testing centre, a lot of advanced countries, a lot of corporate organisations or private organisations in advanced world will come to Nigeria to launch their satellites and that is exactly what we are looking forward to."* (ST2, Space Spokesperson, 12/08/21)

This quote reiterates the importance of the AITC and the launching facility to Nigeria's spacepower, space agenda, and international influence. The participants believe that the space infrastructure would revolutionise the space industry in Nigeria and enhance the state's foreign relations. In line with the structure of power theory, the space infrastructure is a major capability pertinent for an aspiring space state to thrive and set the agenda for other states and organisations to follow. On this basis, there are two potential implications for operating the AITC in Nigeria. The first is an extension of participants ST10, ST11, and ST13's viewpoints that space experts can use the facility for production and developmental purposes as well as for training upcoming engineers. The second implication is that training and development would lead to the retention of knowledge, which could be conservatively shared by Nigeria with other

African states as part of its hegemonic strategy. This connects to the knowledge structure, wherein the experience gained from operating the AITC, including the resultant production (resources), would represent a significant capability by which Nigeria could become a space hub for other states, leading to the acquisition of structural power. With this capability, participant ST2 believes that Nigeria would experience enormous development, thus making the state a leader in Africa.

The other aspect of participant ST2's opinion focuses on what Nigeria can gain internationally when the infrastructure becomes operational. It is important to clarify that the Assembly, Integration, and Testing Centre (AITC) is neither the same as the spaceport nor on the same site. The AITC is where satellites are designed, manufactured, and developed to flight standards. The spaceport, on the other hand, is the site built for launching or receiving spacecraft. Thus, with these space infrastructures, the participant believes that Nigeria would attract states like the US and other space organisations to utilise its space launch facility once both infrastructures are completed, especially because Nigeria is closer to the equator. This space infrastructure could indeed be a key factor in strengthening the national space sector and Nigeria's regional influence. The following section examines the current state of Nigeria's space infrastructure and its potential.

4.4.2 The Nigerian AITC

The establishment of the AITC is provided for in the National Space Policy (NSP). Section 1.2 (b) of the NSP states that *"For the attainment of space capabilities, Nigeria's efforts should focus on research and rigorous education, engineering development, design and manufacture, particularly in the areas of instrumentation, rocketry and small satellites as well as in satellite data acquisition, processing, analysis and management and related software;"* (National Space Policy, 2001:34). This quote reveals that the AITC is a priority for Nigeria in its quest to develop its space capabilities and spacepower. Indeed, the AITC is an essential ground infrastructure of the upstream space segment because it is the workshop for the designing and manufacturing of satellites (Chiedozie, 2019). The centre will serve as a facility for actualising the tacit knowledge of Nigerian space engineers, thus playing a significant role in the state's spacepower and foreign influence.

However, as discussed in Section 4.4, Nigeria's AITC is yet to be completed due to limited available funds. This resonates with participant ST11's opinion in the same section (Section 4.4), where he said, "*I don't blame them; I blame the Nigerian government that is not ready to put money there again."* (ST11, Academic and Space Director, 10/08/21). This statement suggests that the government is not doing enough to provide adequate funding for the actualisation of the space infrastructure in Nigeria. Thus, the government must prioritise the funding of the project and seek ways to provide the required assistance if Nigeria is to reap the benefits of space technology and its capabilities. More so, as argued in this research, the infrastructure is crucial to Nigeria's spacepower and structural power agenda in Africa.

Similarly, but on a separate note, participant FP4 draws attention to the importance of providing the necessary materials required in the production segment of the space industry. He states that:

> *"You cannot have an effective space development programme if you are not sure of the sources of your input. […] The institutions are supposed to service the space industry and the iron and steel industry; the various components that are to be used for the launch, both at the ground level and for several things that will be done. I know that the spacecraft or the satellite is supposed to be very light, even aluminium is light and strong, and that is why aluminium is used for the body of aircraft. […] So, the space industry itself needs to be serviced by other industries, including the iron and steel industry.*
>
> *[…] our iron and steel industry is still comatose after so many years from the 1960s to the present. So, what Nigeria still does is to import steel products, which is not good because if Nigeria were to be in a war, you cannot rely on imports from above to service your machinery, your armoured cars, your aircraft."* (FP4, Academic, 23/11/2021).

This quote can be understood in two ways: first, the AITC cannot function without a sustainable supply of the raw materials needed to produce satellites, rockets, and other space devices. As mentioned by the participant, aluminium is crucial to building space gadgets such as spacecraft, engines, and other components (The Aluminum Association, 2022). This is because the design of spacecraft involves using light and durable materials that are operable in a space setting (Shulman, 2017). Thus, NASRDA must work in synergy with the iron and steel sector in

Nigeria to ensure the provision of the necessary equipment. This leads to the other aspect of the participant's opinion.

The second part of the quotation relates to the issues encountered in the Nigerian iron and steel industry. Having spent an estimated $8 billion on its national steel company in Ajaokuta, Nigeria still imports iron, steel, and other metals (Clement, 2018). This is due to the breakdown in the operation of the Ajaokuta steel company. Anudu (2022) states that Nigeria spent N837.761 billion ($2 billion) in the third and fourth quarters of 2021 on the importation of iron, steel, and metals. The basic metal products were estimated at N748.529 billion ($1.8 billion), while the worth of iron and steel was N88.232 billion ($209 million) within the two quarters (Ibid).

Considering the importance of iron and steel to not only the space sector but also the military and air industries in Nigeria, as mentioned by the participant, Abuja must find a solution to the problems at Ajaokuta. In other words, the iron and steel industry should be fully operational for the sustainable production of space equipment in Nigeria, as this will guarantee the supply of the required tools to produce satellites, spacecraft, and other related appliances at AITC, including at the spaceport.

On the other hand, most of Nigeria's iron and steel imports are from China, with the 2021 importations valued at N283.146 billion (US$672.8 million) (Yahaya, 2022). Invariably, we may assume that, apart from the direct space agreement between Beijing and Abuja, China will also be contributing to the development of the space sector in Nigeria through the provision of iron and steel. See further discussion on the Nigerian and Chinese space relations in Chapter 5.

4.4.3 The Nigerian Spaceport

Space launches are a crucial segment of space technology and the space industry. Satellites are launched into space to perform their core functions, such as military, communications, and meteorological purposes. Rockets are the primary mode of transportation for all space satellites and applications. According to Chakrabarti (2021), 7,941 satellites are in Earth orbit, with approximately 1,300 satellites launched from 114 rocket missions in 2020. However, there

were no space rockets or satellites launched on African soil during this time or in recent decades. This is due to the lack of sufficiently developed launch capacities on the continent. Therefore, India, China, Kazakhstan, Russia, the US, and French Guiana's orbital pads have been the launching sites for African states (Oyewole, 2017).

Nevertheless, as discussed in Chapter 2, Section 2.3.1, Nigeria aims to run a spaceport with the capacity to launch several satellites into Geosynchronous Equatorial Orbit (GEO), Low Earth Orbit (LEO), and interplanetary space by 2030 (Space in Africa, 2019c). This aspiration was declared in the NSP and the 25-year space roadmap (2005-2030). Section 1.3.5 of the NSP states that, *"It has become imperative and expedient for Nigeria to take the initiative in this part of the world being the largest country in Africa and its Diaspora to develop and acquire Rocket Technological capability."* (National Space Policy, 2001:48).

The use of the phrases "this part of the world" and "being the largest country in Africa and its Diaspora" demonstrates Abuja's recognition of its role in the region and the awareness of the significance of having the space infrastructure within the territory. To actualise this, Nigeria's space roadmap includes the quest to develop rocketry and propulsion systems by 2025 and launch indigenous satellites from Nigeria's spaceport through its launch vehicles by 2030 (Chizea, 2017). As discussed in Chapter 2, section 2.2, the CSTP was assigned to implement the development of rocketry and propulsion systems, the launch vehicles, and all aspects of associated technology required for Nigeria's space programme. The centre is located in Lagos and has developed the technology that is essential for manufacturing rocket components, rocket propulsion fuels, and high-tech capabilities, as well as the launching platforms for the use of civil and military applications (MacLeish *et al.*, 2015).

However, as highlighted in Section 4.4, the CSTP project has slowed due to limited funding despite the government's annual allocation to NASRDA (Oludimu, 2018). Fashade (2008) argues that establishing and operating CSTP is capital intensive and requires enormous financial investment for sustainability. In view of Strange's finance structure, money is essential for the provision of infrastructure (Strange, 1994, 2015). Hence, to reiterate, the comprehensive attainment of Nigeria's spaceport project would be dependent on the provision of financial capital.

Essentially, the spaceport presents a great prospect for Nigeria's spacepower and strengthens its regional hegemony. Through the lens of realists, Nigeria's spaceport and its location, as well as the AITC, are material capabilities that could be utilised, while they can also be used as a means of structural power. Indeed, the potential of this infrastructural capacity could provide

an opportunity for Abuja to gain power, prestige, and profits. The 2019 African Space Industry Report estimates 40% growth in the continent's space sector by 2024, increasing the yearly worth from $7 billion to $10 billion (Space in Africa, 2019a). This growth is projected to result from the increasing number of states launching their space programmes and satellites to improve their national economies and citizens' livelihoods. Hence, Nigeria can leverage the potential turnover and prestige by completing and operating its spaceport. Indeed, commercial launch capabilities represent a state's or a company's ability to provide further flexible services for penetrating into space and earn income by providing space transportation for less capable space actors with no independent ways of accessing space (Bowen, 2020).

There are currently seven spaceports in Africa, but none of them are fully operational. The host states are the Democratic Republic of the Congo, Kenya, Libya, Mauritania, the Republic of the Congo, and South Africa, including the first spaceport established in 1947 at Hammaguir, Algeria. According to Space in Africa (2020), these sites launched 278 rockets with many failed attempts between 1947 and 1990. The history and the lack of active African spaceports strengthen the need for Nigeria to complete its space station in order to generate consistent revenue and structural power. This will also boost the West African state's spacepower, as other states will patronise the service. Thus, Abuja can use its infrastructure to influence their behaviour. It is noteworthy, however, that Egypt is currently developing a magnificent space project that includes a modern launch site. Kenya is also considering leveraging its close proximity to the equator to construct its own space station (Varada, 2022). It could be argued that the states' aspirations are borne out of the desire to be the first state to build Africa's first modern and functional spaceport (Ibid). Thus, this potentially constitutes a space rivalry in Africa.

Nongo, Ikpaya and Ikpaya (2021:37) argue that "spaceports represent critical infrastructure that create the basis for advancing space competitiveness, economic growth and technological development." They further claim that an African spaceport will facilitate the integration of space technology into the commercial, political, and socio-economic growth of the continent (Ibid). Aside from the general benefits that space competition has for states and the space industry, this indicates the influence that an African state with a space infrastructure can acquire through its contribution to the continent while also impacting its own state.

For Nigeria, the spaceport would further contribute to national development, which includes national security and the prosperity of the economy, as discussed in Chapter 3. The space station will enhance the direct use of space capabilities and research for the benefit of Nigeria

and, by extension, the region of Africa and the globe. Through these provisions, Nigeria will become a spacepower as its diplomatic influence on the continent is strengthened. Further, Nigeria will join the global ranks of states with space launch facilities, thus increasing competition among them and providing alternatives to African and non-African states with space ambitions to launch satellites into orbit.

To align this discourse with the IPE structural power strand of the theoretical framework, as Strange (1994, 2015) asks in the knowledge structure, *"Cui bono?"*, which translates to "who benefits?" It is vital to ask who benefits from this advanced technology. In clear terms, what is the significance of the spaceport for Nigeria's regional hegemony?

To provide a response to this question, as previously discussed in this chapter, the implementation of a national spaceport would reduce the cost of launching subsequent Nigerian satellites. Likewise, the Nigerian spaceport would serve as a means for spacepower and structural power for the country since it operates what other states require to run their space programmes, for example, the need to launch satellites or rockets into space. Nevertheless, it is noteworthy that an aspiring spaceport operation requires acquiring information through market research (Innes, Curley and Baker, 2019). This would give accurate data about the target market while providing clarity regarding future benefits (Ibid). For instance, such research can identify Angola, Ethiopia, and Ghana as Nigeria's potential partners due to their proximity to each other.

This draws attention to the space race in Africa, which was earlier highlighted in this section. As mentioned, there are currently seven non-operational spaceports on the continent, with Kenya and South Africa playing host to two of them. This indicates that Kenya and South Africa have had the long-term ambition of operating functional launch sites, even as Nairobi is contemplating the possibility of building a new spaceport. These developments, including Egypt's quest to construct a satellite manufacturing and launching capacity, are worth taking note of by Nigeria. This is especially necessary as the World Economic Forum's (WEF) 2022 Global Risks Report ranked only South Africa and Egypt among the emerging space-faring powers due to the potential influence they would derive from their investment in space infrastructure (WEF, 2022:72).

The lack of recognition by WEF could be associated with the inadequate funding and scarcity of information on the level of progress made in the development of Nigeria's space infrastructure, as discussed in section 4.4. Nevertheless, Nigeria's rival, South Africa, has recently been

involved in several space projects. For example, in 2022, Johannesburg launched a constellation of three satellites (MDASat-Marine Domain Awareness) from Cape Canaveral, US (Onyango, 2022). Similarly, South Africa and Australia host the world's biggest radio telescope project (SKA-Square Kilometre Array). The SKA project is an intergovernmental mission involving South Africa, Australia, and China, among other states. When completed, the SKA will have one million square metres of collection area, augmenting data flow at a speed of 100,000 times greater than the current international average broadband velocity (SKAO, 2022).

For its part, Egypt's proposed space city is being built to advance space research that will build and transfer space science and technology to Egyptians for the manufacturing and launching of satellites (Asunloye, 2022). The infrastructure will also serve as a space tourist centre and the African Space Agency (AfSA) headquarters (Ibid). However, the project will only become publicly accessible by 2026 and operational at maximum capacity by 2030 (Gabr, 2022).

These events clearly suggest that Nigeria is not the only African state making advances in the space sector. In fact, it appears that South Africa and Egypt are far ahead, even though Johannesburg does not currently prioritise operating a vast space launch site. Hence, Abuja might be wasting a huge sum of money and resources if its space infrastructure plans are not realised on time. That is, for example, if South Africa or Egypt acquire these capabilities ahead of Nigeria, they could gain spacepower and structural power. Nevertheless, it is vital to point out that what confers structural power on an actor is not mainly the acquisition of infrastructure but the ability to leverage the infrastructure to control the four structures—security, knowledge, production, and finance. Similarly, the acquisition of space capabilities does not automatically confer spacepower on an actor unless the capabilities are structurally controlled (Peter, 2010), which is what this chapter postulates.

Thus, part of what could contribute to acquiring structural power and spacepower through the spaceport is the proximity of the infrastructure to the equator. Roberts (2019) suggests the nearness to the equator, the ability to launch eastbound or near-eastbound, and advantageous environmental factors as part of the geographic characteristics that a ground-based space station should have. In other words, developing a spaceport involves taking into consideration the site's proximity to the equator, among other things. Indeed, most launches are done in equatorial zones due to the weaker gravitational pull and thrust of the rotating Earth in that region, making it ideal for launching into the geostationary transfer orbit (Zijlma, 2019).

Similarly, the land at the equator moves at 1670 km per hour, implying that any spacecraft launched in this region moves practically 500 km per hour faster than in non-equatorial areas, thereby using less rocket fuel (National Geographic, 2023).

Furthermore, Hertzfeld and Peter (2007) argue that spaceports are mostly situated in coastal areas to reduce potential damage to humans and property from a launch disaster. This means that spaceports are traditionally or deliberately installed where there are limited populations, activities, and infrastructure. These considerations perhaps explain why NASA launches its spacecraft from Cape Canaveral, Florida, near the beach and at 28 degrees latitude over the equator (Rowan, 2020). The ESA's spaceport is also in Kourou, French Guiana, located approximately 500 km north of the equator, at a latitude of 5 degrees (European Space Agency, no date a).

On a slightly different but important note, Hertzfeld and Peter (2007) further suggest that a suitable spaceport must have facilities that make it convenient to transport payloads from their location to the launch site. The site must also have equipment for regular testing of payloads, such as integrating the payloads with the vehicle and checking for mechanical and weather anomalies before being launched (Ibid).

In Africa, the equator runs approximately 2,500 miles (4,020 kilometres) (Zijlma, 2019). With the equatorial plane practically dividing the continent equally, Africa could be considered a good location for spaceports. Likewise, the continent possesses the following requirements to make it a suitable region for rocket launching: proximity to the equator; local weather conditions; flight paths; population density; target orbit; seaports; airports (Nongo, Ikpaya and Ikpaya, 2021:47). Given these criteria, the Nigerian CSTP rocketry and propulsion site is capable of being a substantial space infrastructure, thus contributing to its spacepower.

As discussed in Chapter 2, Section 2.3.1, the CSTP is situated in Lagos, close to the Epe engineering campus of Lagos State University. This is to support R&D in the space propulsion system and transport vehicles. However, it is worthy of note that the launch site is a non-residential vast area with no social activities (Oludimu, 2018). Broadly, Epe town is located on the north bank of the Lagos Lagoon, 718 kilometres (446 miles) from the equator. Thus, the location would be strategically advantageous for satellite and rocket launches. The launch site must also take into consideration Hertzfeld and Peter's (2007) significant factors for an appropriate spaceport. That is, Nigeria must possess the essential gadgets and see to the convenience of the space clients while ensuring that professional protocols are followed in the

process leading to the launching of space rockets and satellites. These provisions will enable the engineers to perform their functions to a credible standard that lures international clients.

On the other hand, taking a cue from the case of ESA (European Space Agency), which launches its space satellites and rockets faraway in French Guiana, in the long run, Nigeria may consider setting up a spaceport on a remote landmass in the Atlantic closer to the equator. This would be aided by Abuja's spacepower and require the capacity to accommodate extensive and full-sized space launch projects. However, it is vital to note that this idea would involve a concrete bilateral agreement between Nigeria and the host state.

In summary, it is generally expected that the spaceport would have enormous benefits for Nigeria. The most obvious benefits would be additional foreign collaboration and direct investment as other spacefaring states and private firms could launch their satellites or rockets from Lagos on bilateral or multilateral commercial terms. This would strengthen Nigeria's spacepower. However, Nigeria would also be likely to see growth in terms of international standing and regional power. Likewise, in answering the question of who benefits from the spaceport (*Cui bono?),* considering the factors discussed, we may assume that Nigeria would benefit more from the space infrastructure, even though it would also save costs and resources for other client spacefaring states or organisations.

4.5 Power Structure 4 – Finance

Strange (1994, 2015) suggests that in political terms, money represents a substitute for force as a means of economic growth and an instrument to provide collective goods. As discussed in Chapter 1, Section 1.6.1.3, collective goods are synonymous with public goods. Thus, since Nigeria's space capabilities can contribute to the provision of public goods such as products and services and security, including the potential benefit of operating space workshops and a launch site, funding is essential for the national space projects.

However, as discussed in Sections 4.4.2 and 4.4.3, Chiedozie (2019), Fashade (2008), and Oludimu (2018), respectively, argue that the national space infrastructure projects lack funding. Similarly, some participants' opinions indicate a shortage of resources for Nigeria's space infrastructure. For example, participant ST11, whose viewpoint is affirmed in Section 4.4,

further mentions that:

> *"Well, you know people say that 'if money is not at home, don't talk about any development.' So, money is fundamental to everything. […] Go to the records and see how much other countries, including South Africa, are throwing into their space programme. You will see that Nigeria is nowhere at all. Those countries that are making ways, including India, are putting a lot of money. But Nigerian government is yet to take the proper recognition of the need to fund the Nigerian space programme very well from the viewpoint that this will plough back into the economy of the nation."* (ST11, Academic and Space Director, 10/08/21)

This quote is indicative of the necessity of government funding for the realisation of Nigeria's space agenda. The participant believes that ambitious space states like South Africa and India invest substantial money into their space programmes compared to what Nigeria spends. This extends the discussion in Section 4.4 on the level of Abuja's investment in the advancement of its space infrastructure. The space budget for 2023 reveals that Abuja allocated N199 million ($431,516) to its AITC and space launch station projects, which is lower than other states' spending on relative infrastructure (see Tables 4 and 5). Therefore, the participant attributes this shortcoming to the government's lack of awareness of the enormous benefits inherent in space technology. To this end, it is imperative that the government understand the potential of space technology and inject more money into the Nigerian space programme to accelerate the completion of the AITC and the spaceport.

Likewise, participant FP6 believes that the government is not yet prepared to take full responsibility for funding Nigeria's space infrastructure. He mentions that *"unfortunately, Nigerian states and the Nigerian government don't care about funding space technology or space science in Nigeria."* (FP6, Academic, 02/03/21)

The extract emphasises the need for the government and society to understand the importance of space technology and space scientists to the state. The participant believes that the government is unwilling to invest in space technology and space science. Hence, the insufficient capital constitutes a major challenge for the actualisation of Nigeria's space agenda and spacepower, wherein it can utilise its capabilities to strengthen its regional influence.

The government's unwillingness to invest in space technology could be a combination of many reasons. The national budget would be a dependable source of evidence of the government's priorities. Hence, Abuja's 2023 budget shows that the government spent more on defence, with an allocation of approximately N1.4 trillion ($3 billion), followed by education, which was allocated a sum of N1.08 trillion ($2.3 billion). Similarly, health, works and housing, and agriculture and rural development were allotted N1.08 trillion ($2.3 billion), N534 billion ($1.2 billion), and N427 billion ($925 million), respectively (Budget Office of the Federation, 2023). Further, the Ministry of Science, Technology, and Innovation, under which space technology is classified, was apportioned N185 billion ($401 million) (Ibid). This implies that science and technology represent 0.84% of the total budget of N21.83 trillion (see Table 6 for the top 10 budgetary allocations).

Table 6: Top 10 budgetary allocation of the 2023 Nigerian National Budget

Rating	Sector	Total Allocation
1	Defence	N1,383,921,175,708
2	Education	N1,076,219,559,121
3	Health	N1,075,795,183,695
4	Works and Housing	N534,455,695,989
5	Agriculture and Rural Development	N426,989,907,243
6	Human Affairs, Disaster Management, and Social Development	N 382,358,506,329
7	Power	N258,494,986,301
8	Youth and Sport Development	N193,418,082,888
9	Science, Technology, and Innovation	N184,911,126,338
10	Transportation	N130,346,188,727

Source: Budget Office of the Federation (2023)

These figures indicate that Abuja prioritises security, education, and health, as is expected for every state. As discussed in Chapter 3, Section 3.2, the rate of insecurity in Nigeria is at an alarming level. Thus, with the issues of terrorism, banditry, and kidnapping, among others, spiralling out of control, it is understandable that the government allotted a vast amount to provide national security. However, considering the general importance of science, technology, and innovation, especially as it underpins virtually every sector, thereby aiding modern development and wealth creation, it could be argued that Abuja should be spending more on this aspect. It is noteworthy that a sum of N6.3 billion ($14 million), which is 0.45% of the defence budget, was allocated to the space division of the military (DSA) (Budget Office of

the Federation, 2023). Nonetheless, the overall budgetary apportionment for the science and technology-related divisions is still considerably lower compared to other key sectors, affirming participant FP6's opinion on the government's casual attitude towards space and science technology.

Furthermore, participant ST2 affirmed a lack of funding in the completion of the space facilities when he stated that:

> *"The project [AITC] is ongoing, but due to the poor situation of funds, we have not been able to complete the project. So, we are making effort that in the current year [2021], we should be able to get a substantial amount of money for the successful completion of the laboratory.* (ST2, Space Spokesperson, 12/08/21)

This quote reiterates that the construction of Nigeria's space infrastructure requires funding. However, the focus here is the participant's suggestion that as soon as a considerable amount of money is made available, the space infrastructure will be completed. This raises two critical questions. The first is whether the government is taking into consideration the time frame set out in the national space roadmap for the completion of the space infrastructure. The second question stems from the first; that is, is the government committed to utilising space technology for national development and strengthening its regional influence?

To respond, it is clear from the space roadmap that Nigeria aims to develop rocketry and propulsion systems by 2025 and launch indigenously built satellites from Nigeria's spaceport through the state's launch vehicles by 2030. This implies that the AITC does not have a definite date but must be completed by 2030, along with the spaceport, since it would serve as the facility for the construction of comprehensive indigenous satellites. Nonetheless, the funding of the construction of space infrastructure must be prioritised for the benefit of the state, its spacepower, and the strengthening of its influence in Africa.

Nongo, Ikpaya and Ikpaya (2021) suggest five models of investment that could smooth African states' processes for establishing space stations. These are direct funding, targeted investment, targeted company investment, private sector investment, and public-private partnership (PPP) (p. 49-51). Two of these models fit into the Nigerian context and apply to the AITC and spaceport projects. The first is direct funding, where the government is responsible for financing the national space programme. This is the current status of the Nigerian space

projects. Abuja is the sole sponsor of the space infrastructure plans. On this basis, it could be suggested that the government can seek external loans to specifically fund the procurement of necessary facilities needed for the completion of the AITC and spaceport, leading to the development of the space sector and the provision of international services, all of which enhance Nigeria's spacepower. It is important to note that Beijing provides loans for some of Abuja's projects and could provide more loans. This will, however, open Nigeria to being subjected to the Asian state's agenda, which is argued to be global dominance.

The second is the public-private partnership (PPP). The PPP, as mentioned in Chapter 1, Section 1.6.1.2, is NASRDA's long-term economic development model. Within this model, private collaboration is pursued by the government, even though NASRDA will regulate private investors' activities in the upstream space sector (James, Akinyede and Halilu, 2014). This implies that the government will have a role in the building and control of an upstream project such as the spaceport, even when the private sector is involved. This may also include the AITC, since it is a national asset. The reason for Abuja's involvement and operating regulations might not be unconnected to the fact that the space infrastructure is crucially strategic to military activities and national security.

Nonetheless, Nigeria can draw some lessons from NASA's partnership with private firms on the utilisation of the International Space Station (ISS). Among other things, this is to promote commercial creativity and production, thus allowing the private sector to carry out significant tasks in space (Sheetz, 2019; Davenport, 2022). Further, SpaceX was contracted by NASA to transport its astronauts to the ISS, serving as a solution to the government agency's dependence on Russia's Soyuz spacecraft for flight into space (Ibid). The NASA/private partnership is also estimated to save NASA between $20 and $30 billion on the development of spacecraft (Sheetz, 2020). Thus, it is suggested that the Nigerian government facilitate the long-term phase of the economic development model to enable the involvement of the private sector in the financing of the space infrastructure. This would not only accelerate the completion of the projects but also further open up the space industry in Nigeria, leading to increased foreign investment and the enhancement of its spacepower.

4.6 Conclusion

One of the main purposes for analysing structural power and spacepower is that space capabilities can be utilised to strengthen Nigeria's influence in Africa. This is possible when the capabilities are strategically operated in a way that allows other states or firms to benefit from Nigeria's space activities. As discussed by Strange (1994, 2015), the concept of structural power is essential to shaping and determining the IPE structures within which other states and their institutions must operate. It is through security, knowledge, production, and finance structures that Nigeria can acquire structural power as other states operate based on its agenda. This also strengthens Abuja's spacepower as it structurally uses its space capabilities (Peter, 2010). The chapter examined the second research question of this thesis. It looked at the effect that Nigeria's space capabilities (spacepower) could have on its regional hegemony.

Despite the opinions given by some participants in Chapter 3 and Sections 4.1 and 4.2 of this chapter that Abuja's regional influence is on the decline, a significant percentage of the interviewees from the diplomatic and space sectors, including the academic community, believe that the use of space capabilities such as knowledge, manufacturing and launching infrastructure, and space-enhanced military operations, as well as the commercial aspect, could strengthen Nigeria's spacepower and regional hegemony.

In terms of security, Nigeria has a limited number of space capabilities, such as satellite data, that enable it to support military operations on the continent. However, a key finding is that Abuja could further utilise space technology to provide modern applications and precision gadgets for enhancing security in Africa. With this capability, other states could see Nigeria as a reliable provider of regional security. It is noteworthy that Nigeria launched a military satellite (DELSAT-1) recently to boost national security.

Furthermore, Nigeria can utilise its space-enhanced security capabilities to counter threats from rivals, whether purposively or unintentionally. This justifies Cohen's observation on structural power that the establishment of structures automatically influences states' behaviour and precludes the need for intentional force to gain conformity (Cohen, 2016). For example, other states' perceptions of Nigeria's security gadgets and modernised operations can keep them at bay, especially the regional rivals, even when Nigeria does not intend to use the capability to counter threats.

The study found that Nigeria possesses many trained space experts and therefore has knowledge that can be shared with other states for the development of their societies. For example, the SBAS project, which involves the transfer of knowledge between Nigeria, Cameroon, the Democratic Republic of the Congo, and Togo, shows the idea of structural power and spacepower. Nigeria provides the host satellite for the SBAS and retains core knowledge that it could conserve, and share based on its discretion. This further enhances its spacepower.

However, another important finding is that Nigeria can organise more engagements that allow it to demonstrate its space capabilities, such as knowledge. The thesis particularly discovered that, despite the indigenous space experts possessing relevant and quality knowledge, they do not have space laboratories to perform their duties. As a result, the state is underutilising the benefits of its investment in human capacity building in space technology. This led to another finding: Abuja requires space infrastructure to enable the translation of space knowledge into reality. These infrastructures are the satellite manufacturing and launching facilities, such as the AITC and the spaceport. The production laboratory and spaceport will help Nigeria control its knowledge and production structures. That is, other states, especially African countries, can use the facilities to build and launch their satellites, among other functions.

Similarly, an important issue that was raised concerns the supply of raw materials for the production of space instruments such as satellites and spacecraft. Aluminium is essential for manufacturing spacecraft and engines. The study found that the iron and steel industry in Nigeria is not fully functional; thus, materials such as aluminium are being imported. This may substantially reduce the productivity and sustainability of Nigeria's AITC and spaceport and, by extension, its spacepower.

There was also a large proportion of participants who highlighted the lack of funding for space infrastructure in Nigeria. Funding is essential for actualising Nigeria's space dream and leveraging space capabilities to strengthen its regional influence. The national budget shows that the government prioritises security, education, and health over space technology and science. However, funding space technology and science sufficiently could enhance the provision of basic amenities and alleviate some of Abuja's immediate concerns, enabling Nigeria to function effectively internationally.

Against this background, the following provisional suggestions can be made: Firstly, based on the participants' opinions, the government must seek ways to provide funding for the swift completion of the AITC and spaceport. This could be through its regular direct funding but may be enhanced with the acquisition of foreign loans or the Public-Private Partnership (PPP), where the private sector can fund or contribute to capital upstream space projects such as NASA's partnerships with SpaceX, among other independent firms. Furthermore, in the long run, Nigeria might, if necessary, consider setting up a spaceport on a remote landmass in the Atlantic to accommodate full-sized space launch projects. This would, however, be based on bilateral agreements between the states encompassing what they each stand to gain.

Secondly, the government must prioritise the use of space technology to support its military in order to strengthen Nigeria's contribution to security in Africa. It is important to reiterate that Nigeria recently launched its military satellite (DELSAT-1). Strange (1994, 2015) argues that the providers of security ultimately enjoy benefits in the production or consumption of wealth and society. Thus, as a contributor to Africa's security, Nigeria can benefit from the production structure by inventing space-enhanced security gadgets and applications for the continent through its AITC for economic gain and hegemonic influence.

The third recommendation links with the first and second suggestions. That is, regardless of the government's funding for the completion of the space infrastructures as well as their use for the provision of security in Africa, if there is an inconsistent supply of materials for the production of space devices, it would affect the national space operations and spacepower. Thus, this thesis suggests that the iron and steel industry be developed alongside the space infrastructure for sustainable operations.

Finally, Nigeria could extend its space capabilities to other states by offering space programmes such as capacity building to train space enthusiasts and transfer knowledge for socio-economic development in Africa. This could be seen as help from the regional power by the recipient state, but in reality, Nigeria is promoting its own agenda and spacepower.

Chapter Five: Nigeria's Space Diplomacy

5.0 Introduction

The crux of this research centres on leveraging space capabilities to address Nigeria's domestic issues and strengthen its regional influence. Thus, the analysis in Chapter 3 focused on the impact of space applications on the Nigerian domestic setting, while Chapter 4 examined how Abuja's space capabilities could be used as spacepower and to acquire structural power in Africa. This chapter discusses the importance of Nigeria's space relations to enhance its spacepower and develop its space capabilities. The various activities and innovations in the space sector have made it mandatory for states to adapt their diplomacy to garner specific benefits, such as developing their technical capabilities. Nigeria has existing space partnerships with several states and private agencies for the development of its space sector and capabilities. Abuja has two predominant partnerships: China Great Wall Industry Corporation (CGWIC)[2] and Surrey Satellite Technology Limited (SSTL) in the UK, for the design, manufacture, and launch of satellites, including capacity building. China is a space power and has consistently contributed to the growth of space technology and exploration. Likewise, SSTL, as a private firm, has immensely contributed to the production of satellites, among other services. Thus, this chapter presents an analysis of Nigeria's relationship with the two space firms.

The chapter consists of three major sections. The first part examines Nigeria's foreign relations and capacity building, involving SSTL and the CGWIC, while the second section focuses on the Chinese diplomatic strategy, including its space partnership with Abuja. The final section discusses the categories of associates that Nigeria has as well as China's prospects that could be beneficial to Abuja's space ambitions. China forms a key part of the discussions in this chapter. This is based on the responses from research participants, Beijing's spacepower, and its ideologies and partnership with Nigeria, thus having the potential to influence Abuja's quest to acquire structural power in Africa. This chapter is analysed using Susan Strange's structural power theory and Neoclassical Realism (NCR) with the hope that it will provide a clear understanding of Nigeria's space prospects and its quest to strengthen its regional influence.

[2] China will occasionally be used to refer to CGWIC since the space firm is state-owned.

5.1 Foreign collaboration and capacity building

International collaboration is crucial to maximising the impact of space technology globally and developing national space capabilities. Oyewole (2020) suggests that African governments pursue foreign collaboration to acquire space benefits, such as security and other socio-economic advantages. Nigeria prioritises international partnerships for the development of its space sector. The discussion on foreign collaboration was an essential issue that was stressed by participants. For example, participant ST3 states that:

> *"One thing about our [Nigeria's] international cooperation is that we do have, as an obligation, international partnership because space technology development is not in isolation. You have to work with partners. For example, we are members of the International Telecommunication Union (ITU). We work with the United Nations Office for Outer Space Affairs, the committee on the peaceful uses of outer space. We participate in their programmes twice a year; that is the technical subcommittee and then the legal subcommittee. So, we are members of these organisations."* (ST3, Space Engineer, 30/08/21)

This extract reveals the importance of international collaboration to the Nigerian space agenda. This is because no individual developing state can leverage space technology without the support of established spacefaring states or organisations for the development of its capabilities and other benefits. Hence, Nigeria participates in global space programmes and builds relations in order to sustain its national space development. This is enshrined in Section 1.3.1 (B), numbers IV-V of the NSP, which states that Nigeria will *"collaborate in well-defined projects with other countries. In such collaboration, Nigerian scientists and engineers must be involved ab-initio in the design and developmental processes."* (National Space Policy, 2001:35). This implies that Nigerian engineers and their capacity building are commonly given priority in any of Nigeria's international collaborations on space technology.

Participant ST2, in agreement with Nigeria's plan to build its space capacity through foreign partnership, mentions that:

> *"In all our partnerships, we are not just interested in acquiring satellites or launching satellites; the focus of our partnerships is capacity building. If we are*

> *going to partner with you, we will look at the area of benefits. What can we benefit from in this area? How can we train our engineers in this process? What can we benefit as an agency [NASRDA], and what can Nigeria benefit as a nation? So, that is our focus, and you can imagine that some of the things; the knowledge you would have been able to acquire cannot be quantified in the area of Naira and Kobo [Nigerian currencies]."* (ST2, Space Spokesperson, 12/08/21)

This quote suggests that the quest to acquire knowledge as part of developing national space capabilities is what propels Nigeria to partner with top space states and firms. In other words, capacity building is central to the Nigerian space agenda, spacepower, and, by extension, generally maximising space capabilities to impact society. As discussed in Chapter 2, Section 2.2, the impact of capacity building on the national space sector is enormous. Kganyago and Paidamwoyo (2019) suggest that the scientific and practical skills and expertise of trained personnel as part of capacity building will contribute positively to the national space agency. Similarly, Oyewole (2017) notes that building capacity would lower the cost of acquiring and operating space-enhanced programmes for the benefit of the country. Indeed, capacity building enhances the national space capabilities and the state's spacepower.

Participant ST5, who is a director at NASRDA with 20 years of experience in space systems and engineering, commented on Nigeria's priorities for international partnerships. He states that:

> *"It [international partnership] is to make sure that we can sustain our space programme in being able to build our capacity, in being able to do it ourselves in Nigeria, and our hope and our roadmap are to build and launch a Nigerian satellite in Nigeria by 2026. So, all the things that are necessary and needed, we are going to try to get through collaboration with China, SSTL, US, and other countries that are interested in supporting us."* (ST5, Space Director, 15/10/21)

This excerpt confirms that Nigeria's goal in collaborating with global space actors is to build its capacity to operate a powerful space sector capable of manufacturing and launching indigenous satellites on Nigerian soil by 2030, even though the participant mentioned 2026. The benefits derived through capacity building will combine with these to strengthen Nigeria's spacepower. Further, the participant's emphasis on Nigeria's relationships with China, SSTL,

and the US, among other space agencies (private or state-owned), suggests that these states and the private firm are significant space actors and contributors to Abuja's space endeavours. However, it is worth stating that Washington is not directly involved in Nigeria's space activities compared to China and SSTL.

The main drivers of Nigeria's international cooperation in space technology have been identified in this section. Abuja prioritises capacity building in its space agreements with foreign counterparts, including building and launching satellites. Thus, to understand the impact and the level of achievement that Nigeria has had in its partnerships, it is necessary to look at its collaborations with the British private company, SSTL, and the Chinese state-owned company, CGWIC. The following section examines Nigeria's cooperation with SSTL in the manufacture and launch of its satellites, while the subsequent section discusses Beijing's diplomatic strategy in Africa and Abuja's relationship with CGWIC.

5.2 Nigeria and SSTL Partnership

Nigeria's partnership with SSTL began in 2003 when the British firm built NASRDA's first Earth Observation (EO) satellite (NigeriaSat-1). Consequently, SSTL has worked with Nigerian engineers and scientists to manufacture two more satellites for the country (NigeriaSat-2 and NigeriaSat-X). Assessing SSTL's involvement in manufacturing Nigeria's satellites, participant ST4 mentions that:

> *"For the Earth Observation satellites, we approached the Surrey Satellite Technology Limited. As you know, it's an affiliate of a university. So, we felt that being a small company, we could really gain and benefit from them, and that was why we entered into agreement with them."* (ST4, Space Scientist, 24/11/21)

This quote shows the importance of SSTL to space development in Nigeria. The participant suggests that SSTL's affiliation with the University of Surrey influenced Abuja's decision to partner with the firm. That is, Nigerian space engineers would get more attention and gain adequate knowledge from the company due to its small size as of 2003. This can be linked to NASRDA's human capacity building agenda. As discussed in Chapter 2, Section 2.2, the space agency prioritises the acquisition of knowledge and experience for its staff. Hence, as the Nigerian engineers were studying space engineering at the University of Surrey, they also

worked in the laboratory to acquire practical experience. As of 2019, over four hundred NASRDA staff have earned their PhDs and MSc degrees (Onuh *et al.*, 2019) at the British university and other similar institutions.

Furthermore, participant ST2 confirms that:

> *"We have our road maps, and, through collaboration, we have been able to compare notes and we have been able to use their [SSTL] own experience to develop what we have back home. So, like I told you, some of our personnel were trained through this collaboration. Like our collaboration with SSTL, a lot of engineers acquired their Master's degrees in the area of space science and technology in specialised area in that university (Surrey)."* (ST2, Space Spokesperson, 12/08/21)

This extract indicates that the relationship between NASRDA and the UK firm is active and productive, especially in building human capacity. Without these capabilities, Abuja cannot independently and sustainably leverage space technology to address domestic issues and strengthen its external influence. As examined in Chapter 2, Section 2.3.1, Nigeria's space roadmap was endorsed in 2005 to facilitate the national space programme and to develop indigenous space capabilities (Okeke and Agi, 2022). Space capabilities include knowledge transfer, human resources, and infrastructural capacities such as manufacturing and launch facilities. Hence, Nigeria embraced the opportunity presented by the SSTL collaboration to train its staff and gradually develop its space capabilities as part of achieving the national space plan (national power) and enhancing its spacepower.

Participant ST2 further affirms Nigeria's gain in the collaboration with SSTL when he said:

> *"We are not just interested in collaboration with all these foreign countries; we are also interested in domesticating our space activity, and that is the essence of the capacity building. So, Surrey [SSTL] was able to give us that platform for our engineers to lay their hands on that first experience of designing and building Nigeria's satellites, and those were the first satellites."* (ST2, Space Spokesperson, 12/08/21)

This excerpt suggests that Abuja intentionally collaborated with SSTL to produce its first satellite and to lay the foundation for subsequent independent satellite construction through the knowledge and experience gained by its engineers at Surrey. This has broadened the scope of space knowledge in the country. For example, space technology has been incorporated into some universities' curricula for engineering students. These developments are in alignment with Nigeria's objectives for space collaboration, as discussed in the previous section.

Additionally, participant ST3 states that:

> *"I should tell you, our collaboration with Surrey has been very helpful. At least, at the end of that, we have three satellites in all. We have had three satellites in orbit, two of them are still there. One of them is built by our scientists and engineers, and they built it using University of Surrey's facility [SSTL]. So, that's very beneficial, that's most beneficial."* (ST3, Space Engineer, 30/08/21)

This extract supports participant ST2's opinion about the significant impact of Nigeria's collaboration with SSTL on its space endeavours. Likewise, participant ST3's reference to the construction of satellites reiterates the discussion on Nigeria's satellites in Chapter 2, Section 2.4. It was stated there that one of the three satellites was designed and built by Nigerians in Surrey, while the other two were manufactured by Nigerian and SSTL engineers at the same facility. As highlighted in Chapter 4, Nigeria's expertise in space technology can be utilised to strengthen its influence in Africa through knowledge transfer programmes organised by Abuja. However, this would only be possible when its space laboratory is operational.

Conversely, some participants believe Abuja deserves to benefit more from its agreement with SSTL. The following extracts capture the opinions of the participants. Participant ST1, who was chairman of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) from 2004 to 2006 and a former senior special assistant to the president of Nigeria on space science and technology, mentions that:

> *"The NSA [National Security Adviser] officially gave me a letter and asked me to review the agreement [Space agreement with SSTL]. I couldn't believe Nigeria is being sold out completely. Fortunately, because of my job in the US, I left the US with a lot of colleagues in high places in their own countries who are my friends:*

the head of Malaysia's space agency, they also had an agreement with Surrey to build a satellite for them. They [SSTL] had an agreement with South Africa, and I got in touch with all of them, and they all sent me a copy of the agreements they signed with Surrey. It was absolutely at variance with the Nigerian agreement, and I put all of these together in writing." (ST1, Space Ambassador, 05/08/21)

This extract shows that, going by what other states benefitted from their various international space agreements, Nigeria could have achieved more than capacity building and satellite production and launch in its collaboration with SSTL. The participant, therefore, gave his views on where he thinks SSTL defaulted in the agreement.

"Surrey, in building Nigeria's first satellite, said that they were going to carry out an experimental data acquisition over Nigeria. Did anybody in Nigeria see that data acquisition? Did they participate in the analysis of that data? In the case of the United States and France, at the beginning of NASA, I spotted the first data they collected for about two or three years. They shared that data for every country with the countries all over the world, using it to tell us what it has done right and what it has done wrong, so that when we go into the next phase, we can improve on it. Nigeria's satellite never had that experience. Were Nigerian universities involved? I cannot answer that question concretely. You can ask NASRDA for that." (ST1, Space Ambassador, 05/08/21)

The participant, who by nature of his role at UNCOPUOS was privy to several other states' space data, believed that SSTL should have acted similarly to the US and France by sharing the relevant data with Nigeria. For example, the quote suggests that SSTL did not stick to its promise to produce experimental data on the country. Although this was during the early years of Nigeria's space journey, the lack of data represented a risk to preventing environmental disasters and the supply of on-time safety or defence information, thus impacting the operations of security and disaster management agents. These, among other things, suggest that Nigeria, though seemed satisfied with its collaboration with the British firm, could have benefitted more.

On the basis of structural power, SSTL dictated the terms and conditions of the production of satellites, while Nigeria was a recipient of the services and thus could not operate effectively

without the grand role of SSTL at the time. This gives an idea of structural power where once structures are set, including payoffs, beneficiaries must operate by them (Strange, 1994, 2015; Cohen, 2016). Nevertheless, the actor exercising power must ensure that the framework and incentives are accurate and consistent.

Participant ST8 also adds to participant ST1's views on Nigeria's collaboration with SSTL by saying:

> *"I think with the British [SSTL], we basically got sold an Earth Observation satellite, particularly for the DMC constellation, which is the first satellite that Nigeria got. It was kind of like, 'Oh! You have a satellite; you are a space actor. By buying a satellite, you are going to have a seat at the table'. But people were like, 'not really, just because you bought a satellite doesn't mean you have any technical capabilities or any particular better access to the data'. I think there were issues with even them [Nigeria] having access to the data from their own satellite."* (ST8, Academic, 05/08/21)

This quote highlights another dimension to the Nigerian-SSTL collaboration. The participant's opinion suggests that Nigeria's perception of space technology was mainly to own a satellite without any particular regard to maximising the relevant data from the satellite. This could be because, according to the participant, the Nigerians were made to believe that owning a satellite essentially confers power on the holder. But substantially, the quality and accuracy of data from the satellite, including how the data is used, matters more than typically acquiring a satellite (Peter, 2010). Thus, the participant recounts the issues with Nigeria's accessibility to data from its satellite.

In the tenet of the knowledge structure, considering participants ST1 and ST8's opinions on SSTL, it is not illogical to think that SSTL may have purposely restricted Nigeria's access to comprehensive data in order to maintain control in the bilateral relationship. Indeed, Abiodun (2017) captures this assumption in his lecture at the Elliot School of International Affairs, US, when he said, "The contractor (SSTL) drafted the agreement and took advantage of the national inadequate knowledge of the subject matter". In other words, SSTL had full control of the space agreement with Nigeria and dictated the means of operation. This scenario gives an indication

of what dependant states or actors might experience in keeping up with their relationship with an actor in a position of control.

In summary, Nigeria may naively not have thought to ask for relevant data and other benefits, but its experience with SSTL is a lesson that Abuja must have learned from, especially in ensuring that a more beneficial contract is signed on behalf of the state. As Nigeria develops its space capabilities and enhances its spacepower, it is important to pay attention to space diplomacy.

5.3 The Chinese Diplomatic and Space Strategy

To understand China's activities and involvement with the Nigerian space programme and capacity development, it is essential to first examine Beijing's diplomatic strategy in Africa. This is because China has a formidable influence on the continent due to its provision of socio-economic incentives to African countries (Albert, 2017). China has been at the forefront of building roads, railways, airports, seaports, dams, factories, government offices, and stadiums in Africa. The Chinese government also grants loans and sends educational, medical, and technological experts to Africa (Park, 2015; Zwanbin, 2020), prompting state leaders to view the Chinese offers as better alternatives to what the West offers (Zhao, 2014). However, in his opinion on China's foreign strategy, participant ST9 said:

> *"You know how China has been having inroad into different African countries. They have been […] strategically positioning themselves in different sectors, not just space. In construction, in virtually anything you can think of, you can see the Chinese. So, that was the same way when we [Nigeria] were interested in the space programme, and you know how they do their own; they will tell you that this is how much it cost, but we can borrow you the money, and then you pay, you return at a cheaper rate and over a longer period of time. So, the terms of the contract, 'they look good, they look good', I use that carefully, and that's why we go for them."* (ST9, Academic, 07/07/21)

This quote characterises China's presence in Africa as diplomatically strategic, as the Asian powerhouse is involved in key sectors of several African countries. The participant believes that the Chinese purposefully offer attractive incentives to entice African states to patronise

them. The Chinese also offer services and infrastructure in order to acquire mineral and agricultural resources from Africa. Zhao (2014:1034) claims that "while African resources help feed China's economic boom, Africa's economic growth benefits from trade and infrastructure built and financed by China." Indeed, for example, in 2006, Beijing offered Nigeria a loan with a long-term repayment plan to secure its communications satellite. Adebajo (2020) notes that the Chinese Export and Import Bank (EXIM) lent Nigeria $200 million to launch the satellite, including building control stations and training technicians (Pons, 2020).

As discussed in Chapter 1, Section 1.6, structural power not only creates rules for economic relations and agenda-setting for negotiation, but it also grants the power to regulate protocols and shape relationship frameworks (Strange, 1994, 2015). In other words, intentionally setting an agenda can shape the framework that works to the actor's advantage (Cohen, 2016). And as specified by Strange (1994, 2015), the finance structure is one of the four structures through which structural power can be attained. As such, it could be argued that the Chinese provision of loans and other financial incentives is a strategy to set an agenda for African states. Essentially, the Chinese strategy makes the collaboration convenient and "look good" for Nigeria and other states where a similar contract is offered. With such incentives, Abuja may be leveraging China's capabilities, but it must be ready to pay the price it may incur in its space collaboration with Beijing.

Accordingly, it is crucial to note the participant's repetitive use of the term "*they look good"* while simultaneously admitting to choosing his words carefully. Judging from the participant's body language during the interview, it appears that he did not agree with his own words. This means that the phrase was an "irony", indicating a more implicit meaning to the initial opinion. That is, even though the Chinese incentives are appealing, there is more to what they offer.

China's foreign activities are operated within its Belt and Road Initiative (BRI). Kuo and Kommenda (2018) explain that the BRI is Beijing's strategy to increase its global influence. They stated that the BRI is "a state-backed campaign for global dominance, a stimulus package for a slowing economy, and a massive marketing campaign for something that was already happening – Chinese investment around the world." This is structural power at play, as it enables China to determine the IPE structures that other states must operate with (Strange, 1994, 2015). Thus, the BRI could be argued to be a Chinese strategy to set the agenda for its

collaboration with recipient states. An excellent case study is the Sino-Zambian relationship. Zambia, the second-largest producer of copper, is a participant in the BRI and the recipient of China's loan of over $23 billion (Orr, 2020). China is the world's largest consumer of copper and has massively invested in Zambia, with over 600 Chinese firms operating in the African country's key sectors (Ibid). Through the lens of Strange's production structure, China's control of the construction, mining, and manufacturing industries could confer power on China over Zambia. For instance, Orr (2020) argues that Zambia's inability to service its loan would resort to the Chinese taking over the copper resources and public assets. Indeed, when eight Chinese were recruited into the Zambian police force in 2017, Zambians perceived it as a means of infiltrating their key institutions, thus leading to an uproar and the decommissioning of the Chinese (Asiedu, 2020). This shows how the Chinese diplomatic strategy works in Africa and the ensuing implications.

Further, participant ST12's opinion suggested that there is more to the Chinese' offers.

> *"I would say that China, from what I know about economics and borrowing loans and all those things, sometimes in the loan agreement is written a clause that says you have to use the technologies from China. China does that a lot, and that may be one reason. China will also offer you things for free, not free, but at a lower price than the other countries would."* (ST12, Space specialist, 08/09/21)

This quote reiterates the Chinese strategy to entice client states even though Beijing would include favourable terms and conditions that implicitly suit itself in the agreement. As suggested by the participant and similar to the Zambian example, these conditions could be a mandatory obligation for the recipient state to use only Chinese technologies or patronise its indigenous companies. In some agreements, Beijing could provide certain services at a minimal cost compared to what other countries offer. Citing the case of Nigeria, Klinger (2020:13) argues that the $200 million satellite loan agreement was signed in "'preferential buyer's credit' to help fund the project". The Chinese preferential buyers' credits are non-ODA (Official Development Assistance) subsidised loans given to overseas borrowers to help them pay for their importation of Chinese products (Massa, 2011). This correlates with participants ST9 and ST12's views, thus giving further clarity to why CGWIC built and launched Nigeria's communications satellite while the EXIM Bank released the funds. Since Beijing is versatile in key sectors, it ensures that its domestic firms are involved in its international operations.

Further, participant ST8, using Nigeria's space partnership with China as an example, gave another perspective on Beijing's strategy.

> *"Nigeria, I think […] had something like 21 bids from different countries, and I think at the end of the day, the Chinese were willing to pay for everything […]. They were also willing to do technology transfer in a way that, for instance, the US won't be able to do because that wasn't part of their business model. So, the Chinese really, at the end of the day, that proposal is what was going to give them more than the others, [...]. It was in their interest to get the contract because Nigeria was their first international customer. So, they had to show that their technology is ready for the world, and Nigeria happens to be the testbed."* (ST8, Academic, 05/08/21)

The participant's opinion aligns with participants ST9 and ST12's comments on the Chinese provision of services on an almost free basis. In Nigeria's example, CGWIC's offer far outweighed other space agencies' bids to emerge as the NIGCOMSAT-1R manufacturer. The space offer included the transfer of knowledge to Nigeria in a way the US would not have done. This gives an indication and buttresses the suggestion that China may have its own agenda and that it has more to gain from the collaboration, as they needed to prove to the world their ability as a space power by ensuring that the Nigerian project was successful.

Participant FP2 shared a similar opinion with the preceding participants (ST8, ST9, and ST12) when he mentioned that:

> *"China, in the last few years, has made a major breakthrough in Nigeria, and this was largely because there was a vacuum in foreign aid. We were no longer able to get the kind of foreign assistance, financial assistance that we were getting from the major global powers, and the Chinese moved in. They were willing to lend us money. So right now, they are the biggest investors in Nigeria. They are in virtually every section of the economy; the railways are being built by the Chinese, roads, and what have you. So, the Chinese are here already, and as you know, they are not only in Nigeria, but they are also all over Africa, making major economic inputs, and the Western powers are worried about this. But because of*

> *their own domestic situations too, there is very little they can do now. They cannot offer the kind of assistance that China is offering Nigeria."* (FP2, Career Ambassador, 25/01/21)

This excerpt gives more evidence of the increasing Chinese dominance in Africa, particularly in Nigeria. Due to the lack of financial aid from other top countries, Nigeria had no choice but to accept the Chinese financial offers. As reported by participants ST8, ST9, and ST12, participant FP2 also states that China presented enticing incentives in the form of loans to Nigeria, thereby gaining the access it needed to spread its tentacles to various sectors in the country. Albert (2017) suggests that Beijing partners with resource-rich African states and provides them with loans, trade, and economic assistance. This implies that the Chinese operate a relatively similar strategy in several African countries by investing in their key sectors. Thus, participant FP2 claims that the West is often concerned about China's rise on the continent and cannot rival Beijing in offering Nigeria better incentives.

This situation could place China in a position to control or dictate the pace of development in Nigeria. Participant FP2 shared this notion when he further said:

> *"China now, really, […] is in the position to influence foreign policy issues in Nigeria, but they are also being very conscious. They understand that Nigeria is a big country and that they have to move very carefully, particularly in view of all the divisions we have in Nigeria, tribal and religious and what have you. So, the Chinese too; what they are doing is that they are moving into the domestic economy, investing in various sectors; mining, logging, and that kind of thing. But I don't think politically they have any real influence in Nigeria now."* (FP2, Career Ambassador, 25/01/21)

This quote suggests that China can acquire power through its influence in Nigeria. Beijing's decisions and actions, whether by restricting its loans or increasing its investment as part of its bilateral relationship with Abuja, could have an impact on Nigeria. This position indirectly gives China influence over Nigeria. However, due to the diverse nature of the West African state, which cuts across religious and tribal divides, Beijing may find it challenging to exercise political power over Abuja. Hence, participant FP2 believe that China is treading lightly but, at the same time, investing strategically in key industries, such as mining, logging, and space technology, in Nigeria.

This section broadly examined the Chinese diplomacy and space strategy in its partnerships within the African region, citing the Zambian case study and further elaborating on the Nigerian example. The participants identified some of Beijing's strategies as the provision of favourable loans with a long-term repayment plan, knowledge transfer in space technology, and investment in key sectors. Thus, the following section discusses the Nigerian and Chinese space partnerships. The section also considers the implications for Abuja's spacepower, domestic environment, and regional hegemony.

5.4 Nigeria and China space partnership

This chapter has established the role of China in infrastructural development in Africa and Nigeria, including the provision of loans and aid. The chapter also briefly discussed Nigeria's importation of Chinese iron and steel, which could be essentially useful for the indigenous production of spacecraft and relevant gadgets. This section further examines the Chinese involvement in the Nigerian space adventure, especially in the construction and launch of its satellite capabilities. Several participants felt China was an ideal partner for the West African state in developing its space capabilities. For example, participant ST2 mentioned that:

> *"The collaboration between us [NASRDA] and China has been very fantastic and, again, the communications satellite, NIGCOMSAT-1, that they designed for Nigeria and launched was the first communications satellite built for any nation by China. So, it was our collaboration with them."* (ST2, Space Spokesperson, 12/08/21)

While it is common knowledge that Nigeria was China's first international client in satellite manufacture and launch, the quote gives an insight into how Nigeria views China and their relationship. It seems that Abuja takes pride in the bilateral collaboration, especially being the pioneering state for CGWIC foreign services. However, though it appears that China did Nigeria a favour by developing and launching its satellite, participant ST2's opinion equally suggests that Beijing could have also struggled to get a chance to launch a satellite for an influential African state if Abuja had declined the offer. This claim can be supported by the fact that China has only in the last decade intensified space relations with Nigeria's hegemonic rival, South Africa. South Africa signed space pacts with China, linking with other BRICS states (Brazil, Russia, and India) to develop the Square Kilometre Array radio telescope for the country and its space industry (Space in Africa, 2019e).

Nonetheless, Nigeria and China went ahead with their collaboration to the extent that it served their national interests. For example, China was able to showcase its capability as part of its agenda to gain influence in the global space arena, whereas Nigeria saw the agreement as a way to save on satellite acquisition while paying back the loan in instalments with interest. Moreover, the communications satellite has contributed to the advancement of the Nigerian telecommunications industry and can further be used to support Abuja's Afrocentric foreign policy.

Further, participant ST4 had a similar view with participant ST2 on the Chinese space partnership when he stated that:

> *"China was attractive because they also brought on the table a loan for the communications satellite and then Nigeria only had to make its own counterpart funding. So, that was very attractive, and we went for that, that's for the communications satellite. […] The engineers and scientists that were trained in China were all well trained, they have the capacity. As a matter of fact, the ground station of the communications satellite in Nigeria is being run by Nigerian engineers that were trained in China. They are trained, and they are using their knowledge to run the ground stations here in Nigeria."* (ST4, Space Scientist, 24/11/21)

This excerpt affirms the assertion about the Chinese strategy discussed in the previous section (section 5.3). The Chinese offered Nigeria a lucrative loan and other incentives that could not be resisted because no other state or space agency was willing to offer such a bargain. In addition to this, participant ST4's opinion suggests that Nigerian engineers and scientists immensely benefitted from their Chinese counterparts, thus enabling them to operate the satellite ground station independently in Nigeria. Similarly, participant ST7, in his view, believes that Nigeria's space relationship with China is strong and progressive.

> *"It's still ongoing [Nigeria-China collaboration], that partnership is there in terms of support, and don't forget, we also have a backup ground station in China. So, they remain our technical partner as far as the first satellite is concerned."* (ST7, Space Engineer, 05/09/2021)

This extract implies that China plays a significant role in the Nigerian space sector. The Chinese state, through CGWIC were responsible for the manufacture of the communications satellite and continue to host the standby ground station for the satellite in case of an emergency. Therefore, we may assume that an essential proportion of the operation and sustainability of the satellite falls within China's responsibility. This shows that Beijing holds partial control of Nigeria's most lucrative satellite, affirming its structural power agenda.

It is noteworthy that some participants believe that China's indirect influence on the operation of Nigeria's communications satellite was not the only point of attention in their collaboration with Nigeria but that other issues needed to be examined as well. For example, participant ST11's view shows that there was an anomaly about how Nigerian engineers were trained at CGWIC compared to how engineers were trained at SSTL.

> *"I found out during the time we were there that, unlike SSTL, I believe Nigeria gained more from SSTL than from China, who built the Nigerian communications satellite. [...] The Nigerian staff who built NigeriaSAT-1 and then NigeriaSAT-2, they gained experience, and they were on their own. They have been able to build the NigeriaSAT-X. But for the communications satellite, those who went for training in China, I visited the trainees in China myself. That was after that period, and I saw that they were not given much opportunity. Really, if you talk to some of those trainees today, they will tell you about their experience in China. Do you believe China is a little bit crafty? Sorry to say this. You know where those boys can return home and now say they want to build their own communications satellite. I don't know, except they are the only ones that can answer that question."* (ST11, Academic and Space Director, 10/08/21)

This quote shows a disparity between the experience acquired by the Nigerian engineers in China and the engineers who trained at SSTL. It is worth noting that Nigeria signed both partnership agreements for different projects and purposes. SSTL built the EO satellites, while CGWIC manufactured Nigeria's only communications satellite. Having two firms handle separate tasks should not have influenced the quality and quantity of knowledge transfer. However, as mentioned by the participant, the engineers trained at SSTL have been able to independently build a satellite even though they used a foreign laboratory. Tella (2018) notes that twenty-six Nigerians worked at SSTL to manufacture NigeriaSat-X in 2011. This shows the level of training and access to information the engineers experienced at SSTL.

On the other hand, none of the China-trained engineers has attempted to develop a satellite. This could be because, as the participant indicated, China was a bit "crafty" and restricted the Nigerian engineers to a few opportunities. This generally suggests an attempt by Beijing to conceal ideas and knowledge, including practical experience, that could have enabled the Nigerians to acquire more tangible skills.

This raises the question of whether Beijing deliberately wielded power to protect its knowledge capability, as Strange argues that power could be maintained in the knowledge structure if the authority could limit access to it (Strange, 1994, 2015). The implication of this for Abuja, apart from the incapacity to construct a communications satellite, is that the lack of solid indigenous capabilities such as trained engineers in specialised fields would generally limit Nigeria's spacepower, technology development, and structural power in Africa, thereby remaining under the influence of Beijing. Thus, in alignment with Strange's theory, this confirms that structural power can be sustained when key actors provide the basis for the relationship (the framework) and maintain their exclusive responsibility in the agreement. This would protect the relevance of the actor while strengthening the framework that works automatically to its advantage.

Furthermore, in her opinion, participant ST8 believes that Nigeria did not properly nurture the Chinese relationship, mainly due to inexperience.

> *"I don't think those relationships were really optimised [...]. Of course, the Chinese are very aggressive with what they proposed and how they do their partnerships. [...] I think in those first initial relationships, they [Nigeria] didn't know what they didn't know, and so they didn't negotiate the best terms for themselves. They were just learning. So, I think now we are in the position where we should at least be able to understand the technology better and figure out how partnerships are going to be actual mutual partnerships rather than one-sided deals whereby you are just used to being a customer."* (ST8, Academic, 05/08/21)

This excerpt suggests that Nigeria's first experience with its Chinese counterpart served as a learning curve for the country since it lacked experience in space diplomacy. Thus, as highlighted by the participant, Abuja couldn't negotiate the best terms of agreement for itself. The participant, therefore, labelled the relationship as "one-sided". A one-sided relationship is an association between two parties where one party has a limited advantage while the other party maintains most of the benefits. Indeed, the participant further said,

> *"I won't even call it [Nigeria-China space collaboration] a partnership; I would just call that like customer-client. They were not on the same level playing field. They didn't have mutual goals they were working towards each other. It was the case of, we want a satellite, and the Chinese saying, we will give you a satellite, we will pay for it. It wasn't like let's co-create. But at the end of the day, maybe like it takes a phase to create a partnership because if you have no assets and you don't know what you are doing, who wants to be your partner anyway? Right, everyone is just going to see you as a client. So, maybe that's just normal."* (ST8, Academic, 05/08/21)

This quote clarifies the participant's thoughts about the Nigeria-China space collaboration. Nigeria was focused on having an operational satellite without paying adequate attention to the aspect of training, especially the extent to which China was willing to transfer knowledge and provide support. Hence, the participant attributes Nigeria's weakened position in the agreement to inexperience and a lack of active space capabilities. Therefore, China saw Nigeria as a client and not a mutual partner. This perhaps contributed to China's approach to the agreement; as reported by participant ST11, China might have voluntarily restricted the flow of knowledge to Nigeria. A key finding of this research, as discussed in the previous chapter, is the importance of having a ground space infrastructure. When this is operational, it will enhance Abuja's spacepower and influence in the global space arena, where the state could negotiate better deals for itself.

This section gave an insight into the implications of Nigeria's space partnership with China. Nigeria's relationship with CGWIC, as well as with the privately owned SSTL, represented a remarkable feat on Abuja's space agenda. However, both partnerships had their own peculiar issues. For example, while SSTL provided comprehensive training and experience to Nigerian engineers, some irregularities were identified in their provision of data at the initial stage of the partnership. For CGWIC, the execution of the project and the enablement of access to satellite data are commendable. It is only that there were reported issues with the Chinese transfer of knowledge to Nigeria. Although the two space firms were contracted for different space projects, it can be suggested that Nigeria's experience with SSTL must have influenced Abuja's deal with China concerning the acquisition of data. Perhaps the most obvious evidence of this is the presence of NIGCOMSAT-1R's main ground station in Abuja, which allows engineers to directly access data from the satellite. The satellite data is crucial to Nigeria because the lack

of information represents a risk to national safety. Similarly, a lack of knowledge would, in the long run, create a gap in Nigeria's ability to produce indigenous satellites, impacting its spacepower and affecting the domestic commercial industry's sustainability and growth.

With the application of Strange's structural power theory, the subchapter shows how power could be acquired and maintained through the possession of knowledge, leading to the provision of specific services. These services, therefore, determine what is produced (production), the provision of security, and the expenditure and derivation of economic benefits (finance). In summary, considering the pattern identified in Nigeria's space relationship, the collaboration could be termed a mixture of the good and the not-so-good. Hence, the next section discusses the strategy Nigeria could adopt to enhance its space diplomacy. The need for a robust space diplomacy rests on the basis that it would contribute to the enhancement of Abuja's space capabilities (spacepower) and, by extension, its influence in Africa.

5.5 "Friends, Partners, and Brothers"

The significant issue raised by the participants about Nigeria's space activities is the lack of a comprehensive understanding of space data, which led to the data being underutilised during the early years of Nigeria's space journey. A further highlighted issue is Nigeria's inexperience in space diplomacy, which has resulted in the state's inability to realise its full potential in its space relations. As a result, participant FP6 proposes a strategy for Nigeria to increase its chances in space collaboration.

> *"The only option left for the Nigerian government, Nigerian state, is to look for three people internationally—friends, partners, and brothers who share both our fears and our challenges—so that they can assist us. So, while doing so, we must be very careful. There's no free lunch. We must be able to at least assemble a team who understands not only the ideas about space technology management and how it impacts positively on national growth and development, but you must assemble experts who can add value to negotiations, to dialogue with those teams from other international countries, and we must identify people who are ready and willing to assist us so that we do not play into the sharks into the sea."* (FP6, Academic, 02/03/21)

This excerpt can be split into three parts for clarity. The first part suggests that Nigeria requires three different types of foreign counterparts who understand the situation in the state and its objectives for embarking on infrastructural projects such as the space programme. The three counterparts are classified as "friends, partners, and brothers", and according to the participant, they must have the desire and capacity to help Nigeria achieve its agenda.

The Merriam-Webster dictionary has differing definitions for these three categories (friends, partners, and brothers): a friend is someone who admires another; a partner is someone who works with another to complete a mission; and a brother is someone who shares a common identity with another (Merriam-Webster, 2022). On the basis of Nigerian space relations and in relation to this research, we may suggest that Nigeria is a friend to the US; China, through CGWIC, can be classified as a partner, while SSTL occupies the position of a brother. It is important to note that this classification is not generally limited to the US (NASA), SSTL (UK), and CGWIC (China), but the three states or space firms were chosen due to their involvement in Nigeria's space journey.

5.5.1 Friend

National Aeronautics and Space Administration (NASA) is the world's largest independent space agency of the US federal government (NASA, 2023) and has contributed to space exploration and development since the mid-20th century. Although Nigeria does not have a substantial direct space relationship with the US, both states can be categorised as friends. As discussed in Chapter 2, Section 2.1, Nigeria hosted NASA's tracking station that monitored the Gemini and Apollo space missions in the early 1960s. Likewise, President John F. Kennedy's first live telephone transmission on the world's first satellite communications ship (USNS Kingsport T-AG-164) was with Nigeria's prime minister, Abubakar Tafawa Balewa (Ajewole, 2011).

Further, Nigeria uses NASA's Global Positioning System (GPS) and, aside from space technology, Abuja is equally a beneficiary of the United States Agency for International Development's (USAID) aid, among other benefits. USAID promotes economic growth, food and human security, better education, and good governance (USAID, 2023). These attributes correlate with participant FP6's suggestion that the "friends" must understand Nigeria's situation and

contribute to its quest to resolve the national issues. On account of this, Washington can generally be justified as a friend that is admired by Abuja.

5.5.2 Brother

On historical grounds, SSTL can be termed Nigeria's "brother", not only because it pioneered the construction of Nigerian satellites but also based on the common attributes Abuja shares with the space firm's domicile state, the UK. It is noteworthy that SSTL's collaboration with Abuja was on a private basis, though with the acknowledgement of the UK government (British High Commission, 2014).

Nigeria got its independence from the UK and remains a Commonwealth member and an English-speaking country. This recounts colonial heritage. Though this is often linked to a history that is generally perceived to be negative and humiliating for colonised states (Ifversen and Pozzi, 2020), some landmark events, such as the amalgamation of Southern and Northern Nigeria, were carried out by the British in 1914. On the aspect of space technology, SSTL has significantly contributed to Nigeria, particularly as NASRDA's first international collaborator in the development of satellites. As mentioned in this chapter and previously in this thesis, SSTL built Nigeria's first satellite in 2003 and had an agreement in place to manufacture more EO satellites and train Nigerian space engineers at its facility in Surrey.

As discussed in Chapter 2, Section 2.5, SSTL also invented the DMC (Disaster Monitoring Constellation). SSTL, as part of its achievements, has manufactured three EO satellites for Abuja and helped NASRDA with capacity building and the contribution to national and global disaster management. This correlates with participant FP6's idea that the "brothers" must understand Nigeria's situation and contribute to its quest to resolve its challenges.

5.5.3 Partner

It suffices to first acknowledge that Beijing could equally have fit into the rank of a "brother" for the following reasons: China is the most populous state in the world, while Nigeria is the most populated black nation on earth. Both states are also regarded as regional hegemonies, except that China is a rising global power and Nigeria is a middle power in the systemic context. Moreover, the statement of Nigeria's former president, Olusegun Obasanjo, to the former Chinese leader, Hu Jintao, at his visit to Abuja in 2006 shows the level of closeness between

the two states. Obasanjo said, "And when you are leading the world, we want to be close behind you. When you are going to the moon, we don't want to be left behind." (Michel and Beuret, 2009:11). Though friends and partners can attain this level of intimacy, occasionally it is the siblings (brothers) that lay claim to such a privilege.

Nevertheless, for this research, China (CGWIC) may be well-suited as Nigeria's "partner" because of its existing bilateral "strategic partnership", diplomacy, spacepower, and substantial contribution to Nigeria's space activities. Likewise, in line with participant FP6's benchmark, China identifies with Nigeria's internal issues and, as already mentioned in this chapter, contributes significantly to Abuja's economy and infrastructural development, including space technology.

China's classification as a partner corresponds with Li and Ye's (2019) study, which places the Chinese-Nigerian relationship within the "strategic partnership" category. As highlighted in Chapter 2, Section 2.7, Li and Ye (2019) argue that the bilateral relationship is long-term, stable, and not influenced by ideological or political differences but carried out on a mutual-respect, mutual-trust, and equality basis. This strategy is central to China's foreign policy in Africa, as Zhao (2014) suggests that, contrary to the West's pattern of relations involving ethical and political considerations, Beijing operates a policy of "non-interference" in states' internal affairs. Thus, this might account for its sustainable relationship with Nigeria.

Indeed, Nigeria and China have a long history of relations, including space collaboration. China has made several investments and milestone contributions to the Nigerian space sector, including building Abuja's only communications satellite, which significantly enhanced the telecommunications industry and the economy of the country. As discussed in Section 5.3, China's actions could be borne out of its quest for global power (Kuo and Kommenda, 2018). Thus, since Nigeria's space capabilities can be leveraged as spacepower to strengthen its continental influence, as this thesis has argued, it could be suggested that Beijing and Abuja operate marginally similar space and foreign policy strategies and can therefore partner in the quest to attain individual goals.

The second part of participant FP6's quote focuses on the statement that Nigeria *"must be very careful. There's no free lunch."* This phrase implies that there is a "price to pay" for obtaining a desired or valuable thing, even when it seems to be free of charge. In other words, Abuja would have to pay in some way if it is to achieve its aims from its association with the three

counterparts (Friend, partner, and brother). This connects to participant ST9's opinion in Section 5.3 that Beijing's offer "looks good" but that the state must be ready to pay the price.

Further, this relates to the discussion on realism and states' intentions in Chapter 1, Section 1.4.4. That is, the uncertainty surrounding the genuine motives of the three associates (friends, partners, and brothers) may eventually lead Nigeria to pursue its own security (Mearsheimer, 2007). This is supported by Lubojemski (2019), who argues that states build their defences due to their incapacity to recognise other states' intentions as natural or potential dangers. Therefore, it is vital to recall participant ST11's opinion about China's restrictions on knowledge sharing and participant ST8's classification of the Chinese collaboration as a "customer-client" affair in Section 5.4. The bone of contention here is that these participants' notions contradict China's classification as a partner, even though it appears Beijing is willing to support the Nigerian space agenda. Given realists' general uncertainty about states' intentions, it is important to understand why China must have withheld key information from Nigerian engineers and what it gains from the relationship. Also crucial is identifying how Nigeria stands to benefit from China in its quest to strengthen its space capabilities.

To respond to the questions, recalling the word "mutual" in Li and Ye's (2019) definition of the strategic partnership, which connotes bilateralism or cooperation, Chunsi (2008) argues that the mutual interests among states enhance their possibility of having sustainable collaboration on the space programme, suggesting that collaboration would be a sensible economic choice for smaller states hoping to rapidly develop their space technology. Tella (2018) therefore claims that the pursuit of international significance in the space sector, amidst other commercial and political reasons, is the motive behind Abuja's synergetic relations with China, while similarly, apart from its resolute interest in Nigerian crude oil, China's cooperation with the Nigerian space programme rests on its broader ambition to become a top actor in global space (space power). Further, Olukotun (2016) argues that Nigeria collaborates with Beijing for satellite launches because of the training and knowledge transfer involved for Nigerians, especially since the top space agencies are unable to share practical knowledge with the emerging states for security purposes.

A double-layered implication arises from the above statements: the first part is about Nigeria and China's respective agendas as it concerns their relationship. While China may be implicitly seeking to expand its global and space power, Nigeria is depending on this partnership to develop its national space capabilities in order to address its domestic issues and strengthen its

regional influence (spacepower). The second implication stems from Strange's argument that the power derived from the knowledge structure can be maintained and used to guide against any threat of competition. This reiterates the argument that Beijing uses its expertise in space technology as a source of structural power, thus raising the question of why China would want to train and transfer knowledge to Nigeria. The response may not be far-fetched. As a developing country, Nigeria does not have the same level of financial and technological capacity as the East Asian state. Hence, as part of its agenda, China may limit the quantity and quality of training and knowledge that are transferred to Nigerian engineers. This, according to Strange, would ensure the control of power in the knowledge structure.

This leads to the third part of the quote—Abuja needs experienced negotiators in order not to *"play into the sharks into the sea".* Applying the concept of realism, this phrase indicates that the international stage and bilateral or multilateral relations are competitive platforms where states or firms directly or indirectly seek their personal interests before others (Mearsheimer, 2007; Rathbun, 2008; Waltz, 2010). The NCR approach, however, places emphasis on the state/unit level because it is what shapes the state's perception and foreign policy behaviour (Rose, 1998).

In view of this, having a domestic or state-level team of space negotiators that can ensure that Nigeria does not fall on the losing end of its international agreements would be beneficial in a system where space powers protect their own interests even when it seems they are in support of less influential states. As discussed in Chapter 2, Section 2.1, Nigeria has a space governing council headed by the president. The council approves decisions made on national space matters, including funding, while NASRDA focuses on implementation. The ministry of science and technology, through NASRDA, is also responsible for negotiating Nigeria's satellite projects with foreign counterparts. Nevertheless, participant FP6 believes that the negotiating team or agency should not be appointed based on bureaucratic choices but on merit. That is, the negotiating team that would be of benefit to Abuja should include space experts who are knowledgeable about the indigenous space sector and Nigeria's space diplomacy, as this will enable them to get the best deal for the country in international collaborations.

This introduces the dimension of domestic ideas to the discourse. Since Rose (1998) argues that systemic pressures must pass through the domestic setting to form foreign policy behaviour, the solidity of ideas possessed by Nigeria's space negotiators can help Abuja withstand international pressure from the space powers and the space environment so that it

can hold sway. Further, as discussed in Chapter 1, Section 1.5.2, employing strategic ideas can influence states' foreign policy outcomes. Kitchen (2010) notes that ideas can be incorporated at the domestic level and could serve as the framework through which interests can be pursued. Certainly, the negotiators' knowledge could impact their perception and pattern of relations with their counterparts. Thus, amidst the three specific types of ideas (scientific, intentional, and operational) suggested by Kitchen, intentional ideas can be applied by Abuja. Intentional ideas are normative suggestions that reflect ethical preconceptions and seek to articulate states' actions simply because it is the right thing to do (Ibid). As such, Nigeria's negotiators must be driven by the national interest, ensuring that the space agreements are in tandem with the state's space goals and national developmental plan.

Nevertheless, considering the discussions in Chapter 4, it could be stated that there is not much Nigeria can gain in the global space arena when it still lacks the substantial space capabilities and infrastructure needed to acquire power. This reinforces the need for Nigeria to complete its satellite launching facilities and the AITC to achieve its spacepower goals. It is worth noting that Abuja requires foreign assistance to develop space capabilities that will aid the framework in gaining structural power.

This section examined the different types of associations Nigeria has with its space collaboration. The Chinese partnership could be helpful to Nigeria in its quest to use space capabilities to strengthen its regional hegemony. Thus, the next segment focuses on Nigeria's prospects in its relations with China, particularly on the development of its space capabilities for national development and boosting its continental influence.

5.5.4 Partners: Chinese Space Capabilities and Prospect for Nigeria's Utility

This chapter has established Chinese relations with Nigeria in space technology. Based on its space capabilities, China could be considered a space hegemon and could thus represent a threat to other powers if seen through the lens of realist scholars. Further, applying the structure of power analysis as discussed in this chapter, Beijing may have significant control over Nigeria in its space relations. Nevertheless, considering the thesis' argument for Nigeria to strengthen its regional influence through space technology, maintaining a partnership with China may be delicate but beneficial to Abuja's space agenda.

As highlighted in Chapter 2, Section 2.7, China's technological capabilities serve as a selling point in its association with Nigeria through its BRI (Way, 2020). Thus, with China's space-derived knowledge transpiring into military use and the production of new and mass-produced products, operational private and state-owned space firms, and added to the state's financial strength, especially the ability to give loans (Abolarin, 2023), Nigeria can leverage its partnership with Beijing in its quest for spacepower. This opinion is shared by participant ST11, who mentions that:

> *"China has a very big vision where they are building their own international space station. Going to Mars, they are also trying. […] We are still expecting strong collaboration with China. If they [NASRDA] are even asking China to train the astronauts to be able to get to space, not just for ego, but to also look forward to seeing what such a base can do and the international space station. If Nigeria can participate with China, […] there's no reason why Nigeria cannot join them to see what they are doing."* (ST11, Academic and Space Director, 10/08/21)

This quote indicates that Nigeria could strengthen its spacepower potential and build its space capabilities through its relationship with China. China is one of the leading actors in space innovation. Since the US banned China from using the International Space Station (ISS), the Chinese have embarked on building their own space station (Tiangong Space Station) (Jones, 2021; Wang, Zhang and Wang, 2023). Thus, the participant believes Nigeria could immensely benefit from Beijing's space projects and capabilities. For example, China could be given the task of training Nigerian astronauts and potentially hosting them at their space station. This would be a remarkable achievement for Abuja and particularly relevant to strengthening its regional hegemony. Though it is argued that states that fly to space for non-scientific or economic purposes get no real value in return except for prestige, it would be advantageous to Nigeria in terms of gaining reputation in Africa, national pride, and space education. Further, such collaboration between Nigeria and China could transcend into more advanced technology research and production, leading to the possession of sophisticated space knowledge and the provision of adequate security. Hence, advanced space knowledge could be disseminated within the country and among its technological institutions through NASRDA's capacity-building programme. This would empower the indigenous space engineers and impact the

space and non-space sectors. It would also improve Nigeria's space capabilities and space-power, giving Abuja more influence in Africa. This further links to the discussion in Chapter 4 about how Nigeria can acquire and maintain structural power in Africa through knowledge transfer programmes and the production of space spinoffs.

5.5.5 Nigeria-China Relations: Recognising the Limits— *"No free lunch".*

Based on precedents and the discussions in this chapter, Beijing has arguably played critical roles in Nigeria's space activities and capability acquisition. It is important to restate that Beijing was involved in the construction of Nigeria's communications satellite, the provision of loans, and the training of Nigerian space engineers, among other non-space incentives provided. As stated in previous sections, these actions give China access to data and partial or full control over Abuja's space agenda under the tenet of structural power. Thus, while both states seem to prioritise their relationship, Abuja must be wary of the potential threat and consequences that come along with the Chinese benefits. This is a reminiscence of FP6's opinion in Section 5.5. He states that *"…we must be very careful. There's no free lunch. […] we must identify people who are ready and willing to assist us so that we do not play into the sharks into the sea."* (FP6, Academic, 02/03/21)

Whether China is ready to assist Abuja without any ulterior motives is yet to be fully known. But considering Beijing's foreign policy strategy in Africa, as discussed in Section 5.3, and the reports from its BRI beneficiaries, it strengthens the argument for Nigeria to be alert to the potential threat that China poses. Revisiting the Zambian example in this chapter, the south-central African state was on the verge of being taken over by Chinese firms because it defaulted on its loan repayment. This implies that, even though the Chinese loan style may "look good", as participant ST9 stated, evidence suggests that it could be a master-slave relationship.

Nigeria is in a space and non-space partnership with China and owes the state a huge sum of money. As of March 31, 2020, Nigeria owed China concessional loans of USD 3.1 billion with an annual interest rate of 2.50 per cent, representing 3.94% of Nigeria's total public debt (Debt Management Office, 2020). Beijing's loans are so crucial for Nigeria's infrastructural development that when China suspended its payment to Nigeria, Abuja saw it as a dent in its national plan (Clowes, 2022). Nonetheless, this massive loan and the general perception of China's loan reclamation strategy, such as that seen in Zambia, have given rise to public uproar in Nigeria. The general belief is that the Chinese will take over Nigeria and its institutions if it

fails to pay its loans (Kazeem, 2020; Anichukwueze, 2022). Nigeria must therefore be careful and strategic in recognising the limits when signing agreements with China. This is linked to having experienced space diplomats who can negotiate favourable terms for the country.

There are also concerns about spying and national security, especially as space technology plays a key role in the provision of security. In 2011, the US Congress banned Beijing from the International Space Station (ISS) to secure its national security (Kluger, 2015). This is because Washington could not guarantee that China would not use the space capacity and its involvement to amass important information about the state. The Chinese are known for spying on other states and their institutions. Recently, the Chinese government was accused of snooping on government institutions in the UK (Al Jazeera, 2022b). Rayner (2023) argues that Beijing possesses the means to spy on British citizens through the weaponisation of microchips fixed in cars and on home devices, such as refrigerators and light bulbs. Thus, since Beijing is involved in Abuja's space programme, it has access to data about Nigeria's security and society. This means that Beijing may be able to spy on Abuja and launch cyberattacks against it when it is deemed necessary.

5.6 Conclusion

There are several reasons why space diplomacy is essential for developing the space sector and space capabilities in Nigeria. First, the need to acquire satellites and utilise the data for national development means that Abuja must seek foreign collaboration in the manufacture and launch of satellites. This has benefitted the state in many ways, as discussed in this chapter. The second is linked to the first; that is, Nigeria ought to strengthen its diplomatic relations to leverage modern innovations in the space arena. This is because knowledge and technology are crucial to the provision of security, production, and other essential services, including revenue and expenditure. Third, for Nigeria to strengthen its influence on the continent through space, its space capabilities must be operational (also discussed in Chapter 4). This requires partnerships with influential space states or firms to develop the space infrastructure. Further, as an upcoming space state, Nigeria cannot afford to be isolated in space diplomacy. Thus, Abuja needs collaboration to propel it, accomplish its space dreams, and strengthen its spacepower.

This chapter has provided an answer to the third research question as outlined in the introduction of the thesis. The chapter examined Nigeria's main space partnerships and how

they contribute to its space potential. Nigeria's space counterparts were classified into three categories: friends, partners, and brothers, with the US, CGWIC, and SSTL, respectively, grouped into each category. The chapter demonstrates that the SSTL, a privately run firm, and the CGWIC, a Chinese state-owned corporation, played key roles in the construction and launch of Nigerian satellites. They also contributed to the development of Abuja's space programme as it was discovered that Nigeria prioritises capacity building in its collaborations in order to obtain and retain knowledge. Capacity building is central to Abuja's space agenda and is always at the centre of any of its foreign agreements.

A key finding was that some irregularities were identified in Nigeria's space collaborations. For example, there was an issue with the provision of data by SSTL at the early stage of Nigeria's space adventure. Even though SSTL was classified as a "brother" to Nigeria in the space collaboration, it was noted that Abuja may have been naive not to request or include, as part of the contract, the provision of comprehensive data, among other benefits, from SSTL.

The other irregularity found was the restriction of space knowledge by the Chinese company. This was affirmed by a participant in Section 5.4, who claims that officials at the CGWIC were a bit "crafty", suggesting that the Chinese officials were economical with their sharing of space knowledge. Indeed, with the application of structure of power theory, it seems clear that Beijing may have been protecting its knowledge capability from Abuja, as this was essential to maintaining their control and structural power.

Broadly, the chapter identified the provision of loans with favourable long-term repayment plans, knowledge transfer, and investment in key sectors as China's diplomatic strategy in Africa. However, it can be argued that these strategies are part of Beijing's BRI (Belt and Road Initiative), set up to acquire global dominance (Kuo and Kommenda, 2018).

China sees Nigeria as a "strategic partner", and this chapter suggests Beijing as Nigeria's "partner" in the space arena. The chapter found that, considering the uncertainty of predicting states' intentions in NCR, Abuja needs to have a source of power to enable it to hold sway in the global arena of space. This leads to the suggestion that Nigeria could benefit from Beijing's support as a "strategic 'partner'" in its quest to develop its space capabilities and thereby strengthen its spacepower, despite being in collaboration with China on other grounds. Nigeria could benefit from China's Tiangong Space Station and have its astronauts trained and potentially hosted in outer space. Even though this may grant Abuja a prestigious status that has no real economic value, there are other benefits, such as research and production of

advanced technology, space power, space education, and national development, which can lead to better security and economic growth.

Nonetheless, considering China's history and capabilities, as discussed in this chapter, Nigeria must be able to recognise the limit. It is important that the West African state maintain some level of control in the relations, especially access to and maintenance of satellite data, in order to guard against being totally vulnerable to Beijing. On the other hand, Abuja must be ready to pay the price for its relations with the powerful Asian state. This leads to the next finding: Nigeria needs competent negotiators who possess experience in space diplomacy and relevant knowledge and ideas that can help the state withstand international pressure from space powers. Nigeria's negotiators must be driven by the national interest by applying intentional ideas to ensure that the country achieves beneficial space agreements.

On this basis, the following suggestions can be recommended: Since the chapter discussion implies that within the Nigerian space programme and activities, China has an economic and technical influence, which reinforces its structural power, Abuja could further engage with Beijing in completing its launch site and AITC. This could be through the acquisition of technological gadgets and securing loans. In the meantime, the Chinese space firm CGWIC could be contracted to construct more communications satellites for Nigeria. This is because NIGCOMSAT-1R, the only national communications satellite, is entering its final years in space. However, it is important to note that Abuja must tread with caution in its collaboration with China. The state can learn from Zambia's experience. That is, if Nigeria defaults on its agreement with China, the state could lose ground in the bilateral relationship. In this case, the Asian state's global agenda will be strengthened, thereby expanding its influence on the continent of Africa. The Nigerian engineers' experience with CGWIC serves as another significant point of caution. As noted in this chapter, the engineers were deprived of certain knowledge, which contributed to their inability to design and build a communications satellite independently or collaboratively. Thus, China, with its advanced capabilities, can decide to continue maintaining its influence under the key structures by regulating what it makes available to recipient states.

Chapter Six: Theoretical Contributions

6.0 Introduction

The previous analysis chapters examined the importance of space capabilities and space activities to Nigeria's domestic environment, regional influence, and space diplomacy. According to the tenets of NCR and spacepower, the domestic environment and national space capabilities are respectively relevant to a state's foreign influence. Thus, Chapter 3 examined the challenges confronting the Nigerian state and proposed solutions and contributions to address the national issues using space applications. The next chapter (Chapter 4) focused on how Nigeria could use space capabilities to control the four power structures, as Strange's IPE theory suggests. The implication of this is that Nigeria can gain structural power and strengthen its position as a leader in the African region. Consequently, Chapter 5 examined Abuja's space relations with powerful states and firms, its space diplomacy, and how they impact the state.

This penultimate chapter pulls the findings from the analysis chapters together by answering an overall theoretical question posed in Chapter 1. The multi theoretical approach to this thesis is necessitated to leverage the potential impact of space as a source of structural power and to strengthen Nigeria's regional influence and foreign relations (space power). Thus, considering the combination of the spacepower, NCR, and structural power theories, this chapter looks at the main points that emerged from the analysis and explains the impact of the space capabilities on the domestic environment and how they can be used to strengthen Nigeria's external influence. The chapter includes crucial suggestions for the future of Nigeria's foreign activities, driven by space.

The chapter is divided into three parts. The first section discusses the connection between spacepower and NCR, as they both involve domestic and international environments. The second section focuses on spacepower and structural power, analysing space as a new power structure with Nigeria as the focal point. The final part centres on Nigeria's foreign policy, with discussions of its space capabilities as material power capabilities, its new approach as a middle power and regional power, and the domestic environment's response to systemic pressures.

6.1 Spacepower and NCR: Balancing the Domestic and International Settings

As highlighted in Chapter 1, Section 1.2, there is not yet a fully developed spacepower theory or comprehensive definition of spacepower. However, we may define spacepower as the states' ability to utilise space capabilities for achieving national goals and capably act in the international arena (Lupton, 1998; Peter, 2010). This connotes that the domestic environment significantly features in spacepower and equally benefits from the state's space capability to enhance the attainment of national objectives.

Peter (2010) suggests a link between spacepower and national power. This is because while national power is the state's decisive effort and capacity to accomplish strategic goals, the use of space capabilities by the state, including its space activities and space agency, to accomplish its internal and external goals can be termed as spacepower (Lupton, 1998; Peter, 2010). Hence, it can be stated that part of Nigeria's spacepower is the use of space technology as a national power to address its domestic issues.

In tandem with foreign policy, the state's strategic goals can be termed "national interest", while in correspondence with NCR, national power can be defined as the state's action and capacity to strengthen its domestic setting in order to respond to external pressures as part of pursuing its national interest. This shows that the spacepower dimension and the NCR theory both take into consideration the domestic and global environment. Indeed, NCR is concerned with the importance of national policy, the nature of political governments and systems, ideology, the political economy, and institutions of a state (Adigbuo, 2007), and how these influence the state's foreign behaviour. On the other hand, spacepower involves the use of national capabilities, such as the space agency and space facilities, to guide the attainment of national objectives and drive international activities (Peter, 2010).

Nigeria has experienced several internal challenges, especially in the areas of security and the economy. Abuja has issues ranging from border security, jailbreaks, land disputes, banditry, and terrorism to kidnapping. In the economic aspect, the state's crude oil market is affected by the fluctuations in the global oil price, crude oil theft, and inadequate agribusiness facilities, which have hampered food security and the development of the agricultural sector. Thus, this shows that national security and the economy are the two most important issues for the Nigerian state. Therefore, the problems needed to be addressed in order to stabilise the country.

Nigeria's space capabilities are the source of its spacepower, and as this thesis proposes, the state could resolve many of its domestic problems with its space applications and expertise. Indeed, as discussed in Chapter 3, Abuja's space satellites, applications, and devices were demonstrated as a way to address national problems. The whole idea is that space technology and its applications can strengthen the domestic environment, thus putting Nigeria in a strong position both internally and, by extension, externally. In a broad sense, the ability to address domestic challenges with space capabilities is evidence of Nigeria's spacepower, while the capabilities and effort put in place are national power.

In the global arena, anarchy is the modus operandi, according to the NCR theory. Likewise, in the concept of spacepower, the states' ability to act and control activities through space in order to attain their national interests (security and military, economic and political) and influence other states' behaviour is crucial (Peter, 2010:351). Therefore, both the NCR and spacepower emphasise the significant nature of the systemic environment. In this case, Nigeria will leverage its space capabilities in the form of four structures to acquire power and maintain its influence in Africa. The focus on Africa is based on Nigeria's concentric circle of foreign policy, which makes Africa the centrepiece.

Chapter 4 focused on the use of domestic space-based capabilities to control security, production, knowledge, and finance structures. To reiterate, though the discussion mainly centred on Africa, it shows the power play and the potential influence attainable in the systemic environment. Furthermore, because the great powers or superpowers wield power at the centre, Nigeria's space capabilities are critical to its response and actions at the centre. This reaffirms the correlation that exists between NCR and spacepower.

6.2 Spacepower and Structural Power

Peter's (2010) definition of spacepower as a state's ability to influence activities in space to achieve its security, military, economic, and political goals and to influence other global actors is similar to the idea of structural power. As previously stated in this thesis, structural power is the capacity of a state to shape and determine the structures within which other states must operate, and it confers power on the key actor (Strange, 1994, 2015). Thus, the ability to influence other states and shape their operational patterns is the meeting point of spacepower and structural power. Indeed, Peter (2010:351) continues by stating that the possession of

equipment and human resources is insufficient for spacepower unless the assets are structured for executing special missions. The structuring of assets (resources) confirms the position of Strange's structural power theory.

Nigeria aims to use its space capabilities as a spacepower in quadruple form to acquire structural power. Chapter 4 demonstrates the strategic use of Nigeria's space capabilities for the acquisition of structural power on the continent of Africa. This is done through the control of the space-enhanced structures. Nigeria's space infrastructure and space applications play critical roles in the state's security, knowledge, production, and finance structures. Once the structures and incentives are put in place (Cohen, 2016) through the provision of space-enhanced gadgets or support to the military and security forces, the production of relevant materials, the strategic utility of knowledge, and the availability of funding, among other things, other recipient states in Africa and beyond may have no option but to operate by Abuja's standards. As a result, we can assume that Nigeria's spacepower is the method by which the state uses its space capabilities to take control of the four major structures and acquire structural power.

The use of space capabilities to influence activities could also involve negotiation. As discussed in Chapter 5, Nigeria would benefit from highly skilled space experts who can efficiently negotiate on behalf of the state in the global arena. This is essential because Abuja needs partners in order to develop its space capabilities, through which it can exercise spacepower to gain structural power. For example, China is a strategic partner of Nigeria and could contribute more to its space quest, even though Nigeria needs to be wary.

6.2.1 Space as a New Power Structure: The Nigerian Case

As discussed in the literature (Chapter 1, Section 1.6), Susan Strange, who conceptualised structural power theory, presented four structures for acquiring power. This is through the control of the security, production, finance, and knowledge structures. It is important to highlight the significance of technology for these structures. As Strange claims that security is the most essential human need, thereby influencing the economy (Strange, 2015:49), the production of highly sophisticated weapons and defensive systems involves the use of technology. Similarly, in the production and assembly lines, technology and modern machinery of various calibres are used. The knowledge structure is also largely reliant on technology because technology

development aids new knowledge and vice versa (Russell, 1995). That is, the acquisition of knowledge contributes to the advancement of technology and its efficiency. Essentially, knowledge is required for modern technology. Technology is equally crucial to the finance structure. The software and the banking swift transfer process facilitate the transfer of funds between states, actors, or organisations. These developments are rooted in technological advancement.

Space is a significant and sustainable source of technology development. As discussed in Chapter 2, the space race between the US and the Soviet Union provides insight into the impact of space on technological advancement. At the time, both states increased investments in technology and military hardware for advanced space operations, resulting in the overall development of the space sector and its spinoffs. For example, the military's use of space has changed from solely building up key capabilities to using space to gain operational and strategic advantages in land-based war (Hays and Lutes, 2007). Further, the emergence of modern space exploration, exploitation, and innovations by the private sector, such as Space X, as well as the weaponisation of space, demonstrate space and its uses as a major source of power.

Therefore, while technology was pivotal to Strange's structures, technological advancement and private investment in space were just evolving. Prior to the passing of the renowned international relations scholar, the field of space technology had not been as widely researched as it is today and thus was not an area simultaneously contested by several states for the acquisition of power. Until the early 1990s, as mentioned, the US and the Soviet Union were the only states that significantly harnessed the potential of space technology. Nonetheless, space has become a crucial area in academia, international relations, and other fields. In the realms of international relations, states use space to develop capabilities, resulting in the acquisition of spacepower and, by extension, structural power or other forms of power.

As mentioned in Chapter 2, there is a large literature on spacepower with a diverse focus on practical and theoretical approaches from the fields of international relations, political science, history, and military and security studies. However, there are limited contributions from the application of international political economy theory to spacepower or the entire space subject (Lieberman, 2017a; Rementeria, 2022). This thesis has filled a gap in the literature by examining space as a fundamental power structure from the perspective of foreign policy and the strengthening of the state's regional influence. The Nigerian case study provides evidence that space capabilities can be a source of power for addressing national issues and strengthening

regional influence. Chapter 3 discusses the role of space in addressing domestic economic and national security issues. While this relates to the domestic environment, it is crucial for Nigeria's foreign policy because the domestic setting is relevant to its external activities. Hence, the utility of space capabilities nationally can aid national power in the pursuit of national interests.

Abuja's space capabilities are also essential to its continental influence. Nigeria's space agency, space factory (AITC), operational satellites, launch pad, and the fact that the country is relatively close to the equator, which gives it an advantage when launching satellites, as well as other related capabilities, represent new ground for gaining or strengthening the state's influence on the continent. Nigeria's military operations can benefit from its space applications, as discussed in Chapter 4, especially given that the country just launched its military satellite (DELSAT-1). In addition, the space expertise that Nigeria possesses can contribute to the development of other African states' space and non-space ambitions through its knowledge transfer programmes. This is also linked to the production structure; that is, knowledge will contribute to the increased manufacture of space gadgets and satellites in Nigeria's facilities for African communities. This implies the level of Abuja's structural spacepower to shape others' ways of operating.

The analysis of Abuja's space collaboration with the Chinese CGWIC and British private firm SSTL, among others, in Chapter 5 demonstrates the crucial and strategic nature of the space arena and space capabilities for the acquisition of power. As discussed in the same chapter, China is involved in Abuja's space journey and activities to arguably promote its Belt and Road Initiative (BRI). This agenda is said to have been put in place to allow Beijing to gain more global influence. As explained in Section 5.6, China's contribution to the West African state's satellite construction and its loans create an avenue for the control of the knowledge, production, and finance structures, all of which have an impact on the security structure. Equally, Nigeria is a partner with China and sees its "strategic partnership" as an avenue for the development of its space capabilities, even though it requires that the state negotiate favourable terms with the Chinese and other space counterparts.

Consequently, space is an important area in determining where and how power can be acquired through the control of structures. What is particularly noteworthy about structural power is its ability to hold, control, and maintain power, which in this case is spacepower. Structural power does not have to be used only by powerful actors; it can be used by any actor or state as long as the key actor has the capabilities (space capabilities) to control other recipients and shape

how they and their institutions operate. This is exactly Abuja's quest, especially within the continent of Africa, where its foreign policy is mainly focused, thus affirming space as a new structure of power. On the other hand, the study's demonstration of spacepower within the Nigerian context stands as a major development of the theory of spacepower. Hence, this is a contribution to the field of spacepower, as there is a lack of application of the concept to Nigerian space activities.

6.3 Foreign Policy: NCR and Structural Power

This research has analysed Nigeria's foreign relations and space activities using the NCR concept as well as structural power theory. One of the key findings is that Nigeria needs an alternative source of revenue and power besides mainly crude oil and the military's security capabilities, which are on the decline. Thus, participants suggest the use of space capabilities as a means of strengthening Abuja's regional influence. In the discussions that follow, the relevant components of NCR are applied to how Nigeria can strengthen its external influence.

Rose (1998:146) suggests that NCR "adherents argue that the scope and ambition of a country's foreign policy is driven first and foremost by its place in the international system and specifically by its relative material power capabilities.". This implies that Nigeria's position as a middle power and a regional hegemon, as established in Chapter 1, Section 1.4.4, can be crucial to its external influence through its spacepower. However, NCR further suggests that "the impact of such power capabilities on foreign policy is indirect and complex because systemic pressures must be translated through intervening variables at the unit level." (Ibid:146).

Thus, the first part of this section establishes Abuja's space capabilities as material power capabilities (MPCs). The next section discusses the potential contribution of Nigeria's spacepower to its status as a middle power and regional power. Ravenhill's five C's attributes (capacity, concentration, creativity, coalition-building, and credibility) are applied to this section.

6.3.1 Nigeria's Space Capabilities as Material Power Capabilities (MPCs)

Material power capabilities (MPCs) are broadly defined as the central dominant factor that shapes the pattern of states' foreign policies. In other words, the MPCs are the quantifiable

power that states can use to influence each other. As discussed in Chapter 1, realists measure power based on material capabilities and socio-economic elements (Mearsheimer, 2007). These are mainly wealth, population, raw potential, military power, and technology possessed by a state (Mearsheimer, 2007; Fuchs and Glaab, 2011). Nigeria leverages on the revenues accrued from crude oil; the military's contribution to security within Africa (though recently weakened); the country's size and population; as well as financial donations to continental organisations (See Chapter 2). However, as this thesis has shown, these MPCs have declined due to domestic issues.

On the basis of this research's argument, Abuja's space capabilities can be the new MPCs. Fuchs and Glaab (2011) suggest that the material sources of power can either be actor-specific or structural in nature. This implies that Nigeria's space capabilities can be both actor-specific and a source of structural power. As established in Chapters 3 and 4, Abuja's space-enhanced applications and security gadgets, such as the indigenously designed sensor smart shoes and surveillance devices, satellites, and space data, as well as the Assembling, Integration, and Testing Centre (AITC) and spaceport (both under construction), including the space agency, represent a solid ground for either strengthening the realists' MPCs (wealth, population, raw potential, military power, and technology) or using them in the form of structures in order to acquire structural power.

This thesis shows that Nigeria's space capabilities can be used to aid all the components that make up the MPCs. Indeed, as Bowen (2020) argues, space technology is a crucial component of a modern state's infrastructure and economy, and as such, it has the potential to confer power in international relations. Hence, the state's space applications and derived data from its military satellite can enhance the armed forces' strategies and missions, as well as strengthen national and border security and improve the economic situation in the country. Also, space technology can be used to augment production in the agricultural and oil sectors, including ensuring the citizens' welfare in terms of early disaster detection, the provision of timely security information, and the use of space data for census and election purposes, among other functions. These were all addressed in Chapter 3.

On the other hand, Fuchs and Glaab (2011) argue that material power as a structural power can be used by excluding specific political choices that are available to other actors and concentrating on the effect of production and utility procedures on the actors' power. This

correlates with the structure of power theory. Abuja's space capabilities, through the four structures of power, serve as a means for strengthening its regional influence. The dimensions of Nigeria's space capabilities and structural power were comprehensively examined in Chapter 4. The chapter presented the path through which structural power can be acquired with space capabilities via the control of security, production, finance, and knowledge structures (Strange, 1994, 2015). Thus, since Abuja's space capabilities are enablers of these structures, it suffices to assert that the space capabilities are MPCs, which are utilised structurally for the acquisition of power.

Agenda-setting is also crucial to the control of structures. With its space capabilities and human expertise, Abuja can set the agenda within Africa and determine and shape the structures in which other states, their political institutions, economic enterprises, scientists, and other professionals must operate (Ibid). Linking this to the concept of spacepower, we may suggest that the strength of Nigeria's spacepower lies in its ability to set the agenda through its space capabilities and influence other actors.

Conclusively, drawing on the idea that MPCs impact states' foreign policies and their influence on other states, as suggested in this thesis, Nigeria's space capabilities constitute the spacepower that could set off other parts and influence its foreign policy and regional hegemony.

6.3.2 A New Approach: Nigeria as a Middle Power and Regional Power

This section is grounded on the premises that Nigeria's international position and MPCs (spacepower) will drive the capacity and ambition (national interest) of its foreign policy, taking into consideration that the MPCs have a complex and indirect effect on foreign policy, as systemic influences must be translated across intervening variables (Rose, 1998). This, therefore, requires examining Nigeria's foreign policy approach and how the space-enhanced domestic environment will contribute to it.

As established in Chapter 1, Nigeria is a middle power with a regional influence. Middle powers are global influencers with the ability to stabilise the world (Cooper, Higgott and Nossal, 1993; Jordaan, 2003; Flemes, 2007). Though Cooper, Higgott and Nossal, as well as Jordaan and Flemes, base their thoughts on the activities and contributions of the state towards

global stability through international organisations, in this context, Nigeria's MPCs (spacepower) could enhance and widen its influence in the international system. Since Abuja is a member of several international bodies and a contributor to international peace, its space capabilities could help enhance the global space agenda and aid in the negotiation of favourable terms for itself, Africa, and global interests.

To clearly present Nigeria's potential new foreign operations, Ravenhill's five C's attributes (capacity, concentration, creativity, coalition-building, and credibility), discussed in Chapter 1, are applied in this section based on Abuja's space capabilities and their contributions.

6.3.2.1 Capacity

Ravenhill (1998) argues that the middle power's foreign ministry and diplomatic services are more important than its military and physical capabilities. Thus, the use of top analytical skills, communication networks, and intelligence gathering is prioritised, especially because the state often has sufficient diplomatic tasks that enable it to share its ideas. This is where structural power fits in. As garnered from Chapters 3 and 4, Nigeria's spacepower can enable it to function effectively in this capacity. The strategic use of Nigeria's space capabilities has the potential to open the state up to further advanced diplomatic engagements.

As discussed in Chapter 4, Nigeria's space knowledge and its expertise will be crucial to the analysis of key data and the operation of communication gadgets to gather intelligence as part of its global and continental role in promoting peace and stability through the provision of security and information.

Further, Nigeria's spacepower can contribute to its continental influence through its space activities. As a host of UNOOSA's African Regional Centre for Space Science and Technology Education in English (ARCSSTE-E), Abuja's space capabilities will contribute to improving participants' experiences while they comprehensively utilise the space facilities. This does indeed serve as part of the state's capacity-building agenda discussed in Chapter 2. In view of the tenets of structural power, this strategy and capability give Nigeria more power because the state is able to provide and control the facilities that other states use.

6.3.2.2 Concentration

Due to the limited number of objectives and the few resources available to carry out their foreign policy agendas on a timely basis, the middle powers frequently prioritise areas that they believe will yield results (Ravenhill, 1998). This may suggest why Nigeria's foreign policy is Afrocentric (Oshewolo, 2019). That is, Abuja prioritises its continent on its foreign agenda. Hence, with its space capabilities, Nigeria could be able to comprehensively execute its regional responsibilities as well as its international engagements.

Space technology provides a sustainable platform for various applications and relevant processes. As highlighted in Chapter 4, Nigeria's space gadgets, satellites, and applications, if channelled appropriately for military use in their missions, could enhance security on the continent. Similarly, while Nigeria focuses on specific foreign tasks, its structural power can enable the state to counter potential threats, both intentionally and unintentionally (See Section 4.2.1). This is because once other states become aware of Abuja's spacepower and its space-enhance security formation, they will be restrained.

Also, as a member of several international space and non-space bodies, including bilateral collaborations, Nigeria's space capabilities will enable the state to contribute immensely to the development and attainment of specific goals. For example, the rockets or satellites to be launched from Nigeria's spaceport will contribute to the betterment of society since satellites are often built and utilised for sustainable purposes, especially to enhance human living conditions. Hence, through this, Abuja will be playing its role as a middle power.

Furthermore, as discussed in Chapter 1, Section 1.3.2, Wohlforth (1999) believes that middle powers can only have an impact on the systemic setting if they form alliances with other regional unipolarity and translate their economic potential, power projection, and defence industry into the material capabilities required to be a pole. Following the discussion in Section 6.3.1, Nigeria's space capabilities represent its material capabilities; thus, in line with the finding in Chapter 5 that Abuja needs to maintain space collaboration with China and other relevant actors, this will broaden the country's ability to collaborate more freely and contribute to global institutions, thus making an impact in the international environment.

6.3.2.3 Creativity

Ravenhill (1998) suggests that middle powers base their diplomacy on the provision of either entrepreneurial, intellectual, or structural leadership. Chapter 4 focused on Nigeria's

acquisition of structural power through its space capabilities. Hence, it could be suggested that Abuja's foreign policy and strategies should include the use of its space capabilities in the form of structures. The knowledge structure, which emphasises the importance of ideas and the skills of space experts, provides an opportunity for Nigeria to control the knowledge structure through its space engineers' creativity and ideas. Abuja's space infrastructure, efforts to build capacity, and foreign collaboration will aid the domestication of space knowledge, serving as a means to educate new experts and empower space engineers. This is an important aspect of a growing middle power. Hence, the Nigerian government must prioritise this aspect of knowledge structure. That is, unless Abuja captures the space knowledge and expertise, it won't be able to grow or set the regional agenda.

Ravenhill further acknowledged the importance of creativity and ideas by emphasising that "quick and thoughtful diplomatic footwork" can compensate for any weakness in a middle power's relative economy, politics, or military (pp. 311-312). This buttresses structural power's position that the control of structures supersedes material capabilities. Thus, Nigeria's structural spacepower and its agenda-setting can be vital to compensating for Abuja's material weaknesses while acting swiftly in diplomatic affairs.

6.3.2.4 Coalition-building

According to Ravenhill (1998), middle powers can channel their creativity toward coalition-building. He further states that the nature of specific issues will determine the composition of the coalition, which may include other middle powers, smaller states, and great powers. Therefore, as a middle power, Nigeria can collaborate with China in space in order to have a global impact, since Ravenhill also argues that middle powers need to build alliances through entrepreneurial and intellectual leadership to reach their goals in the international system (Ibid). This makes it even more important for Abuja to use creativity and ideas in its space collaboration. As discussed in Chapter 5 and based on Nigeria's experience with space diplomacy involving China and SSTL, Nigerian negotiators must be skilled at negotiating and framing issues in ways that encourage unified bargaining and lead to agreements that are beneficial for Abuja and the continent of Africa.

Linking the above to Rose's (1998) suggestion on the indirect and intricate effect of relative material power capabilities on foreign policy, the implication of having skilled negotiators in

space diplomacy is that they represent an asset at the unit level in the intervening variable of NCR. Nigeria's space knowledge and capabilities, as previously stated in Section 6.3.2.3, are critical for training new professionals and developing indigenous space diplomats. As a result, this capability provides an advantage for Abuja in the global space arena. That is, pressures from the international environment can be handled by Nigeria through its space competencies in the knowledge structure.

6.3.2.5 Credibility

Ravenhill (1998) maintains that a middle power that pursues its interests and is not likely to be the only prime recipient of the negotiated outcome may find its initiatives more acceptable to other powers. Nigeria's influence and benefit from its space capabilities would be used to leverage its continental responsibilities. This is because Abuja approaches its foreign activities based on how they affect itself and Africa. Moreover, the middle power needs to be consistent with the local and international policies it advocates (Ibid). As Chapter 3 addressed Abuja's domestic challenges through space capabilities, the state's consistent foreign policy focus on Africa could benefit from Nigeria's space diplomatic capacity, thus providing material and non-material support to the region. Indeed, Nigerian spacepower can ensure consistency in the state's contribution to the region. This can be in the form of security, production, knowledge, or the provision of financial capital.

6.4 International Pressures

Rose's (1998) statement in Section 6.3 shows that the international arena is crucial to the NCR theory, as well as to the concept of spacepower. Powerful states leverage space to their own advantage by investing resources and developing relevant capabilities. The US, Russia, China, ESA, among others, possess modern space capabilities and experts, which have all contributed to their spacepower. As discussed in Section 6.2.1, space indeed is a major contributor to these great powers' power structures—security, knowledge, and other technical prowess. Thus, space is a structure for the acquisition of power and the maintenance of influence in the global context.

As discussed in this thesis, the mid to the late 20th century space race gave insight into states' pursuit of power and its effect on the domestic environment. The US and the Soviet Union increased their spending on national technology and military hardware for advanced space operations, thus transforming their domestic administrative strategies and resulting in the significant development of the space sector and its spinoffs (Roberts, 1988; Burwell, 2019; Rementeria, 2022), which have become part of our daily lives. This shows the impact of systemic pressures on a state and its national capabilities.

Gilpin (1981) asserts that great powers or superpowers create and coerce general rules and rights that serve as a guide in the systemic environment. The US and China are considered global powers and space powers because of their advanced technology and space facilities, as well as their research and development efficiency. Thus, in the anarchic system, such states influence decisions and activities that affect other states and actors.

In NCR, the perception of the international environment is crucial to states' interpretations and foreign policy behaviours. As established in Chapter 5, Nigeria perceives the US as a friend based on historical events and collaboration between the two countries. In the non-space sector, Abuja has also purchased several military hardware devices and fighter jets from the North American state, including collaborating on military training. Thus, the US is an acknowledged powerful state within Nigeria. On the other hand, Nigeria and China are strategic partners (see Chapter 5, Section 5.5.3). As discussed in the same chapter, since the Chinese are collaborating with Nigeria in order to enhance their global influence, albeit China is a space power, the Asian state constitutes international pressure. Hence, Abuja needs to be wary, especially in the realist domain, where states' intentions cannot be predicted. This emphasises the significance of domestic structures as well as their relevance and influence on Nigeria's foreign policy.

6.4.1 Nigeria's Domestic Environment and Influence on the Systemic Pressures

6.4.1.1 The Economy

As a revived economy that purposefully leverages the use of space capabilities and applications, the Nigerian agricultural and oil sectors would perform at an improved productivity level. As discussed in Chapter 3, space-enhanced farm products, machinery,

storage facilities, and transport vessels, as well as accurate time estimation and management, would improve the Nigerian state, thus reducing food insecurity and dependence on foreign counterparts. The oil-producing areas can also be effectively monitored through satellite-enhanced gadgets to ensure security, accountability, and quality production procedures.

6.4.1.2 The Security

Nigeria faces a significant challenge in terms of security, as this thesis has highlighted. Thus, space-enhanced applications and products such as the sensor smart shoes and surveillance systems would address border insecurity and domestic problems such as terrorism, banditry, and the decongestion of the prison, thereby making Nigeria a peaceful state where businesses can thrive while attracting foreign investors. These will reduce the pressure on domestic security agents.

6.4.1.3 The Space Capabilities (Spaceport and AITC)

The spaceport and the space manufacturing facility represent the most important strategic means Nigeria requires to maintain sustainable influence in Africa and globally. Since both facilities could enhance Nigeria's spacepower, it will be crucial to deter pressure from the global arena. For example, African countries that usually use US, Russian, or Chinese space facilities to launch their satellites will probably prefer Abuja. This is due to the distance between the African states. Thus, these indigenous facilities could make Nigeria a powerful force to reckon with on the global stage.

The elites' perception is also vital in NCR. Thus, having these space capabilities could influence the Nigerian elites' perception of powerful space states and other countries. This is because Abuja would not have to launch its satellites or other gadgets at other states' facilities. Rather, it would become a potential destination for space launches, thereby utilising its structural capabilities to acquire power. The use of Nigeria's space capabilities as a source of structural power has been demonstrated to be spacepower and is essential to responding to systemic pressures. This is because it eliminates the use of coercion; instead, when structures are set, other states' behaviour will follow accordingly.

Chapter Seven: Conclusion

This thesis has examined the importance of space capabilities for addressing Nigeria's domestic issues and strengthening its regional influence and space relations. As explained in the introduction, this final chapter has three purposes. The first is to give an overview of the thesis. The second is to provide a summary of the research's findings by reviewing the central research questions. The concluding section discusses the implications and limitations of the study and possible avenues for future research.

7.1 Research Overview and Contribution to Knowledge

The study of space technology and the role it plays in international relations is multidimensional. In an article published on space and Nigeria's external relations and regional hegemony, Tella (2018) examines the importance of space technology in strengthening Abuja's foreign affairs and regional influence, observing that Nigeria's 'benevolent leadership in the space regime is critical to solving the challenges on the continent that require space science and technology' (Ibid:46). This thesis contributes to the developing research area of space and international relations by examining the use of space technology as a centrepiece for addressing Nigeria's domestic issues in relation to its external activities using NCR (Neoclassical Realism), the spacepower concept, and the International Political Economy (IPE) structural power theory.

The research broadens knowledge in the theory of NCR with the application of space capabilities to the analysis of the domestic environment, especially the national economy and national security, which are crucially relevant to the state's external activities. The study also broadens knowledge on the tenets of spacepower and structural power by focusing on how Nigeria could maintain power and influence other states in Africa through security, production, knowledge, and finance structures. The study builds on previous studies and focuses on contemporary issues surrounding Abuja's regional influence and space relations.

Examining the role of space in Nigeria's domestic environment and foreign activities, as well as its space diplomacy, this research contributes to various areas of existing literature. Considering the importance of the domestic environment to foreign policy, as discussed in Chapter 3, the study gives a detailed analysis of the national issues, particularly to understand

the contributing factors to Abuja's declining regional hegemony. Hence, the national economy and national security, specifically poor agricultural production, transportation, and storage, oil theft, a lack of operational refineries, terrorism, and porous borders, were found to be the most important issues that needed to be addressed. The research contributes to and provides better insight into the use of space applications to tackle these national issues, thus impacting external activities.

On this basis, this thesis contributes to this crucial aspect of research by, first, combining the NCR theory and the IPE structural power analysis and, second, highlighting space as a reliable source of power for Nigeria's foreign policy. Third, as discussed in Chapter 4, the application of the IPE structural power theory is considerably lacking in the context of African politics and space research. Thus, this thesis contributes to this field by applying structural power theory to space technology as a means to control structures and acquire power in Africa. By undertaking empirical research, this study also contributes to the development of structural power theory. Based on the space and foreign policy-related literature, the research highlights the use of space capabilities in the form of security, production, finance, and knowledge structures to exemplify how Abuja can shape other states' operations and strengthen its regional influence. Fourth, as highlighted in Chapters 5 and 6, this thesis brings to life the criticality of national power, spacepower and space collaboration. That is, the space-enhanced domestic environment represents Nigeria's national power in the pursuit of its national interests, just as the state's space capabilities form the basis for its spacepower in Africa. Thus, since spacepower theory is evolving, this study contributes to the theory by analysing Abuja's acquisition and use of its space capabilities. The research also adds to the area of space diplomacy by highlighting the importance of negotiations in Nigeria's space partnership.

Finally, considering the above points and the empirical discussions in this research, the thesis puts forward some suggestions for the study of space and foreign policy. The research adds to the current empirical analysis of Nigeria's space and foreign policy direction. The suggestions are based on the strategic contributions of space applications and space activities to Nigeria's regional endeavours, affirming space as a new source of power in its foreign relations. The section that follows discusses the thesis's key findings and how they addressed the research questions.

7.2 The Research Questions Addressed

The four key questions listed below served as a guide for this thesis and determined the direction and process of the research:

1. To what extent does space technology contribute to Nigeria's domestic environment, and in which sectors?

2. To what extent do Nigeria's space capabilities enhance its regional influence, and how does this align with its foreign policy?

3. How do Nigeria's international space partnerships, in particular with China, contribute to its space ambitions and shape its space diplomacy?

4. To what extent do Nigeria's space activities contribute to foreign policy, spacepower, and the IPE structural power literature?

This section discusses how the key findings from the analysis chapters answer these questions, which are addressed in sequence.

7.2.1 To what extent does space technology contribute to Nigeria's domestic environment, and in which sectors?

This is an attempt to understand the ongoing issues in Nigeria and offer solutions. Domestic issues are crucial to Nigeria's foreign policy because they affect the state's source of revenue, determine the strength of national stability, and, by extension, contribute to regional influence. This thesis reveals that the problems with Nigeria's regional influence and wider foreign activities are rooted in the state's dwindling domestic sectors. In the interviews with academics and former ambassadors, a common theme emerged that the government often neglects the domestic environment to focus on external activities. Hence, the application of the NCR concept is necessary to understand how domestic factors influence foreign policy. The thesis found that the national economy and national security are the two most important issues that affect Nigeria's ability to function effectively abroad.

Nigeria's dependence on crude oil provides the impetus for funding its Afrocentric foreign policy. However, the uncertainty in the global oil market, reduced crude oil production, and oil theft arising from the high rate of insecurity in the country have affected the government's revenue and thus its ability to perform on the continent. The national economy is also weakened, with the agriculture industry facing issues with substandard farm products, poor logistics, insufficient storage facilities, and climate change, leading to food insecurity. Further, as discussed in Chapter 3, issues of national insecurity, such as terrorism, kidnapping, ethnic violence, the herders' crisis, weak borders, and jailbreaks, have become the norm in Nigeria. Different governments have attempted to solve these domestic problems, but as this research shows, their efforts have not led to any real improvements. It is noteworthy that while space applications and data have been widely used in various sectors in Nigeria, there have been no significant developments.

This thesis expands on the significance of space technology and highlights specific applications for addressing economic issues and national insecurity in Nigeria. One crucial observation was that Abuja prioritises its crude oil revenue over other sectors that have potential. However, since the government cannot entirely control the issues that relate to oil production and set the global oil price, including operating national refineries, this constitutes a major problem for Nigeria. The study found that, by utilising space applications and related gadgets, Nigeria could move from solely depending on crude oil to leveraging modern technology to enhance the oil sector and other industries with high propensity for sustainable revenue generation. With the use of space applications, the agricultural sector was identified as a long-term solution to Nigeria's economic problems. Indeed, satellite data and applications can enhance the availability, accessibility, utility, and stability of the provision and distribution of food. Further, space-enhanced farm equipment can be used in rural and urban areas to augment the agricultural value chain, thus contributing to economic stability.

The research findings show that NASRDA's security surveillance systems, such as the sensor smart shoes and head trackers, can be used to address the state's security challenges and enhance national security. The sensor smart shoes and the head tracker are designed for security agents to provide adequate security, prevent kidnapping, and enhance the success of security missions. Within the country, the smart shoes can also help in the decongestion of Nigerian prisons. Similarly, the use of these gadgets is found to have the potential to promote community participation in the provision of security information to the relevant agents. The thesis further

found that inland security forces and immigration services can benefit from other NASRDA's security devices, such as the prototype multi-wing copter and the surveillance system with RFID. The insecure state of Nigeria's borders was found to be a major cause of insecurity, along with terrorism and the herders' crisis. Thus, the space-enhanced gadgets can curb the high rate of illegal entry into Nigeria and potentially reduce crimes. A further implication of utilising space capabilities for border security is the safety of other states that share borders with Nigeria and, by extension, the West African sub-region and Africa in general. As discussed in Chapter 3, Section 3.2, this is because Abuja is portrayed as Africa's epicentre, and thus returning Jihadists from Syria and other parts of the world often sneak into the country to assist their counterparts in wreaking havoc. However, with the comprehensive deployment of satellites and surveillance systems, Nigeria will not only be guarding itself but also providing protection for its African counterparts. On this basis, the thesis suggests that Abuja can focus on sharing intelligence information on border security with its neighbouring states, as this aligns with its foreign policy objectives. This contributes to the research's findings that space technology can be a key contributor to strengthening Nigeria's regional activities and influence.

Furthermore, the study found that the current Nigerian EO satellites have some limitations to their effective use for security purposes. Thus, it was suggested that Abuja invest in more advanced satellites that could contribute to various domestic and border security operations. Moreover, it was noted that Nigeria recently launched its military satellite with the aim that it would contribute to national and external security. The research also highlights the protection of space knowledge between Nigeria's military and its collaborators on national operations. This is crucial for trust and reliance to be built for sustainable collaboration and for the reception of security information for the maintenance of national security.

All the above points centre on the adequate use of data by security operatives and corresponding agents; hence, this study identifies the necessity for the provision of training for technicians and the security agencies for the enhancement of the utility of relevant data for national purposes. This research has shown that the use of space capabilities can be further utilised to address national economic and national security issues. As a result, it is clear that the national economy and national security are the sectors that are mainly impacted by the use of space technology.

7.2.2 To what extent do Nigeria's space capabilities enhance its regional influence, and how does this align with its foreign policy?

This thesis has shown the need for Nigeria to strengthen its foreign policy, especially on the African continent. The first research question examined the state of the domestic environment because Nigeria's domestic sector needs to be secure to enable the state to engage in viable external activities. A key observation from participants was that Nigeria's regional influence is declining, which highlights a gap, and further highlights the significant contribution that space technology could make. As discussed in Chapter 4, space capabilities can be strategically used in a way that shapes the IPE structures that allow states and organisations to benefit from Nigeria's space activities and resources (Strange, 1994, 2015). In the security structure, Nigeria has a Defence Space Administration (DSA), which channels the state's space capabilities to support military operations. One important finding is that Nigeria can use its currently developed space facilities to provide advanced applications and precision in armed operations on the continent. This is particularly true with the recently launched military satellite (DELSAT-1). This will make other states see Abuja as a reliable source of security. A further finding is that the capabilities can be used purposefully or unintentionally as a means to counter threats from rivals. That is, the contribution of satellite applications to Nigeria's military operations affirms the state's competence and control over the security structure, thus influencing other states' behaviour and generally preventing the need for intentional force (Cohen, 2016).

There is a gap in the knowledge structure, specifically in the acquisition of space knowledge in Africa. This thesis found that Nigeria's space experts can share knowledge with other countries for their national development, thus controlling the knowledge structure. The recipient states will view this gesture as a form of help from Nigeria, even though Abuja is implicitly promoting its own agenda. The SBAS (Satellite Based Augmentation System) project, in which Nigerian space engineers share knowledge with Cameroon, the Democratic Republic of the Congo, and Togo, is a significant example of how Nigeria controls the knowledge structure. Abuja provides the satellite for the SBAS and holds key information that it can choose to keep secret or share. With such capability, Nigeria can organise more engagements that allow it to demonstrate its space prowess. This leads to another finding: most of Nigeria's space experts do not have laboratories in which to work. This implies that Nigeria is not fully maximising the benefits of its space investment.

Considering the above in relation to Nigeria's quest for strong foreign relations and regional influence, the research observes that the state needs space infrastructure to enable the translation of space knowledge into physical capabilities and resources. The infrastructure is identified as the satellite manufacturing (AITC) and launching (Epe spaceport) facilities. The AITC can be beneficial for producing advanced security gadgets and applications for Nigeria and the continent. Likewise, the spaceport can be used for launching satellites and rockets, not only for the country but also for international counterparts. This will allow Nigeria to control the four structures on the continent. However, many participants hint at a shortage of funding for space infrastructure projects. Thus, this thesis crucially suggests that the government prioritise space projects in the country. In line with the findings of this study, the prioritisation of space projects must include a steady supply of iron and steel materials to improve the production of space devices.

As established throughout this thesis, Nigeria's concentric circles of foreign policy concentrate on Africa. The structural use of space capabilities to strengthen Abuja's regional hegemony arguably fits with the state's foreign policy objectives, as discussed in Chapters 1 and 2. That is, the security structure can guarantee the promotion and protection of the national interest, including providing support to the AU and maintaining peace in Africa through the use of advanced technology for military operations. The other space-enhanced structures of production, knowledge, and finance also contribute to Abuja's collaboration on global peace and the promotion of a just world economic order. The knowledge structure, along with the finance structure, enhances the production of technical equipment that can support security operations and generally promote global economic development.

Overall, Nigeria's use of space capabilities, including its activities and strategic decisions in regional activities, is spacepower. In alignment with Peter's (2010) assertion that the structural use of space capabilities is spacepower, as demonstrated in this study, it is safe to say that Nigeria's spacepower contributes to the concept of spacepower.

7.2.3 How do Nigeria's international space partnerships, in particular with China, contribute to its space ambitions and shape its space diplomacy?

Space partnerships are important because they can enhance Abuja's national capabilities, spacepower, and, by extension, its continental influence. In general, and as discussed in Chapter 5, Nigeria has three main international space partnerships. The first is with the US, which is classified as "friends". The second is the "brothers" relationship, under which Surrey Satellites Technology Limited (SSTL), UK, falls, while the third is Nigeria's "partnership" with China.

There is not much ongoing between the US and Nigeria in terms of space collaborations, apart from the global benefits that states enjoy through NASA's innovations. However, the privately owned SSTL was instrumental in the development and launch of Nigerian EO satellites. The firm built and launched Nigeria's first satellite and contributes to the development of the space sector and capacity building. The study discovered that Nigeria includes capacity building in all its international collaborations in order to obtain and retain space knowledge. Hence, SSTL trained several Nigerian space engineers who also had their postgraduate degrees at the University of Surrey. However, as indicated in Chapter 5, Section 5.2, the thesis findings reveal that there were issues with SSTL's provision of data to Abuja at the commencement of their relations. That is, the data was not comprehensive enough when compared to other states' data provided by the same British firm. Further findings suggest that this was due to Abuja's inexperience in space diplomacy, prompting them not to include an obligation that binds SSTL to provide comprehensive data. It is hoped that Nigeria will have learned from this experience and will endeavour to prioritise its space diplomacy.

Nigeria's other active partnership is with China. Participants believe that Beijing, with its spacepower and ideologies, and as an existing "strategic partner" of Nigeria, is important to the state's space ambitions and quest to strengthen its regional power. The Chinese strategy in Africa and its Belt and Road Initiative (BRI) give access to states to secure loans with favourable long-term repayment offers, knowledge transfer, and investments in key domestic sectors. Nigeria benefits from these incentives in the building and launching of its communications satellite, including acquiring loans for both space and non-space projects. A few of the participants also mentioned that the Chinese space firm trained Nigerian space engineers as part of the capacity building agenda.

The thesis observes that within the Nigerian space programme and activities, China has an economic and technical influence, and Abuja could engage with Beijing in completing its

launch site and AITC. In addition, China has its own space station (Tiangong Space Station), where Nigerian astronauts can potentially be hosted for the purpose of gaining experience. This study suggests that Abuja can gain from China in the areas of advanced technology research and development, space education, and the development of national capabilities. All these support Nigeria in its quest to develop its space capabilities and control the structures, thus strengthening its spacepower. However, an important finding of this thesis shows that Nigeria must be wary of China's diplomatic strategy, even though "they look good", as one of the participants ironically emphasised in Chapter 5, Section 5.3. The study found that the Chinese restricted their space knowledge to Nigeria during knowledge transfer exercises. The participant categorically stated in Section 5.4 that the CGWIC staff were a bit "crafty" with how they shared information with Nigerian engineers. In view of the tenet of structural power, actors can restrict the flow and access to knowledge to maintain control of the knowledge structure (Strange, 1994, 2015). Hence, Nigeria needs to be sensitive to the potential issues that come with partnering with Beijing. This is especially significant because, as the research points out, the Chinese strategies and the BRI are arguably designed to achieve global dominance. Indeed, China is a fast-rising superpower and is investing heavily in Africa and other continents as part of its international agenda.

Taking into account Nigeria's experience with SSTL and the Chinese threat, Nigeria cannot afford to be naive in space diplomacy. One key finding of this study is that the most populous black nation must be able to recognise the limits of its bilateral space relationship with China and should endeavour to maintain a level of control in crucial matters, such as satellite data. A further key finding is that Abuja needs experienced space diplomats who are driven by the national interest and have relevant knowledge to ensure that the state holds sway among space powers and achieves valuable space agreements.

7.2.4 To extent what do Nigeria's space activities contribute to the literature on foreign policy, spacepower, and the IPE structural power?

The central idea of this section is to put into perspective the theoretical contribution of this research. The study combines the spacepower, NCR, and structural power theories. Considering that the spacepower theory is evolving, the use of space capabilities for achieving national goals (Lupton, 1998; Peter, 2010) creates a link with the NCR theory as well as national power. Nigeria's effort and capacity to accomplish strategic goals can be termed

"national power". Hence, this thesis shows that the use of Abuja's space capabilities, such as its satellites, space agency, spaceport, AITC, and space knowledge, including other gadgets, to accomplish its external goals can be called "spacepower". This connects to the domestic environment of the state because these capabilities are domestically based and operated. On this basis, the study demonstrates that the concepts of spacepower and NCR take into account both the domestic and global environments and are applicable to the Nigerian case studied in this research.

The thesis also synthesised spacepower and structural power in the context of the Nigerian case study. The two theories involve the ability to influence other states' operations through space capabilities, especially as Peter (2010:351) emphasises the structuring of assets over merely possessing them. The structuring of assets (resources) confirms the position of Strange's structural power theory. The research spotlights space capabilities as the basis for structural power from the perspective of foreign policy. Abuja aims to use its spacepower to acquire structural power, as established in Chapter 4, through the security, production, knowledge, and finance structures. Hence, space is demonstrated as a sustainable source of Nigeria's internal capabilities and regional power. That is, Nigeria's space capabilities, including its proximity to the equator for space launches, represent new ground for gaining international influence. This thesis, therefore, portrays space as a new structure of power.

On foreign policy, the study merged the NCR and structural power. In this context, Nigeria's space capabilities are demonstrated as "material power capabilities" (MPCs). The MPCs are the central dominant factor that shapes the pattern of states' foreign policies; thus, as Nigeria's MPCs are declining (see Chapter 2), the thesis presents Abuja's space capabilities as the new MPCs. This proposes Nigeria's space capabilities as enablers that could either be used to strengthen the realists' MPCs (wealth, population, raw potential, military power, and technology) or used in the form of structures in order to acquire power.

Finally, the thesis proposes a space-enhanced Nigeria as a middle power and regional power. Ravenhill's five C's attributes (capacity, concentration, creativity, coalition-building, and credibility) were used to elaborate on Abuja's space capabilities (spacepower) and their potential contributions to the state's external affairs. Based on the five Cs, the thesis demonstrates that Nigerian foreign policy can function more effectively with space resources. Likewise, the space-reliant domestic sectors, such as the economy and security, including the

spaceport and the AITC, would enhance Nigeria's response to international pressures as part of the NCR theory.

7.3 Implications and Limitations of the Study, and Prospects for Further Research

This concluding part of the chapter considers the implications of the key findings, the research's limitations, and recommendations for future study. The thesis has extensively examined space technology and foreign policy, particularly how space capabilities could address domestic issues and enhance Nigeria's regional influence. As a result, the research adds to the existing empirical and theoretical literature. From an empirical point of view, it has contributed to the research on space, thus building our understanding and adding new knowledge by demonstrating the importance of space capabilities in addressing Abuja's internal and external issues. The issues are economic and national security matters, declining regional influence, specifically how the state can fortify its power on the continent, and the enhancement of Nigeria's space diplomacy. Thus, the following are some of the implications of the study:

First, the findings build on the existing testament that space applications can be essential for economic development. With the effective use of space data by trained experts, the Nigerian federal government's agenda to diversify the national economy from solely depending on oil into other sectors can be facilitated. As discussed in Chapter 3, Section 3.3.1, space applications can aid the agriculture industry by ensuring sustainable food storage with satisfactory storage conditions, including adequate logistics. For example, satellites can provide the relevant weather temperature and monitor road conditions and travel times for the transportation of agricultural products to various zones in the country. This will make the agricultural industry a sector that provides sustainable jobs and food for the citizenry while also serving as a solution to national economic issues.

The second implication relates to security issues. Security pertains to more than military security, and Nigeria's use of space capabilities is a clear demonstration that outer space can also be used for much more than military logistics or future warfare. For example, this thesis has shown that Nigeria has space capabilities that would allow the Nigerian Police Force and NASRDA to collaborate on inland security, leading to the production of more multi-wing

copters, sensor smart shoes, and head trackers. This will potentially reduce the rate of crimes such as kidnapping, terrorism, herders' crises, and communal violence.

NASRDA's surveillance devices can also help the Nigerian Correctional Service (NCoS) curb the high number of jailbreaks in the country. For example, the multi-wing copter can track the movements of inmates within the property. Satellite-tracked electronic tags can be used to decongest Nigeria's prisons, allowing offenders to serve their sentences in their homes, but on a tracking basis. This is specifically relevant to Nigeria because it is not currently in use and could serve as a major breakthrough for the prison service. Further, the military could leverage sensor smart shoes and head trackers more in their mission against terrorism. This will serve as a complement to the initial data provided by the military satellite (DELSAT-1) about the zones under attack. However, this implies that NASRDA will work to produce more prototypes of the devices to ensure that the armies on mission are well-equipped. This also links to the Nigerian Immigration Service (NIS). That is, similar equipment to that used by the military, as well as high-tech surveillance cameras and multi-wing copters, can be dedicated to border control to manage the influx of people and spot illegal arms importation. The general implication of the above recommendations is that they contribute to addressing domestic issues, thus enhancing economic development and national security. This is relevant to NCR; the more stable the domestic environment is, the better placed the state is to respond to international pressures and engage in a strong foreign policy.

In relation to foreign policy, the third implication of this thesis is the use of space capabilities by Abuja. This could enhance the safety and domestic development of other African states. The provision of relevant services to other states through space capabilities in security, production, and knowledge acquisition that could lead to national prosperity (finance) is a means of validating Nigeria's influence in Africa. Hence, this thesis proposes that the government and policymakers should make space technology the centrepiece of Nigerian foreign policy, especially as its focus is on Africa. On this basis, considering the importance of space to Nigeria and its regional power, the government and stakeholders involved in the construction of the AITC and the spaceport must ensure that the needed resources, such as funding, are provided to speed up the completion of the two infrastructures.

There are different ways that space can enhance a state's foreign policy. As highlighted in Chapter 5, states must pay attention to space negotiations. Thus, the final empirical implication

of this research is that NASRDA and the Ministry of Technology should ensure that they secure the services of experienced space diplomats who are knowledgeable about the country's needs, national interests, and priorities in space technology. This will strengthen Nigeria's space diplomacy and spacepower.

On the theoretical implication, the study contributes by building on previous studies on the theories of structural power, NCR, and spacepower. As discussed in Section 7.2, Question 4, the thesis adds to the evolving theory of spacepower and structural power, drawing on the domestic aspect of NCR to develop our knowledge of the impact of Nigeria's space capabilities on its quest to strengthen its international influence. On this note, following some of the points already made, a few broader implications of the thesis can be noted.

The first theoretical implication of this thesis relates to the field of space. Building on Tella's (2018) work on Nigeria's use of space for regional hegemonic purposes, this research's application of structural power theory to the aspect of international relations and spacepower shows that states can acquire power through the four structures enhanced by space technology. What is different about this research is not that states or actors can use space for national development, regional power, or commercial benefit, as argued by Tella (Ibid), but that states can control the means of power to their own advantage, thereby influencing how other states and institutions operate based on the actor's provisions. Indeed, the research shows that spacepower and structural power both involve the ability to influence state operations by structuring space capabilities. The Nigerian case study gives flesh to these theoretical bones, that is, how the use of national space capabilities in security, production, knowledge, and finance sets the agenda on the continent and ensures the acquisition of structural power.

The thesis' second theoretical implication is the combination of NCR and structural power theory. NCR proponents argue that international pressures must be translated at the domestic level to determine foreign policy outcomes (Rose, 1998). Therefore, this study combines the domestic level variable of NCR, which focuses on the internal environment of the state, with the concept of structural power for the acquisition of regional power through the control of structures. The research prioritised the importance of a stable domestic environment by analysing the contributing factors to national instability and how they could be addressed. Hence, the stability of the Nigerian state will ensure the effectiveness of its space capabilities and structural power on the continent. The implication of this theoretical blend as it relates to

foreign policy is twofold. One is that Nigeria does not need to use force to command influence once the national developmental structures (domestic economy and national security) are in place. In addition to this, when the agenda is structurally set through space capabilities with incentives provided, other states will conform and accord respect to Nigeria. The other implication is the demonstration of national space capabilities as material power capabilities (MPCs) in Chapter 6. This implies that Nigeria's space capabilities can be a basis that could either strengthen the realists' MPCs (wealth, population, raw potential, military power, and technology) or be utilised in the form of structures.

Finally, the study develops Ravenhill's five C's attributes (capacity, concentration, creativity, coalition-building, and credibility) of middle powers within the context of space technology. Through the case of Nigeria, the research shows that space can contribute to each of the attributes and enhance Nigeria's global activities as a middle power.

Despite the thesis's contribution and implications discussed above, the study has a few limitations. First, the research methodology approach focused on Nigeria, with twenty participants from the fields of academia, foreign policy, and space technology taking part in the interviews. Hence, the participants' responses and the data interpretations limit the scope and generalisation of the results. This might constrain applying the findings to other domestic sectors as they relate to foreign activities or applying them to other countries. Second, the study focused mainly on Nigeria's regional influence and its space relations with the UK's SSTL and the Chinese firm CGWIC. This implies that the results may not be comprehensive enough to predict what might happen in other diplomatic cases involving Nigeria and other counterparts. Third, considering the time and resources needed to carry out the study, including the COVID-19 travel constraints during the data collection, some government parastatals and public officials could not be reached. Thus, data was gathered via an online platform (Zoom), which may have hindered access to some information. Finally, due to the composition of Nigerian society, public servants often find it hard to release information that pertains to the government's operations, including security matters. As a result, the researcher was unable to collect data on the current status of Nigeria's spaceport. It is noteworthy that the impact of this on the results is not significant as secondary data, such as that from recent newspaper articles and online journals, was used.

Following the discussion in this thesis, there are three recommendations for future research. These relate to the theories of spacepower and structural power. First, as the spacepower theory evolves, this research has focused on Nigeria. Thus, new research that focuses on other top African states with spacepower ambitions, such as Egypt and South Africa, and how their capabilities and ambitions affects both the African and global space races, will help contribute to the field of study. The inclusion of non-African states will ensure that the study takes into account modern capabilities as determining factors on a global scale, thereby contributing to the advancement of the spacepower theory.

The second potential avenue for research relates to the IPE structure of power theory. Strange (1994, 2015) argues that actors could maintain power if they could limit access to their knowledge capabilities. As suggested in Chapter 4, Nigeria would put in place strategies to control the outflow of space knowledge to other African counterparts. Thus, future research could consider the implication in the case where other advanced space states provide similar or more services or incentives to what Abuja offers to the African states, also taking into consideration their ability to offer privileges and support in other structures such as security, production, and finance.

The third avenue focuses on the international system, where hierarchies exist in terms of power and resources. This has deep roots in states' relations and is reinforced through various agreements. As discussed in this thesis, Nigeria's space programme has agreements with China Great Wall Industry Corporation and Surrey Satellite Technology Limited, UK. Further research can look into whether racial discrimination and assumptions about Nigeria's ability to be an equal partner had an impact on the partnerships. This is particularly essential because in both partnerships, but in different ways, there were limits to the sharing of knowledge, data, and training (see Chapter 5). Essentially, this kept Nigeria dependent on external expertise and hindered the development of a fully autonomous space programme—a pattern we see reproduced in many powerful states' interactions with middle and small states.

On a final note, it is noteworthy that the focus of this study continues to be crucial to current issues in Nigeria. The state's investment in space infrastructure and the quest to strengthen its foreign policy are at the forefront of Abuja's agenda. Thus, the thesis's contribution to these areas and to potential decision making and engagements will have key implications for the

development of space capabilities and sustaining Nigeria’s regional influence and external relations.

Chapter Eight: Bibliography

Abiodun, A. A. (2012) 'Trends in the global space arena - impact on Africa and Africa's response', *Space Policy*, 28, pp. 283–290. doi: 10.1016/j.spacepol.2012.09.001.

Abiodun, A. A. (2017) 'Nigeria's Space Journey: Understanding its Past, Reshaping its Future'. Washington DC: The Space Policy Institute, Elliott School of International Affairs, George Washington University.

Abolarin, K. (2023) 'The Nigerian Space Sector: Structure of Power Analysis', in Lieberman, S., Athanasopoulos, H. K., and Hoerber, T. (eds) *The Commercialisation of Space: Politics, Economics and Ethics*. Oxon: Routledge, pp. 56–70.

Adams, J. A. and Ebegbulem, J. C. (2016) 'Nigeria's National Interest and Interventions in West African Conflicts: A Critical Analysis', *African Journal of Politics and Administrative Studies*, 9(1).

Adaramola, Z. (2022) 'Inside FG's Move To Launch New Multibillion Naira Satellite', *Daily Trust*, 6 February. Available at: https://dailytrust.com/inside-fgs-move-to-launch-new-multibillion-naira-satellite.

Ade-Ibijola, A. (2013) 'Overview of National Interest, Continuities and Flaws in Nigeria Foreign Policy', *International Journal of Academic Research in Business and Social Sciences*, 3(1), pp. 565–572.

Adebajo, K. (2020) 'NigComSat: Nigeria's satellite company still not profitable 14 years after launch', *International Centre for Investigate Reporting*, 20 March. Available at: https://www.icirnigeria.org/nigcomsat-nigerias-satellite-company-still-not-profitable-14-years-after-launch/.

Adebajo, K. (2022) 'Chinese loans: Nigeria is spending money it doesn't have on projects it can't sustain', *The Africa Report*, 20 October. Available at: https://www.theafricareport.com/251131/chinese-loans-nigeria-is-spending-money-it-doesnt-have-on-projects-it-cant-sustain/.

Adebola, O. and Adebola, S. (2021) 'Roadmap for Integrated Space Applications in Africa', *New Space*, 9(1), pp. 12–18. doi: 10.1089/space.2020.0040.

Adekoya, F., Jeremiah, K. and Nzor, E. (2022) 'Crude theft killing Nigeria's oil businesses,

operators lament', *The Guardian*, 28 March. Available at: https://guardian.ng/news/crude-theft-killing-nigerias-oil-businesses-operators-lament/.

Adepoju, P. (2021) 'Nigeria's ambitious Chinese-built rail project is keen to avoid a familiar problem', *Quartz*, 19 January. Available at: https://qz.com/africa/1958964/nigerias-china-built-railway-has-to-avoid-debt-pitfalls.

Adetoro, L. and Aro, O. (2011) 'Nigeria Space Programs'. Abuja: National Space Research and Development Agency (NASRDA), Abuja, Federal Republic of Nigeria.

Adigbuo, R. (2007) 'Beyond IR theories: The case for national role conceptions', *Politikon*, 34(1), pp. 83–97. doi: 10.1080/02589340701336286.

Adugbo, D. (2015) 'FG, UK firm sign $250m satellite deal with Nigeria', *African Association of Remote Sensing of the Environment*, 29 June. Available at: https://africanremotesensing.org/fg-uk-firm-sign-250m-satellite-deal-with-nigeria/.

Aganaba-Jeanty, T. (2013) 'Precursor to an African Space Agency: Commentary on Dr Peter Martinez "Is there a need for an African Space Agency?"', *Space Policy*, 29(3), pp. 168–174. doi: 10.1016/j.spacepol.2013.06.009.

Agbaje, G. (2010) 'Nigeria in Space-an Impetus for Rapid Mapping of the Country for Sustainable Development Planning', in *FIG Congress 2010, Facing the Challenges – Building the Capacity, 11-16 April 2010*. Sydney, pp. 1–20.

Ajetunmobi, R. O., Osunkoya, A. O. and Omotere, T. F. (2011) 'Impact of President Olusegun Obasanjo's Personality on Nigeria's Foreign Policy (1999-2007)', *Pakistan Journal of Social Sciences*, 8(6), pp. 308–315.

Ajewole, M. O. (2011) 'Radio and Rain: Friends and Foes'. An inaugural lecture delievered at the Federal University of Technology, Akure, Nigeria, pp 23-25.

Akerele, D. *et al.* (2013) 'Food Insecurity and Coping Strategies in South-West Nigeria', *Springer Science Business Media Dordrecht and International Society for Plant Pathology*, 5, pp. 407–414. doi: 10.1007/s12571-013-0264-x.

Akinyede, J. and Agbaje, G. (2006) 'Nigeria's satellite data utilization for sustainable development'. National Space Research and Development Agency (NASRDA), Abuja, Federal Republic of Nigeria., pp. 1–6. Available at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.132.65&rep=rep1&type=pdf.

Akinyede, J. O. (2012) ‘Capacity Building in Space Science and Technology : Achievements of Arcsste-E’, in *Capacity Building in Space Science and Technology : Achievements of Arcsste-E*. Vienna, pp. 1–43.

Akinyemi, M. (2021) ‘Nigeria’s Space Agency Says Nigeria’s Satellites Cannot Track Terrorists; It Is Right’, *HumAngle*, 24 May. Available at: https://humanglemedia.com/nigerias-space-agency-says-nigerias-satellites-cannot-track-terrorists-it-is-right/.

Albert, E. (2017) ‘China in Africa’, *Council on Foreign Relations*, 12 July. Available at: https://www.cfr.org/backgrounder/china-africa.

Alemika, E., Cheeseman, N. and LeBas, A. (2012) *Do the Nigerian public trust their police?* 21. Available at: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://assets.publishing.service.gov.uk/media/57a08a80e5274a31e0000630/iiG-briefingpaper-21-PublicTrustNigerianPolice.pdf.

Amaefule, E. (2019) ‘FG pledges to complete satellite assembly plant’, *Punch Newspaper*, 25 April. Available at: https://punchng.com/fg-pledges-to-complete-satellite-assembly-plant/.

Angelo, Jr., J. A. (2003) *Space Technology*. Westport: Greenwood Press.

Anichukwueze, D. (2022) ‘They Will Soon Take Over Nigeria, Yul Edochie Raises Alarm Over Chinese Loans’, *Channels*, 3 November. Available at: https://www.channelstv.com/2022/11/03/they-will-soon-take-over-nigeria-yul-edochie-raises-alarm-over-chinese-loans/.

Anudu, O. (2022) ‘After spending over $8bn on Ajaokuta, Nigeria imports N837bn steel’, *Punch Newspaper*, 5 May. Available at: https://punchng.com/after-spending-over-8bn-on-ajaokuta-nigeria-imports-n837bn-steel/.

Anuforo, E. (2022) ‘African Development Bank chief visits Dangote oil refinery and petrochemical complex’, *African Development Bank Group*, 23 January. Available at: https://www.afdb.org/en/news-and-events/press-releases/african-development-bank-chief-visits-dangote-oil-refinery-and-petrochemical-complex-48572#:~:text=On Saturday%2C the continent’s premier,owned by Dangote Industries Limited.&text=Every African countr.

Aragba-Akpore, S. (2023) ‘NIGCOMSAT-1R and the Race for Relevance’, *This Day Newspaper*, 1 June. Available at: https://www.thisdaylive.com/index.php/2023/05/24/nigcomsat-1r-and-the-race-for-relevance.

Archibald, M. M. *et al.* (2019) 'Using Zoom Videoconferencing for Qualitative Data Collection: Perceptions and Experiences of Researchers and Participants', *International Journal of Qualitative Methods*, 18, pp. 1–8. doi: 10.1177/1609406919874596.

Army Technology (2022) 'US approves sale of arms worth $1bn to Nigeria', *Army Technology*, 15 April. Available at: https://www.army-technology.com/news/us-arms-1bn-nigeria/.

Arseneault, M. (2017) 'How France armed Biafra's bid to break from Nigeria', *Radio France International*, 25 May. Available at: https://www.rfi.fr/en/africa/20170525-how-france-armed-biafras-bid-break-nigeria.

Asiedu, K. (2020) 'Zambia has become the poster child for the good, bad, and ugly of the China-Africa story.', *Quartz*, 18 June. Available at: https://qz.com/africa/1870218/how-zambia-became-china-africas-ground-zero-of-debt-racism/.

Asunloye, A. (2022) 'Egypt Plans to Inaugurate its Space City Late 2022', *Space in Africa*, 30 May. Available at: https://africanews.space/egypt-plans-to-inaugurate-its-space-city-by-the-year-2022/.

Azmanova, A. (2018) 'Relational, structural and systemic forms of power: the "right to justification" confronting three types of domination', *Journal of Political Power*, 11(1), pp. 68–78. doi: 10.1080/2158379X.2018.1433757.

Babalola, D. (2019) *The Political Economy of Federalism in Nigeria*. Cham: Palgrave Macmillan. Available at: http://www.palgrave.com/gp/series/15730.

Baldacchino, G. and Wivel, A. (2020) *Small States: Concepts and Theories*, *Handbook on the Politics of Small States*. Cheltenham: Edward Elgar Publishing Limited.

BBC (2022) 'What sanctions are being imposed on Russia over Ukraine invasion?', *BBC News*, 12 April. Available at: https://www.bbc.co.uk/news/world-europe-60125659.

Beach, D. (2012) *Analyzing Foreign Policy*. Basingstoke: Palgrave Macmillan.

Beasley, R. K. *et al.* (eds) (2012) *Foreign Policy in Comparative Perspective: Domestic and International Influences on State Behavior*. 2nd edn. Los Angeles: CQ Press.

Blumenstock, J. *et al.* (2021) 'Using Big Data and machine learning to locate the poor in Nigeria.', *World Bank Blogs*, 22 February. Available at: https://blogs.worldbank.org/opendata/using-big-data-and-machine-learning-locate-poor-

nigeria#_ftn1.

Boroffice, R. A. (2008) 'The Nigerian Space Programme: An Update', *African Skies*, (12), pp. 40–45.

Bosman, I. (2022) 'Africa: Key issues to track in 2022', *South African Institute of International Affairs*, 4 February. Available at: https://saiia.org.za/research/africa-key-issues-to-track-in-2022/.

Bowen, B. E. (2020a) 'A Clash of Spacepowers', *War in Space*, pp. 228–270. doi: 10.3366/edinburgh/9781474450485.003.0007.

Bowen, B. E. (2020b) *War in Space: Strategy, Spacepower, Geopolitics*. Edinburgh: Edinburgh University Press Limited. Available at: https://www.jstor.org/stable/10.3366/j.ctv1453js4%0A.

Bowen, G. (2009) 'Document analysis as a qualitative research method', *Qualitative Research Journal*, 9(2), pp. 27–40. doi: 10.3316/QRJ0902027.

Brassett, J. (2016) 'British comedy, global resistance: Russell Brand, Charlie Brooker and Stewart Lee', *European Journal of International Relations*, 22(1), pp. 168–191. doi: 10.1177/1354066115586816.

Braun, V. and Clarke, V. (2006) 'Using thematic analysis in psychology', *Qualitative Research in Psychology*, 3(2), pp. 77–101. doi: 10.1191/1478088706qp063oa.

British High Commission (2014) *Nigeria and UK agree to work on space technology cooperation.* Available at: https://www.gov.uk/government/news/nigeria-and-uk-agree-to-work-on-space-technology-cooperation (Accessed: 10 May 2023).

Broniatowski, D. A. *et al.* (2008) 'A framework for evaluating international cooperation in space exploration', *Space Policy*, 24(4), pp. 181–189. doi: 10.1016/j.spacepol.2008.09.012.

Bryman, A. (2012) *Social Research Methods*. 4th edn. Oxford: Oxford University Press.

Budget Office of the Federation (2023) *Appropriation Bill 2023*. [Online]. Available at: https://www.budgetoffice.gov.ng/index.php/resources/internal-resources/budget-documents/2023-budget (Accessed: 15 February 2023).

Burns, D. (2022) 'Nigeria finance minister: low oil output barely enough to cover petrol imports', *Reuters*, 27 May. Available at: https://www.reuters.com/business/energy/nigeria-

finance-minister-low-oil-output-barely-enough-cover-petrol-imports-2022-05-26/.

Burrington, I. (2018) 'New Mexico's Sad Bet on Space Exploration', *The Atlantic*, 2 March. Available at: https://www.theatlantic.com/technology/archive/2018/03/new-mexicos-sad-bet-on-space-exploration/554243/#CorrectionB.

Burwell, J. (2019) 'Imagining the Beyond: The Social and Political Fashioning of Outer Space', *Space Policy*, 48, pp. 41–49. doi: 10.1016/j.spacepol.2018.10.002.

Cairns, R. (2021) 'ColdHubs: How solar-powered cold storage is reducing food waste in Nigeria', *CNN*, 23 September. Available at: https://edition.cnn.com/2021/09/23/africa/coldhubs-nigeria-food-supply-chain-hnk-spc-intl/index.html.

Carlsnaes, W. (2002) 'Foreign Policy', in Carlsnaes, W., Risse, T., and Simmons, B. A. (eds) *Handbook of International Relations*. 1st edn. London: SAGE Publications Ltd, pp. 331–349.

Carter, P. and Johannsen, C. (2005) 'Site-Specific Soil Management', *Earth Systems and Environmental Sciences*, pp. 497–503.

Castleberry, A. and Nolen, A. (2018) 'Thematic analysis of qualitative research data: Is it as easy as it sounds?', *Currents in Pharmacy Teaching and Learning*, 10(6), pp. 807–815. doi: 10.1016/j.cptl.2018.03.019.

Centre for Economics and Business Research (2022) *World Economic League Table 2023*, *World Economic League Table 2023*. Available at: https://cebr.com/wp-content/uploads/2022/12/WELT-2023.pdf.

Chakrabarti, S. (2021) 'How many satellites are orbiting Earth?', *Space.com*, 25 September. Available at: https://www.space.com/how-many-satellites-are-orbiting-earth.

Chau, D. C. (2007) *Political Warfare in Sub-Saharan Africa: U.S. Capabilities and Chinese Operations in Ethiopia, Kenya, Nigeria, and South Africa, Africa*. Carlisle.

Chiedozie, I. (2019) 'Poor funding threatens satellites' local design, launch', *Punch Newspaper*, 29 November. Available at: https://punchng.com/poor-funding-threatens-satellites-local-design-launch/.

Chizea, F. D. (2017) 'Space Technology Development in Nigeria'. Stellenbosch. Available at: chrome-

extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.unoosa.org/documents/pdf/psa/activities/2017/SouthAfrica/slides/Presentation11.pdf.

Chizea, F., Umunna, R. and Ovie, E. (2019) 'NASRDA's Experience in Human Capacity Development and Capability Accumulation in Satellite Technology', *Advances in Sciences and Humanities*, 5(3), pp. 70–75. doi: 10.11648/j.ash.20190503.11.

Chunsi, W. (2008) 'China's outer space activities: Motivations, goals, and policy', *Strategic Analysis*, 32(4), pp. 621–635. doi: 10.1080/09700160802214391.

Clark, J. *et al.* (2014) 'Assessing the full effects of public investment in space', *Space Policy*, 30, pp. 121–134. doi: 10.1016/j.spacepol.2014.03.001.

Clark, S. (2011) 'Chinese Rocket Launches Powerful Nigerian Satellite Into Orbit', *Space.com*, 19 December. Available at: https://www.space.com/13975-china-rocket-launching-huge-nigeria-satellite.html.

Clement, P. S. (2018) 'Nigeria: "Ajaokuta Steel Plant Gulped $8bn, 14 Firms Interested"', *Daily Trust*, 9 March. Available at: https://allafrica.com/stories/201803090106.html.

Clowes, W. (2022) 'China's Pullback on Lending Stalls Dreams of Rebuilding Nigeria', *Bloomberg*, 17 May. Available at: https://www.bloomberg.com/news/articles/2022-05-17/china-infrastructure-funding-stalls-for-nigeria.

Cohen, B. (2016) 'Money, power, authority', in Germain, R. (ed.) *Susan Strange and the Future of Global Political Economy: Power, Control and Transformation*. 1st edn. London: Routledge, pp. 111–125.

De Concini, A. and Toth, J. (2019) *The European Commission By: Innovation Finance Advisory in collaboration with the European Investment Advisory Hub, part of the European Investment Bank's advisory services*. Luxembourg.

Cooper, A. F., Higgott, R. A. and Nossal, K. R. (1993) *Relocating Middle Powers: Australia and Canada in a Changing World Order*. Vancouver: UBC Press.

Crabb. Jr., C. V. (1972) *American Foreign Policy in the Nuclear Age*. 3rd edn. New York: Harper and Row.

Creswell, J. W. (2014) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Thousand Oaks, California: SAGE Publications.

Creswell, J. W. and Creswell, D. J. (2018) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 5th edn. Los Angeles: SAGE Publications Inc.

Crotty, M. (1998) *The Foundations of Social Research: Meaning and Perspective in the Research Process*. 1st edn. London: SAGE Publications.

Culpepper, P. D. (2015) 'Structural power and political science in the post-crisis era', *Business and Politics*, 17(3), pp. 391–409. doi: 10.1515/bap-2015-0031.

Davenport, C. (2022) 'NASA Looks to Private Sector for Successor to the International Space Station', *Wilson Center*, 21 January. Available at: https://www.wilsoncenter.org/article/nasa-looks-private-sector-successor-international-space-station.

David, M. and Meersohn Schmidt, C. (2019) 'Power and Counter-Power: Knowledge Structure and the Limits of Control', *Sociological Research Online*, 24(1), pp. 21–37. doi: 10.1177/1360780418797717.

Deakin, H. and Wakefield, K. (2014) 'Skype interviewing: reflections of two PhD researchers', *Qualitative Research*, 14(5), pp. 603–616. doi: 10.1177/1468794113488126.

Debt Management Office (2020) *Facts about Chinese Loans to Nigeria*. Abuja. Available at: https://www.dmo.gov.ng/facts-about-chinese-loans-to-nigeria (Accessed: 15 October 2022).

Defence Space Administration (2016) 'Defence-Space-Administration-Establishment-Act-2016.pdf'. Abuja, Nigeria: Defence Space Administration. Available at: https://dsa.mil.ng/history.php.

Defence Space Administration (2023) *Our History*. Available at: https://dsa.mil.ng/history.php#:~:text=Pursuant to the provisions of,law on 3 February 2017. (Accessed: 17 March 2023).

Denscombe, M. (2014) *The Good Research Guide: For small-scale social research projects*. 5th edn. Berkshire: Open University Press.

Denscombe, M. (2017) *The Good Research Guide: For Small-Scale Social Research Projects*. 6th edn. London: Open University Press.

Dougherty, J. E. and Pfaltzgraff, Jr., R. L. (2004) *Contending Theories of International Relations: A Comprehensive Survey*. 5th edn. Beijing: Pekings University Press.

Easterby-Smith, M., Thorpe, R. and Jackson, P. (2012) *Management Research*. 4th edn.

London: SAGE Publications.

Edigin, L. U. and Otoghile, A. (2011a) 'The Domestic Context of Nigeria's Foreign Policy Formulation', *International Journal of Research and Development*, 4, pp. 1–8.

Edigin, L. U. and Otoghile, A. (2011b) 'THE MILITARY AND THE PRESS : REFLECTIONS ON THE', 18(2), pp. 1–7.

Edwards, A. (2019) 'Land and Conflict in Nigeria's Middle Belt', *Borgen Magazine*, 6 September. Available at: https://www.borgenmagazine.com/land-and-conflict-in-nigerias-middle-belt/#:~:text=Many farmers have lost their land due to scorched Earth military tactics.&text=Crop destruction%2C water pollution and,resulted in a humanitarian crisis.

Ekugbe, G. (2021) 'Maximising Nigeria's Opportunities for Agricultural Exports', *This Day Newspaper*, 26 October. Available at: https://www.thisdaylive.com/index.php/2021/10/26/maximising-nigerias-opportunities-for-agricultural-exports/.

European Space Agency (2023) *Aquafarm 2.0*. Available at: https://business.esa.int/projects/aquafarm-20 (Accessed: 23 March 2023).

European Space Agency (no date a) 'Europe's Spaceport', *The European Space Agency*. Available at: https://www.esa.int/Enabling_Support/Space_Transportation/Europe_s_Spaceport/Europe_s_Spaceport2.

European Space Agency (no date b) *N2 (NigeriaSat-2)*. Available at: https://earth.esa.int/web/eoportal/satellite-missions/n/nigeriasat-2 (Accessed: 16 August 2021).

European Union Agency for the Space Programme (2019) 'The true impact of space is felt downstream', *EUSPA*, 16 December. Available at: https://www.euspa.europa.eu/newsroom/news/true-impact-space-felt-downstream.

European Union Satellite Centre (2023) *Geospatial Intelligence*. Available at: https://www.satcen.europa.eu/page/geospatial_intelligence (Accessed: 19 February 2023).

Faleti, J. (2021a) 'Nigeria's Budgetary Allocation to its Space Programme for 2022', *Space in Africa*, 31 December. Available at: https://africanews.space/nigerias-budgetary-allocation-to-its-space-programme-for-2022/.

Faleti, J. (2021b) ‘President Buhari Reaffirms NASRDA’s Mandate to Build and Launch Satellites in Nigeria’, *Space in Africa*, 25 June. Available at: https://africanews.space/president-buhari-reaffirms-nasrdas-mandate-to-build-and-launch-satellites-in-nigeria/.

Fashade, O. (2008) ‘National and Regional Capacity Building Activities for the Acquisition of Rocket Launch Capacity and the Associated Infrastructure - Nigeria Strategy’, *African Skies*, 12, pp. 86–89.

Fayomi, O. O., Chidozie, F. C. and Ajayi, L. A. (2015) ‘Nigeria’s National Image and Her Foreign Policy: An Exploratory Approach’, *Open Journal of Political Science*, 5(3), pp. 180–196. doi: 10.4236/ojps.2015.53019.

Federal Republic of Nigeria (1999) *Constitution of the Federal Republic of Nigeria 1999*. Abuja. Available at: http://publicofficialsfinancialdisclosure.worldbank.org/sites/fdl/files/assets/law-library-files/Nigeria_Constitution_1999_en.pdf.

Firsing, S. (2017) ‘Africa and space: the continent starts to look skyward’, *The Conversation Africa*, 6 December. Available at: https://www.huffpost.com/entry/africa-and-space-the-cont_b_12230148.

Flemes, D. (2007) *Conceptualising Regional Power in International Relations: Lessons from the South African Case*. 53. Hamburg. Available at: http://ssrn.com/abstract=1000123Electroniccopyavailableat:http://ssrn.com/abstract=1000123Electroniccopyavailableat:http://ssrn.com/abstract=1000123.

Food and Agricultural Organization (2018) *Role of small family farms in Nigeria, Small Family Farms Country Factsheet*. Available at: http://www.fao.org/3/I9930EN/i9930en.pdf.

Food and Agriculture Organization (2008) ‘An Introduction to the Basic Concepts of Food Security’, *Food Security Information for Action Practical Guides*, (1), pp. 1–3. Available at: http://www.ncbi.nlm.nih.gov/pubmed/21812205%5Cnhttp://jn.nutrition.org/content/140/1/153S.abstract%5Cnhttp://link.springer.com/10.1007/s11205-009-9455-4%5Cnhttp://www.fao.org/docrep/013/al936e/al936e00.pdf%5Cnwww.andes.info.ec/es/noticias/fao-ecuador-boli.

Foulon, M. (2015) ‘Neoclassical realism: Challengers and bridging identities’, *International*

Studies Review. Blackwell Publishing Inc., pp. 635–661. doi: 10.1111/misr.12255.

Foulon, M. (2017) 'Neoclassical Realist Analyses of Foreign Policy', in *Oxford Research Encyclopedia of Politics*. Oxford University Press. doi: 10.1093/acrefore/9780190228637.013.387.

Fuchs, D. and Glaab, K. (2011) 'Material power and normative conflict in global and local agrifood governance: The lessons of "Golden Rice" in India', *Food Policy*, 36(6), pp. 729–735. doi: 10.1016/j.foodpol.2011.07.013.

Gabr, A. (2022) 'A Deep Dive Into Egypt's Latest Mega-Project: A City Dedicated To Space!', *Scoopempire*, 9 April. Available at: https://scoopempire.com/a-deep-dive-into-egypts-latest-mega-project-a-city-dedicated-to-space/.

Gambari, I. A. (1989) *Theory and Reality in Foreign Policy Making: Nigeria after the Second Republic*. Atlantic Highlands: Humanities Press International, Inc.

George Etomi and Partners (2018) 'Overview of space exploration in Nigeria: challenges and solutions for the effective operation of the sector', *Space in Africa*, 15 April. Available at: https://africanews.space/overview-of-space-exploration-in-nigeria-challenges-and-solutions-for-the-effective-operation-of-the-sector/.

Gerson, K. and Horowitz, R. (2002) 'Options and choices in qualitative research', in May, T. (ed.) *Qualitative research in action*. London: Sage, pp. 199–225.

Gilpin, R. (1981) *War and Change in World Politics, War and Change in World Politics*. New York: Cambridge University Press. doi: 10.1017/cbo9780511664267.003.

Giokos, E. and Whiteside, L. (2016) 'Nigeria: Our space program is not an "ego trip"', *CNN Money*, 7 June. Available at: https://money.cnn.com/2016/06/07/news/nigeria-space-program/index.html.

Global Security (2022) *Nigerian Army - End Strength, Global Security*. Available at: https://www.globalsecurity.org/military/world/nigeria/army-end-strength.htm.

Gov.uk (2017) 'Upstream Space: A Galaxy of Capability A Science and Innovation Audit Report sponsored by the Department for Business, Energy & Industrial Strategy', pp. 1–11. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/784297/Annex_C_-_Analysis_of_Small_Satellite_Markets.pdf.

Haggart, B. (2019) 'Taking Knowledge Seriously: Towards an International Political Economy Theory of Knowledge Governance', in Haggart, B., Henne, K., and Tusikov, N. (eds) *Information, Technology and Control in a Changing World. International Political Economy Series.* Cham: Palgrave Macmillan, pp. 25–51. doi: 10.1007/978-3-030-14540-8_2.

Haglund, L. and Lukes, S. (2005) 'Power and Luck', *European Journal of Sociology*, 46(1), pp. 45–66.

Hays, P. L. and Lutes, C. D. (2007) 'Towards a theory of spacepower', *Space Policy*, 23(4), pp. 206–209. doi: 10.1016/j.spacepol.2007.09.003.

Herndon, K. *et al.* (2020) 'What is Synthetic Aperture Radar?', *Earth Data*, 16 April. Available at: https://earthdata.nasa.gov/learn/backgrounders/what-is-sar.

Herrmann, A. F. (2017) 'Hegemony', in Scott, C. and Lewis, L. (eds) *The International Encyclopedia of Organizational Communication*. Chichester: John Wiley and Sons Limited, pp. 1–6. doi: 10.1002/9781118955567.wbieoc094.

Hertzfeld, H. R. and Peter, N. (2007) 'Developing new launch vehicle technology: The case for multi-national private sector cooperation', *Space Policy*, 23, pp. 81–89. doi: 10.1016/j.spacepol.2007.02.002.

Hudson, V. M. (2005) 'Foreign Policy Analysis: Actor-Specific Theory and the Ground of International Relations', *Foreign Policy Analysis*, (1), pp. 1–30.

Hudson, V. M. (2016) 'The History and Evolution of Foreign Policy Analysis', in Smith, S., Hadfield, A., and Dunne, T. (eds) *Foreign Policy: Theories, Actors, Cases*. 3rd edn. Oxford: Oxford University Press, pp. 13–34.

Idahosa, S. O. and Adebayo, K. M. (2017) 'An Analysis of the Nigerian Foreign Policy: A Narrative', *Worldwide Journal of Multidisciplinary Research and Development*, 3(10), pp. 215–221. Available at: https://www.researchgate.net/publication/321034775.

Iderawumi, M. (2021) 'ASECNA, NIGCOMSAT And Thales Alenia Space to Continue Developing SBAS Aviation Services in Africa', *Space in Africa*, 3 June. Available at: https://africanews.space/asecna-nigcomsat-and-thales-alenia-space-to-continue-developing-sbas-aviation-services-in-africa/.

Ifversen, J. and Pozzi, L. (2020) 'European Colonial Heritage in Shanghai: Conflicting Practices', *Heritage and Society*, 13(1–2), pp. 143–163. doi:

10.1080/2159032X.2021.1909405.

Ikpaya, I. O. *et al.* (2016) 'Quest of Nigeria into space for sustainable development', in *SpaceOps 2016 Conference*. American Institute of Aeronautics and Astronautics Inc, AIAA, pp. 1–11. doi: 10.2514/6.2016-2345.

Innes, D., Curley, C. and Baker, A. (2019) 'Building the UK's first spaceport', *Room: Space Journal of Asgardia*. Available at: https://room.eu.com/article/building-the-uks-first-spaceport.

Institute for Economics and Peace (2023) *Global terrorism, Global Terrorism*. doi: 10.4324/9780203731321.

International Crisis Group (2020) *What Role for the Multinational Joint Task Force in Fighting Boko Haram?* Brussels. Available at: https://www.crisisgroup.org/africa/west-africa/291-what-role-multinational-joint-task-force-fighting-boko-haram.

James, G. K., Akinyede, J. and Halilu, S. A. (2014a) 'The Nigerian Space Program and Its Economic Development Model', *New Space*, 2(1), pp. 23–29. doi: 10.1089/space.2013.0041.

James, G. K., Akinyede, J. and Halilu, S. A. (2014b) 'The Nigerian Space Program and Its Economic Development Model', *New Space*, 2(1), pp. 23–29. doi: 10.1089/space.2013.0041.

Al Jazeera (2022a) 'Chinese spy infiltrated UK Parliament, MI5 alleges', *Al Jazeera and News Agencies*, 13 January. Available at: https://www.aljazeera.com/news/2022/1/13/chinese-spy-infiltrated-uk-parliament-mi5-says.

Al Jazeera (2022b) 'Nigeria: 100 million barrels of oil unaccounted for in 2019', *Al Jazeera*, 16 March. Available at: https://www.aljazeera.com/news/2022/3/16/nigeria-100m-barrels-of-oil-unaccounted-for-in-2019-by-state-oil#:~:text=Nigeria loses about 150%2C000 barrels,oil theft%2C using current prices.

Jones, A. (2021) 'China's Tiangong space station', *Space.com*, 24 August. Available at: https://www.space.com/tiangong-space-station.

Jordaan, E. (2003) 'The concept of a middle power in international relations: Distinguishing between emerging and traditional middle powers', *Politikon*, 30(2), pp. 165–181. doi: 10.1080/0258934032000147282.

Jordaan, E. (2017) 'The emerging middle power concept: Time to say goodbye?', *South*

African Journal of International Affairs, 24(3), pp. 395–412. doi: 10.1080/10220461.2017.1394218.

Jun, G. and Saliu, O. (2018) '5 facts about China-Nigeria relations growing at "a very satisfactory win-win level"', *Xinhua*, 6 November. Available at: http://www.xinhuanet.com/english/2018-11/06/c_137585555.htm.

Kaarbo, J. and Ray, J. L. (2011) *Global Politics*. 10th edn. Boston: Wadsworth, Cengage Learning: Cengage Learning.

Kassimeris, C. (2009) '"The Foreign Policy of Small Powers."', *International Politics*, 46, pp. 84–101.

Katzenstein, P. J. (1976) 'International relations and domestic structures: Foreign economic policies of advanced industrial states', *International Organization*, 30(1), pp. 1–45. doi: 10.1017/S0020818300003726.

Kazeem, Y. (2017) 'The US just sold half a billion dollars worth of military gear to Nigeria', *Quartz*, 29 August. Available at: https://qz.com/africa/1064752/boko-haram-nigeria-has-purchased-593-million-worth-of-military-gear-from-the-us.

Kazeem, Y. (2020) 'Misinformation and politics are fueling fears of a Chinese debt trap in Nigeria', *Quartz*, 10 August. Available at: https://qz.com/africa/1890276/china-denies-plan-to-seize-nigeria-assets-over-debt.

Kenton, W. (2023) 'Critical Mass: Overview, Special Considerations, and Examples', *Investopedia*, 25 December. Available at: https://www.investopedia.com/terms/c/critical-mass.asp.

Keohane, R. O. (1969) 'Lilliputians' Dilemmas: Small States in Internatinal Politics', *International Organisation*, 23(2), pp. 291–310. doi: 10.1017/S002081830003160X.

Kganyago, M. and Paidamwoyo, M. (2019) 'The role of African emerging space agencies in earth observation capacity building for facilitating the implementation and monitoring of the African development agenda: The case of African earth observation program', *ISPRS International Journal of Geo-Information*, 8(7). doi: 10.3390/ijgi8070292.

Khalid, I. (2021) 'Nigeria's Boko Haram militants: Six reasons they have not been defeated.', *BBC News*, 17 May. Available at: https://www.bbc.co.uk/news/world-africa-57117296.

Kinnan, C. *et al.* (2011) *Failed State 2030: Nigeria-A Case Study*. 67. Center for Strategy and Technology (CSAT).

Kissinger, H. A. (1966) 'Domestic Structure and Foreign Policy', *Conditions of World Order*, 95(2), pp. 503–529.

Kitchen, N. (2010) 'Systemic pressures and domestic ideas: a neoclassical realist model of grand strategy formation', *Review of International Studies*, 36(1), pp. 117–143. doi: 10.1017/S0260210509990532.

Klinger, J. M. (2020) *China, Africa, and the Rest: Recent Trends in Space Science, Technology, and Satellite Development*. 2020. Washington DC. Available at: http://www.sais-cari.org/publications.

Kluger, J. (2015) 'The Silly Reason the Chinese Aren't Allowed on the Space Station', *Time*, 29 May. Available at: https://time.com/3901419/space-station-no-chinese/.

Krishen, K. (2011) 'Multiple aspects of space technology transfer', *IETE Technical Review (Institution of Electronics and Telecommunication Engineers, India)*, 28(3), pp. 195–206. doi: 10.4103/0256-4602.81228.

Kuo, L. and Kommenda, N. (2018) 'What is China's Belt and Road Initiative?', *The Guardian*, 30 July. Available at: https://www.theguardian.com/cities/ng-interactive/2018/jul/30/what-china-belt-road-initiative-silk-road-explainer.

Kwiatkowska, O. (2016) 'The influence of the crisis in the Republic of Mali on the political situation of the Sahel', *Politeja*, 13(42), pp. 421–447. doi: 10.12797/politeja.13.2016.42.23.

Lafaye, M. (2017) 'Benefit assessment of the application of satellite earth observation for society and policy: Assessing the socioeconomic impacts of the development of downstream space-based earth observation applications', in Onoda, M. and Young, O. R. (eds) *Satellite Earth Observations and Their Impact on Society and Policy*. Singapore: Springer Nature, pp. 93–103. doi: 10.1007/978-981-10-3713-9_7.

Lawal, E. E. and Aluko, O. I. (2016) 'Nigerian Foreign Policy: a Fourth Republic Diplomatic Escapade', *Journal of Siberian Federal University. Humanities & Social Sciences*, 9(04), pp. 708–721. doi: 10.17516/1997-1370-2016-9-4-708-721.

Lawal, L. S., Chatwin, C. R. and Hasan, R. (2018) 'The communications satellite industry as an element in Nigeria's attempt to modernise its economy and society', *International Journal*

of African and Asian Studies, 51, pp. 30–39.

Leloglu, U. M. and Kocaoglan, E. (2008) 'Establishing space industry in developing countries: Opportunities and difficulties', *Advances in Space Research*, 42(11), pp. 1879–1886. doi: 10.1016/j.asr.2008.03.010.

Li, Q. and Ye, M. (2019) 'China's emerging partnership network: what, who, where, when and why', *International Trade, Politics and Development*, 3(2), pp. 66–81. doi: 10.1108/itpd-05-2019-0004.

Lichtenstein, A. (2019) 'From Nigeria to Zanzibar, Africa quietly played a critical role in US moon landing', *Global Voices*, 26 July. Available at: https://globalvoices.org/2019/07/26/from-nigeria-to-zanzibar-africa-quietly-played-a-critical-role-in-us-moon-landing/.

Lieberman, S. (2017a) 'Strange spaces: an international political economy reading of operational space programs', in Hoerber, T. and Sigalas, E. (eds) *Theorizing European Space Policy*. Lanham: Lexington Books, pp. 127–140.

Lieberman, S. (2017b) 'Understanding our changing relationship with space: An international political economy reading of space popularisation', *Space Policy*, 41(April), pp. 53–59. doi: 10.1016/j.spacepol.2017.04.004.

Lobell, S. E., Ripsman, N. M. and Taliaferro, J. W. (eds) (2009) *Neoclassical Realism, the State, and Foreign Policy*. New York: Cambridge University Press.

Lubojemski, A. M. (2019) 'Satellites and the security dilemma', *Astropolitics: The International Journal of Space Politics & Policy*, 17(2), pp. 127–140. doi: 10.1080/14777622.2019.1641689.

Lukes, S. (2005) *Power: A Radical View*. 2nd edn. Basingstoke: Palgrave Macmillan. doi: 10.2307/2065624.

Lupton, D. E. (1998) *On Space Warfare: A Space Power Doctrine, Defense Technical Information center*. Alabama: Air University Press. Available at: https://apps.dtic.mil/sti/citations/ADA421942.

Maass, M. (2009) 'The elusive definition of the small state', *International Politics*, 46(1), pp. 65–83. doi: 10.1057/ip.2008.37.

MacLeish, M. M. *et al.* (2015) 'Global space workforce development: A model for partnership building and knowledge transfer to developing space-faring societies', *Acta Astronautica*, 116, pp. 106–116. doi: 10.1016/j.actaastro.2015.07.003.

Madobi, M. Y. (2022) 'Nigeria's Foreign Policy And International Security Goals', *Nigerian Tribune*, 23 February. Available at: https://tribuneonlineng.com/nigerias-foreign-policy-and-international-security-goals/.

Malamud, A. (2011) 'A Leader Without Followers? The Growing Divergence Between the Regional and Global Performance of Brazilian Foreign Policy', *Latin American Politics and Society*, 53(3), pp. 1–24. doi: 10.1111/j.1548-2456.2011.00123.x.

Martinez, P. (2012a) 'Africa's first International Astronautical Congress: Highlights of IAC 2011', *Space Policy*, 28(1), pp. 54–58. doi: 10.1016/j.spacepol.2011.12.004.

Martinez, P. (2012b) 'Is there a need for an African space agency?', *Space Policy*, 28, pp. 142–145. doi: 10.1016/j.spacepol.2012.06.011.

Massa, I. (2011) *Export Finance Activities by the Chinese Government*. Brussels.

Matthews, B. and Ross, L. (2010) *Research Methods: A practical guide for the social sciences*. Harlow: Pearson Education Limited.

May, C. (1996) 'Strange fruit: Susan Strange's theory of structural power in the international political economy', *Global Society: Journal of Interdisciplinary International Relations*, 10(2), pp. 167–189.

May, T. (2011) *Social Research: Issues, methods and process*. 4th edn. Berkshire: Open University Press.

Mayall, J. (1976) 'Oil and Nigerian Foreign Policy', *African Affairs*, 75(300), pp. 317–330.

Mearsheimer, J (2007) 'Chapter contents', in, pp. 71–88.

Mearsheimer, John (2007) 'Structural Realism', in Dunne, T., Kurki, M., and Smith, S. (eds) *International Relations Theories: Discipline and Diversity*. Oxford: Oxford University Press, pp. 71–88.

Merriam-Webster (2022) *Friend, Brother and Partner*. Available at: https://www.merriam-webster.com/thesaurus/friend (Accessed: 23 January 2022).

Merriam, S. B. and Tisdell, E. J. (2016) *Qualitative Research: A Guide to Design and*

Implementation. 4th edn. San Francisco, California: Jossey Bass.

Michel, S. and Beuret, M. (2009) *China Safari: On the Trail of Beijing's Expansion in Africa*. New York: Nation Books.

Mojeed, M. (2017) 'Nigeria raises troops for Gambia, ready to remove Yahya Jammeh', *Premium Times*, 12 January. Available at: https://www.premiumtimesng.com/news/headlines/220259-exclusive-nigeria-raises-troops-gambia-ready-remove-yahya-jammeh.html?tztc=1.

Monks, K. (2014) 'Spy satellites fighting crime from space', *CNN*, 12 August. Available at: https://edition.cnn.com/2014/08/11/tech/innovation/spy-satellites-fighting-crime-from-space/index.html.

Morgenthau, H. (1973) *Politics Among Nations: The Struggle for Power and Peace*. 5th edn. New York: Alfred A. Knopf.

Mowle, T. S. (2003) *Worldviews in Foreign Policy: Realism, Liberalism, and External Conflict, Political Psychology*.

Moyo, R. (2022) 'Nigeria Inaugurates Integrated Satellite, DELSAT-1', *Space in Africa*, 27 December. Available at: https://africanews.space/nigeria-inaugurates-integrated-satellite-delsat-1/.

Naidoo, P. (2020) 'Nigeria Tops South Africa as the Continent's Biggest Economy', *Bloomberg*, 3 March. Available at: https://www.bloombergquint.com/business/nigeria-now-tops-south-africa-as-the-continent-s-biggest-economy.

Naidu, M. V. (2002) 'Security, Sovereignty, and Intervention: Concepts and Case Studies', *Peace Research*, 34(1), pp. 33–58. Available at: https://www.jstor.org/stable/23608020.

Narizny, K. (2017) 'On systemic paradigms and domestic politics: A critique of the newest realism', *International Security*, 42(2), pp. 155–190. doi: 10.1162/ISEC_a_00296.

National Aeronautics and Space Administration (1962) *Results of the Third United States Manned Orbital Space Flight*. Washington DC. Available at: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://historycollection.jsc.nasa.gov/JSCHistoryPortal/history/mission_trans/MA08_TEC.PDF.

National Aeronautics and Space Administration (2022) *NASA's Earth Observing System*

Project Science Office. Available at: https://eospso.nasa.gov/content/nasas-earth-observing-system-project-science-office (Accessed: 24 September 2022).

National Aeronautics and Space Administration (2023) *About NASA*. Available at: https://www.nasa.gov/about/index.html (Accessed: 24 March 2023).

National Bureau of Statistics (2023) *Nigerian Gross Domestic Product Report Q1 2023*. Abuja.

National Geographic (2023) *Equator*. Available at: https://www.nationalgeographic.org/encyclopedia/equator/#:~:text=An equator is an imaginary,is widest at its Equator. (Accessed: 15 January 2023).

National Oceanic and Atmospheric Administration (2021) *What is the difference between land cover and land use?* Available at: https://oceanservice.noaa.gov/facts/lclu.html (Accessed: 19 January 2021).

National Space Policy (2001a) 'National Space Policy', *Federal Ministry of Science and Technology (FMST)*, pp. 1–62.

National Space Policy (2001b) *National Space Policy*.

Nevin, A. *et al.* (2019) *Unlocking Nigeria's Agricultural Exports Overview*. Available at: www.pwc.com/ng.

News Agency of Nigeria (2018) 'Buhari inaugurates locally made drone, restates commitment to secure Nigeria', *The Guardian*, 15 February. Available at: https://guardian.ng/news/buhari-inaugurates-locally-made-drone-restates-commitment-to-secure-nigeria/.

Nextier SPD (2022) 'Snitches and Victims', *Nextier Daily Analysis*, 29 August. Available at: https://nextierspd.com/snitches-and-victims/.

Nigeria Extractive Industries Transparency Initiative (2022) *Overview and role of the EITI*. Available at: https://eiti.org/countries/nigeria (Accessed: 19 June 2022).

Nkordeh, N., Bob-Manuel, I. and Oni, O. (2017) 'A detailed over-view of satellites launched by national research and development agency from 2001-2016', in *Proceedings of the World Congress on Engineering and Computer Science*. San Francisco, pp. 37–41.

Nnodim, O. (2021) 'Nigeria's petroleum imports exceeded exports by $43.56bn –OPEC', *Punch Newspaper*, 3 October. Available at: https://punchng.com/nigerias-petroleum-imports-exceeded-exports-by-43-56bn-opec/.

Nolte, D. (2010) ‘How to compare regional powers: analytical concepts and research topics’, *Review of International Studies*, 36(4), pp. 881–901. Available at: https://about.jstor.org/terms.

Nongo, S., Ikpaya, N. M. and Ikpaya, N. A. (2021) ‘Prospects of siting a spaceport in Africa’, *International Journal of Aerospace System Science and Engineering*, 1(1), pp. 35–54. doi: 10.1504/ijasse.2021.114151.

Nuamah, R. (2003) *Nigeria’s Foreign Policy after the Cold War: Domestic, Regional and External Influences*. Oxford.

Nwachukwu, J. (2017) ‘Real reason France supported Biafra during the civil war’, *Daily Post*, 1 July. Available at: https://dailypost.ng/2017/07/01/real-reason-france-supported-biafra-civil-war/.

O’Neill, K. (2017) *The Environment and International Relations*. 2nd edn. Cambridge: Cambridge University Press.

Odigbo, J., Udaw, J. E. and Igwe, A. F. (2014) ‘Regional Hegemony and Leadership Space in Africa: Assessing Nigeria’s Prospects and Challenges’, *Review of History and Political Science*, 2(1), pp. 89–105.

Odubajo, T. (2017) ‘Domestic Environmental Variables and Foreign Policy Articulation of the Buhari Administration in Nigeria’s Fourth Republic’, *Austral: Brazilian Journal of Strategy & International Relations*, 6(11), pp. 73–96.

Ogunnubi, O. and Okeke-Uzodike, U. (2016) ‘Can Nigeria be Africa’s hegemon?’, *African Security Review*, 25(2), pp. 110–128. doi: 10.1080/10246029.2016.1147473.

Ojakorotu, V. and Adeleke, A. A. (2018) ‘Nigeria and Conflict Resolution in the Sub-regional West Africa: The Quest for a Regional Hegemon?’, *Insight on Africa*, 10(1), pp. 37–53. doi: 10.1177/0975087817735386.

Okeke, C. and Agi, A. (2022) ‘Current space developments in Nigeria’, *Business Day*, 30 April. Available at: https://businessday.ng/news/article/current-space-developments-in-nigeria/.

Okolo, J. E. (1988) ‘Morality and Realism in Nigerian Foreign Policy’, *World Affairs*, 150(2), pp. 67–83.

Okon, E. O. (2018) ‘Africa’s Space Technology Investment and Socio-Economic Returns: The Case of Nigeria’, *International Journal of Business and Management Future*, 2(1), pp. 1–12.

Available at: www.cribfb.com/journal/index.php/ijbmf.

Okorn, F. and Ndum, V. (2020) 'Cross Border Migration Between Nigeria and Its Francophone Neighbours : Policy Challenge', *Iconic Research and Engineering,* 3(11), pp. 304–311.

Oladosu, O. and Offiong, E. (2013) 'Improving space knowledge in Africa: The ARCSSTE-E', *Space Policy*, 29, pp. 154–158. doi: 10.1016/j.spacepol.2012.12.007.

Olaiya, T. (2021) 'Nigeria at war, SBM report reveals', *The Guardian,* 17 December. Available at: https://guardian.ng/news/nigeria-at-war-sbm-report-reveals/.

Oludimu, T. (2018) 'Why we know next to nothing about Nigeria's space programme', *Techpoint Africa,* 28 November. Available at: https://techpoint.africa/2018/11/28/cstp-centre-epe/.

Olukotun, D. (2016) 'It's not an email scam, people, Nigeria really is sending an astronaut into space', *Quartz,* 27 March. Available at: https://qz.com/africa/648441/its-not-an-email-scam-people-nigeria-really-is-sending-an-astronaut-into-space/.

Olusola, J. A. *et al.* (2021) 'The impact of COVID-19 pandemic on nitrogen dioxide levels in Nigeria', *PeerJ*, 9, pp. 1–17. doi: 10.7717/peerj.11387.

Oneyibo, O. (2022) 'After 23 years, Nigeria's space ambitions still look like a pipe dream', *Techpoint Africa,* 22 January. Available at: https://techpoint.africa/2022/01/27/nigerias-space-ambitions-pipe-dream.

Onu, E. (2022) 'Giant Dangote Oil Refinery Begins Production in 3rd Quarter', *Bloomberg,* 22 January. Available at: https://www.bloomberg.com/news/articles/2022-01-22/giant-dangote-oil-refinery-to-begin-production-in-third-quarter.

Onuah, F. (2021) 'Nigeria budgets for oil benchmark price of $57 per barrel in 2022', *Reuters,* 7 July. Available at: https://www.reuters.com/business/energy/nigeria-budgets-oil-benchmark-price-57-per-barrel-2022-2021-07-07/.

Onuh, S. *et al.* (2019) 'Building the Appropriate Capacity for Enabling Space Programs in Africa: The Nigerian Experience', *International Journal of Sustainable Development Research*, 5(1), pp. 18–23. doi: 10.11648/j.ijsdr.20190501.13.

Onyango, C. (2021) 'Africa joins the global space race', *Quartz,* 2 September. Available at: https://qz.com/africa/2051243/africa-joins-global-space-race-to-boost-connectivity-and-

security/.

Onyango, C. (2022) ‘South Africa and Egypt lead the way in Africa’s space race’, *Quartz,* 1 February. Available at: https://qz.com/africa/2120368/south-africa-and-egypt-lead-the-way-in-africas-space-race/.

OPEC (2022) *Nigeria facts and figures*. Available at: https://www.opec.org/opec_web/en/about_us/167.htm (Accessed: 3 June 2021).

Orbital Today (2021) ‘The Cost Of Building First UK Spaceport In The Highlands May Be Soaring Seriously High’, *Orbital Today,* 4 October. Available at: https://orbitaltoday.com/2021/10/04/the-cost-of-building-first-uk-spaceport-in-the-highlands-may-be-soaring-seriously-high/.

Orr, W. (2020) ‘The Curse of the White Elephant: The Pitfalls of Zambia’s Dependence on China.’, *Global Risk Insights,* 1 December. Available at: https://globalriskinsights.com/2020/12/the-curse-of-the-white-elephant-the-pitfalls-of-zambias-dependence-on-china/.

Oshewolo, S. (2019a) ‘Bringing back the issues: Nigeria’s Afrocentric policy under President Olusegun Obasanjo’, *Commonwealth and Comparative Politics,* 57(3), pp. 324–342. doi: 10.1080/14662043.2019.1576278.

Oshewolo, S. (2019b) ‘Major Contentions on Nigeria’s Afrocentric Policy’, *India Quarterly,* 75(3), pp. 351–365. doi: 10.1177/0974928419860920.

Oshodi, A.-G. and Uzodike, U. O. (2021) ‘Fifty years, five problems - and how Nigeria can work with China in future’, *The Conversation*, 13 April. Available at: https://theconversation.com/fifty-years-five-problems-and-how-nigeria-can-work-with-china-in-future-157254.

Oshuntokun, J. (1987) *‘The Thrust of Nigeria’s Foreign Policy in the Future’*. 6 & 5. Available at: https://www.africaportal.org/publications/the-thrust-of-nigerias-foreign-policy-in-the-future/.

Osoba, S. O. (1996) ‘Corruption in Nigeria: Historical perspectives’, *Review of African Political Economy*, 23(69), pp. 371–386. doi: 10.1080/03056249608704203.

Ota, N. E. and Ecoma, C. S. (2016) ‘Nigerian Foreign Policy and the Democratic Experiment: The Lessons of History and Options for the 21st Century’, *International Journal of Applied*

and Advanced Scientific Research (IJAASR), I(I), pp. 9–18. doi: 10.5281/zenodo.154756.

Oyewole, S. (2017) 'Space research and development in Africa', *Astropolitics*, 15(2), pp. 185–208. doi: 10.1080/14777622.2017.1339254.

Oyewole, S. (2020) 'The quest for space capabilities and military security in Africa', *South African Journal of International Affairs*, 27(2), pp. 147–172. doi: 10.1080/10220461.2020.1782258.

Park, J. (2015) 'Is the chinese government's increase in development co-operation with africa the revival of sinocentrism?', *Geopolitics*, 20(3), pp. 626–644. doi: 10.1080/14650045.2015.1048229.

Pasch, K. (2017) 'Susan Strange and the Future of Global Political Economy: Power, Control and Transformation Randall Germain , ed. London: Routledge, 2016, pp. 234.', *Canadian Journal of Political Science*, 50(4), pp. 1125–1126. doi: 10.1017/s0008423917000944.

Peter, N. (2010) 'Space power and its implications-The case of Europe', *Acta Astronautica*, 66(3–4), pp. 348–354. doi: 10.1016/j.actaastro.2009.07.004.

Pham, J. P. (2007) *Nigeria's Foreign Policy: An Inquiry into Sources and Prospects*. 35.

PM News (2020) 'NIGCOMSAT offers satellite navigation services, first in Africa', *PM News*, 14 September. Available at: https://pmnewsnigeria.com/2020/09/14/nigcomsat-offers-satellite-navigation-services-first-in-africa/?amp=1.

Pons, J. (2020) 'India and China are competing in Nigeria for Africa's important space market', *Atalayar*, 19 August. Available at: https://atalayar.com/en/content/india-and-china-are-competing-nigeria-africas-important-space-market.

Posen, B. R. (2013) 'Pull Back: The Case for a Less Activist Foreign Policy', *Foreign Affairs*, 92(1), pp. 116–128.

Premium Times (2016) 'Despite cash crunch, Nigeria donates vehicles, motorcycles to Benin Republic', *Premium Times*, 28 February. Available at: https://www.premiumtimesng.com/news/headlines/199219-despite-cash-crunch-nigeria-donates-vehicles-motorcycles-benin-republic.html?tztc=1.

Punchng (2016) 'Reviving Nigeria's dying cocoa industry', *Punch Newspaper*, 3 October. Available at: https://punchng.com/reviving-nigerias-dying-cocoa-industry/.

Pustovitovskij, A. and Kremer, J.-F. (2011) *Structural power and international relations analysis : 'fill your basket, get your preferences'*. Bochum: Inst. für Entwicklungsforschung und Entwicklungspolitik der Ruhr-Univ. Bochum.

Rathbun, B. (2008) 'A rose by any other name: Neoclassical realism as the logical and necessary extension of structural realism', *Security Studies*, 17(2), pp. 294–321. doi: 10.1080/09636410802098917.

Ravenhill, J. (1998) 'Cycles of Middle Power Activism: Constraint and Choice in Australian and Canadian Foreign Policies', *Australian Journal of International Affairs*, 52(3), pp. 309–327. doi: 10.1080/10357719808445259.

Rayner, G. (2023) 'China can use people's fridges and laptops to spy on them, UK warned', *The Telegraph*, 23 January. Available at: https://www.telegraph.co.uk/news/2023/01/23/china-could-spy-millions-britons-household-objects-like-fridges/.

Rementeria, S. (2022) 'Power Dynamics in the Age of Space Commercialisation', *Space Policy*, 60, pp. 1–13. doi: 10.1016/j.spacepol.2021.101472.

Reuters (2022) 'Nigeria to receive new attack aircraft and helicopters, drones', *Reuters*, 9 December. Available at: https://www.reuters.com/world/africa/nigeria-receive-new-attack-aircraft-helicopters-drones-2022-12-08/.

Ripsman, N. M., Taliaferro, J. W. and Lobell, S. E. (2016) *Neoclassical Realist Theory of International Politics*. New York: Oxford University Press.

Ritchie, J. *et al.* (eds) (2014) *Qualitative Research Practice: A Guide for Social Science Students and Researchers*. 2nd edn. London: SAGE Publications Ltd.

Roberts, D. (1988a) 'Review : Space and International Relations Reviewed Work (s): Militarization of Space . by Paul Stares : Space Weapons and International Security . by Bhupendra Jasani : The Space Station . by Hans Mark : Outerspace : New Challenges to Law and Policy . ', (May 2021).

Roberts, D. (1988b) 'Space and International Relations', *The Journal of Politics*, 50(4), pp. 1075–1090.

Roberts, T. G. (2019) *Spaceports of the World*. Available at: https://aerospace.csis.org/spaceports-of-the-world/.

Robson, C. and McCartan, K. (2016) *Real World Research: a resource for users of social research methods in applied settings*. 4th edn. Chichester: John Wiley and Sons Limited.

Rose, G. (1998) 'Neoclassical Realism and Theories of Foreign Policy', *World Politics*, 51(1), pp. 144–172.

Rowan, K. (2020) 'Why do rockets launch from Florida?', *Live Science*, 30 May. Available at: https://www.livescience.com/32721-why-are-rockets-launched-from-florida.html.

Rowlatt, J. (2021) 'Why electric cars will take over sooner than you think', *BBC News*, 1 June. Available at: https://www.bbc.co.uk/news/business-57253947.

Russell, A. (1995) 'Merging technological paradigms and the knowledge structure in international political economy', *Science and Public Policy*, 22(2), pp. 106–116.

Salako, P. (2022) 'Small businesses hurting from recurring fuel scarcity in Nigeria', *Al Jazeera*, 24 February. Available at: https://www.aljazeera.com/features/2022/2/24/small-businesses-hurting-from-recurring-fuel-scarcity-in-nigeria.

Saldana, J. (2013) *The Coding Manual for Qualitative Researchers*. 2nd edn. Los Angeles: SAGE. doi: 10.1108/qrom-08-2016-1408.

Saliu, H. A. and Oshewolo, S. (2018) 'Nigeria in African affairs: Hegemonic and altruistic considerations', *Round Table: The Commonwealth Journal of International Affairs*, 107(3), pp. 291–305. doi: 10.1080/00358533.2018.1476095.

Salzgeber, F. (2009) *Saving on fuel and safeguarding the environment with smart driving*. Available at: https://www.esa.int/Applications/Technology_Transfer/Saving_on_fuel_and_safeguarding_the_environment_with_smart_driving (Accessed: 5 March 2023).

Saunders, M. N. K., Lewis, P. and Thornhill, A. (2019) *Research Methods for Business Students*. 8th edn. Harlow: Pearson Education Limited.

SB Morgen (2020) *The Economics of the Kidnap Industry in Nigeria*, *SB Morgen*. Available at: https://www.sbmintel.com/wp-content/uploads/2020/05/202005_Nigeria-Kidnap.pdf.

SB Morgen (2021) *Wiggling out of the Rubble*. Available at: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.sbmintel.com/wp-content/uploads/2021/12/202112_Nigeria_2022.pdf.

Scatteia, L., Frayling, A. and Atie, T. (2020) *The role of emerging space nations in supporting sustainable development and economic growth, leading insights on the space sector*. Ile-de-France. Available at: https://www.pwc.fr/en/industrie/secteur-spatial/pwc-space-team-public-reports-and-articles/emerging-space-nation.html.

Schipani, A. (2020) 'Conflict over fertile lands threatens Nigeria's food security', *Financial Times,* 23 January. Available at: https://www.ft.com/content/fc0934a8-e394-11e9-9743-db5a370481bc.

Schweller, R. L. (2003) 'The Progressiveness of Neoclassical Realism', in Elman, C. and Elman, M. F. (eds) *Progress in International Relations Theory: Appraising the Field*. London: MIT Press, pp. 311–348.

Schweller, R. L. (2004) 'Unanswered Threats: A Neoclassical Realist Theory of Underbalancing', *International Secuirity*, 29(2), pp. 159–201. doi: 10.2307/20032088.

Selassie, A. A. and Hakobyan, S. (2021) 'Six Charts Show the Challenges Faced by Sub-Saharan Africa', *International Monetary Funds News,* 15 April. Available at: https://www.imf.org/en/News/Articles/2021/04/12/na041521-six-charts-show-the-challenges-faced-by-sub-saharan-africa.

de Selding, P. (2011) 'Nigcomsat-1R Launched Successfully by Long March', *Space News*, 21 December. Available at: https://spacenews.com/nigcomsat-1r-launched-successfully-long-march/.

Shaw, T. M. (1987) 'Nigeria Restrained: Foreign Policy under Changing Political and Petroleum Regimes', *The Annals of the American Academy of Political and Social Science*, 489, pp. 40–50. doi: 1045601.

Sheetz, M. (2019) 'How NASA is evolving through partnerships with private space companies', *CNBC Evolve*, 30 November. Available at: https://www.cnbc.com/2019/11/30/how-nasa-is-evolving-through-partnerships-with-private-space-companies.html.

Sheetz, M. (2020) 'NASA estimates having SpaceX and Boeing build spacecraft for astronauts saved $20 billion to $30 billion', *CNBC*, 13 May. Available at: https://www.cnbc.com/2020/05/13/nasa-estimates-having-spacex-and-boeing-build-spacecraft-for-astronauts-saved-up-to-30-billion.html.

Shulman, A. (2017) *How Does NASA Use Aluminum?, Avion Alloys*. Available at: https://avionalloys.com/nasa-use-aluminum/ (Accessed: 24 March 2023).

Space Foundation (2019) 'Lower launch costs, new partnerships spur spaceport development around the world, the space report Q4 analysis determines', *Space Foundation*, 12 December. Available at: https://www.spacefoundation.org/2019/12/12/lower-launch-costs-new-partnerships-spur-spaceport-development-around-the-world-the-space-report-q4-analysis-determines/.

Space in Africa (2018a) 'African Leadership Conference (ALC) on Space Science and Technology – Abuja, Nigeria', *Space in Africa*, 6 October. Available at: https://africanews.space/african-leadership-conference-alc-on-space-science-and-technology/.

Space in Africa (2018b) 'FUTA sets Nigerian record, to launch Nigeria's first Nanosatellite', *Space in Africa*, 25 January. Available at: https://africanews.space/futa-sets-nigerian-record-to-launch-nigerias-first-nanosatellite/.

Space in Africa (2019a) 'African Space Industry Annual Report', *Space in Africa*. Available at: https://africanews.space/african-space-industry-annual-report-2019-edition/.

Space in Africa (2019b) 'ARCSSTE-E to Commence Post-Graduate Programmes in Space Law', *Space in Africa*, 18 June. Available at: https://africanews.space/arcsste-e-to-commence-post-graduate-programmes-in-space-law/#:~:text=The African Regional Centre for,Outer Space Affairs (OOSA).

Space in Africa (2019c) 'How Much Has NASRDA Contributed to Nigeria's Economic Growth and Development?', *Space in Africa*, 24 June. Available at: https://africanews.space/how-much-has-nasrda-contributed-to-nigerias-economic-growth-and-development/.

Space in Africa (2019d) 'Nigeria's CSTP Completes Three Successful Experimental Rocket Launches', *Space in Africa*, 17 October. Available at: https://africanews.space/nigerias-cstp-completes-three-successful-experimental-rocket-launches/.

Space in Africa (2019e) 'South Africa, China Sign Agreement to Partner on Square Kilometre Array', *Space in Africa*, 25 June. Available at: https://africanews.space/south-africa-china-sign-agreement-partner-square-kilometre-array/.

Space in Africa (2019f) 'Towards Africa's first rocket launch from its soil – NASRDA Centre

for Space Transport & Propulsion is making progress', *Space in Africa*, 22 May. Available at: https://africanews.space/towards-africas-first-rocket-launch-from-its-soil-nasrda-centre-for-space-transport-propulsion-is-making-progress/.

Space in Africa (2020a) '2020 in Review – Nigerian Space Agency', *Space in Africa*, 18 December. Available at: https://africanews.space/2020-in-review-nigerian-space-agency/.

Space in Africa (2020b) 'Nigeria's Space Policy is Years Behind Schedule but has Some Notable Achievements', *Space in Africa*, 25 August. Available at: https://africanews.space/nigerias-space-policy-is-years-behind-schedule-but-has-some-notable-achievements/.

Space in Africa (2020c) 'Nigerian Space Agency Launches TeleMedicine Facility To Support Covid-19 Testing In Nigeria', *Space in Africa*, 9 April. Available at: https://africanews.space/nigerian-space-agency-launches-telemedicine-facility-to-support-covid-19-testing-in-nigeria/.

Space in Africa (2022) 'List of Space Agencies in Africa', *Space in Africa*, 25 July. Available at: https://africanews.space/list-of-space-agencies-in-africa/.

Square Kilometre Array Observatory (2022) *The SKA Project*. Available at: https://www.skatelescope.org/the-ska-project/ (Accessed: 27 July 2022).

Starr, P. (2007) *Freedom's Power: The True Force of Liberalism*. New York: Basic Books.

State Council of the People's Republic of China (2000) *'China's Space' White Paper (2000 Edition)*. Available at: http://www.cnsa.gov.cn/n6758824/n6758845/c6772480/content.html (Accessed: 9 June 2021).

Strada, G. M. (2018) *Growing the Space Economy: The Downstream Segment as a Driver*. Università Commerciale Luigi Bocconi. Available at: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://sasic.sa.gov.au/wp-content/uploads/2020/10/gianluca-m-strada-2018_growing-the-space-economy_the-downstream-segment-as-a-driver_sasic.pdf.

Strange, S. (1994) *States and Markets*. 2nd edn. London: Continuum.

Strange, S. (2015) *States and Markets*. London: Bloomsbury Academic.

Tanko, A. (2021) 'Nigeria's security crises - five different threats', *BBC News*, 19 July.

Available at: https://www.bbc.co.uk/news/world-africa-57860993.

Tella, O. (2018) 'Space as a Fulcrum of Nigeria's External Relations and Regional Hegemony', *Space Policy*, 46, pp. 46–52. doi: 10.1016/j.spacepol.2018.05.001.

Tella, O. (2020) 'Nigeria leads Africa's race for space with ambitious satellite programme', *Daily Maverick: Opinionista*, 5 August. Available at: https://www.dailymaverick.co.za/opinionista/2020-08-05-nigeria-leads-africas-race-for-space-with-ambitious-satellite-programme/.

Tepper, E. and Shackelford, S. (2022) 'China's new space station solidifies the country as one of the world's top three space powers', *Fast Company*, 12 October. Available at: https://www.fastcompany.com/90822819/chinas-new-space-station-solidifies-the-country-as-one-of-the-worlds-top-three-space-powers.

Thales Alenia Space (2021) 'ASECNA teams up with Thales Alenia Space and NIGCOMSAT to continue the development of SBAS services for a broader range of business sectors in Africa, backed by Geoflex', *Thales*, 9 July. Available at: https://www.thalesgroup.com/en/worldwide/space/press-release/asecna-teams-thales-alenia-space-and-nigcomsat-continue-development.

The Aluminum Association (2022) *Aircraft & Aerospace: Making Modern Flight Possible.* Available at: https://www.aluminum.org/product-markets/aircraft-aerospace#:~:text=Aluminum is used as building,aluminum as their primary fuel. (Accessed: 25 August 2022).

The Economist (2021) 'Africa is blasting its way into the space race', *The Economist*, 17 June. Available at: https://www.economist.com/middle-east-and-africa/2021/06/17/africa-is-blasting-its-way-into-the-space-race.

The Observatory of Economic Complexity (2023) *Crude Petroleum in Nigeria*. Available at: https://oec.world/en/profile/bilateral-product/crude-petroleum/reporter/nga#:~:text=Historical Data&text=In 2021%2C Nigeria exported %2441.8B in Crude Petroleum.,mainly from Ireland (%245). (Accessed: 19 June 2023).

Toft, P. (2005) 'John J. Mearsheimer: An offensive realist between geopolitics and power', *Journal of International Relations and Development*, 8(4), pp. 381–408. doi: 10.1057/palgrave.jird.1800065.

Toogood, K. (2016) ‘Understanding the Emerging Relationship Between China and Africa: The Case of Nigeria’, *Stimson Center*, pp. 1–10. Available at: www.jstor.org/stable/resrep10795.

Tooze, R. (2000) ‘Susan Strange, Academic International Relations and the Study of International Political Economy’, *New Political Economy*, 5(2), pp. 280–289. doi: 10.1080/713687770.

Townsend, B. (2019) ‘Space Power and the Foundations of an Independent Space Force’, *Air and Space Power Journal*, 33(4), pp. 11–24.

Tuerk, M. (2020) ‘Africa Is The Next Frontier For The Internet’, *Forbes*, 9 June. Available at: https://www.forbes.com/sites/miriamtuerk/2020/06/09/africa-is-the-next-frontier-for-the-internet/?sh=72a7d06b4900.

U.S. Department of State (2021) *Country Reports on Terrorism 2021*. Washington DC. doi: 10.5860/choice.44-4105.

Ubi, E. N. and Akinkuotu, O. O. (2014) ‘Nigerian foreign policy and economic development, 1999–2013’, *International Area Studies Review*, 17(4), pp. 414–433. doi: 10.1177/2233865914557099.

UK Government (no date) *Spaceports, Delivering for Scotland*. Available at: https://www.deliveringforscotland.gov.uk/levelling-up/spaceports/ (Accessed: 15 October 2022).

Umeh, E. (2020) ‘What Nigeria’s tech sector can learn from India’, *World Economic Forum*, 17 November. Available at: https://www.weforum.org/agenda/2020/11/nigeria-tech-information-data-india/.

Umezurike, S. *et al.* (2017) ‘Re-examining Nigeria’s Contributions to the African Union and the Domestic Socio-Economic Ramifications’, *Journal of Economics and Behavioral Studies*, 9(1), pp. 17–26.

UNDP (2021) *Assessing the Impact of Conflict on Development in North-east Nigeria*. Available at: https://www.ng.undp.org/content/nigeria/en/home/library/human_development/assessing-the-impact-of-conflict-on-development-in-north-east-ni.html.

UNESCO (2021) *Capacity-Building, IIEP Learning Portal*. Available at:

https://learningportal.iiep.unesco.org/en/glossary/capacity-building (Accessed: 21 May 2021).

UNHCR (2023) *Nigerian refugees in Chad, Cameroon and Niger, United Nations High Commissioner for Refugees Report*. Available at: https://data2.unhcr.org/en/situations/nigeriasituation#_ga=2.155809531.1973709748.1571844796-1590759838.1571844796 (Accessed: 1 June 2023).

United Nations (2022) *Country Classifications*. New York. doi: 10.18356/036ade46-en.

United Nations Peacekeeping (2023) *Troop and Police Contributors*. New York. Available at: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://peacekeeping.un.org/sites/default/files/01_contributions_to_un_peacekeeping_operations_by_country_and_post_61_april_2023_0.pdf.

United Nations Sustainable Development (1992) 'UN Conference on Environment and Development', in *UN Conference on Environment and Development (Agenda 21)*. Rio de Janeiro, Brazil. doi: 10.4135/9781412971867.n128.

UNOOSA (2008) *Capacity-building in space science and technology: Regional Centres for Space Science and Technology Education affiliated to the United Nations*. New York. Available at: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.unoosa.org/pdf/publications/st_space_41E.pdf.

USAID (2023) *USAID*. Available at: https://www.usaid.gov/ (Accessed: 22 February 2023).

Vaismoradi, M. *et al.* (2016) 'Theme development in qualitative content analysis and thematic analysis', *Journal of Nursing Education and Practice*, 6(5), pp. 100–110. doi: 10.5430/jnep.v6n5p100.

Varada, P. (2022) 'The Space Race Expands: Why African Nations Are Looking Beyond Earth', *Harvard International Review*, 15 April. Available at: https://hir.harvard.edu/why-african-nations-are-shooting-for-the-stars/#:~:text=Between now and 2025%2C African,to remain in the country.

Venturini, K. and Verbano, C. (2014) 'A systematic review of the Space technology transfer literature: Research synthesis and emerging gaps', *Space Policy*, 30, pp. 98–114. doi: 10.1016/j.spacepol.2014.04.003.

Volgy, T. J. and Imwalle, L. E. (2000) ‘Two faces of hegemonic strength: Structural versus relational capabilities’, *International Interactions*, 26(3), pp. 229–251. doi: 10.1080/03050620008434967.

Vongsantivanich, W., Ho, D. L. X. and Verspieren, Q. (2018) ‘Using space for disaster management in emerging space states: A critical assessment’, in *69th International Astronautical Congress*. Bremen: International Astronautical Congress, pp. 1–9.

Waltz, K. N. (2010) *Theory of International Politics*. Illinois: Waveland Press Inc.

Wang, X., Zhang, Q. and Wang, W. (2023) ‘Design and Application Prospect of China’s Tiangong Space Station’, *Space: Science and Technology*, 3, pp. 1–20. doi: 10.34133/space.0035.

Watts, M. (2008) ‘Imperial oil: The anatomy of a Nigerian oil insurgency’, *Erdkunde*, 62(1), pp. 27–39. doi: 10.3112/erdkunde.2008.01.03.

Watts, M. (2017) ‘Anatomy of an Oil Insurgency: Violence and Militants in the Niger Delta, Nigeria’, in Omeje, K. (ed.) *Extractive Economies and Conflicts in the Global South*. 1st edn. Routledge.

Way, T. (2020) ‘Challenges and Opportunities of Nigeria’s Space Program’, *Aerospace Security*, 24 June. Available at: https://aerospace.csis.org/challenges-and-opportunities-of-nigerias-space-program/.

WEF (2022) *The Global Risks Report 2022*. Available at: https://www.weforum.org/reports/global-risks-report-2022.

Weitering, H. (2021) ‘Biden’s 2022 NASA budget proposal gives science and commercial space a boost’, *Space.com*, 28 May. Available at: https://www.space.com/biden-nasa-2022-budget-request-science-artemis.

Wivel, A. (2005) ‘Explaining why state X made a certain move last Tuesday: The promise and limitations of realist foreign policy analysis’, *Journal of International Relations and Development*, 8(4), pp. 355–380. doi: 10.1057/palgrave.jird.1800064.

Wohlforth, W. C. (1999) ‘The Stability of a Unipolar World’, *International Security*, 24(1), pp. 5–41.

Wohlforth, W. C. (2008) ‘Realism and Foreign Policy’, in Smith, S., Hadfield, A., and Dunne,

T. (eds) *Foreign Policy: Theories, Actors, Cases*. New York: Oxford University Press.

Wohlforth, W. C. (2016) 'Realism and Foreign Policy', in Smith, S., Hadfield, A., and Dunne, T. (eds) *Foreign Policy: Theories, Actors, Cases*. 3rd edn. Oxford: Oxford University Press.

Wood, D. and Weigel, A. (2012) 'Charting the evolution of satellite programs in developing countries - The Space Technology Ladder', *Space Policy*, 28(1), pp. 15–24. doi: 10.1016/j.spacepol.2011.11.001.

World Bank (2023) *The World Bank In Small States*. Available at: https://www.worldbank.org/en/country/smallstates (Accessed: 23 December 2023).

Yahaya, H. (2022) 'Despite Gulping $7bn, Nigeria Steel Sector Remains Unstable', *Daily Trust*, 15 June. Available at: https://dailytrust.com/despite-gulping-7bn-nigeria-steel-sector-remains-unstable/.

Yakub, M. U. (2008) *The Impact of Oil on Nigeria's Economy: The Boom and Bust Cycles*, *Bullion - Central Bank of Nigeria*. Abuja.

Zakaria, F. (1992) 'Review: Realism and Domestic Politics: A Review Essay Reviewed Work(s): Myths of Empire: Domestic Politics and International Ambition. by', *International Security*, 17(1), pp. 177–198. Available at: https://about.jstor.org/terms.

Zhao, S. (2014) 'A Neo-Colonialist Predator or Development Partner? China's engagement and rebalance in Africa', *Journal of Contemporary China*, 23(90), pp. 1033–1052. doi: 10.1080/10670564.2014.898893.

Zhao, Y. (2016) 'The Role of bilateral and multilateral agreements in international space cooperation', *Space Policy*, 36, pp. 12–18. doi: 10.1016/j.spacepol.2016.02.007.

Ziarnick, B. (2021) 'A Practical Guide for Spacepower Strategy', *Space Force Journal*, 31 January. Available at: https://spaceforcejournal.org/a-practical-guide-for-spacepower-strategy/#post-3287-endnote-3.

Zijlma, A. (2019) 'Which African Countries Are Located on the Equator?', *Tripsavvy*, 10 February. Available at: https://www.tripsavvy.com/african-countries-located-on-the-equator-1454059.

ZoomVideo Communications Inc (2021) *Zoom: One platform to connect*. Available at: https://zoom.us/ (Accessed: 12 September 2021).

Zwanbin, E. (2020) ‘Our Friend or Foe? Exploring Common Grounds for China-Africa Relations.’, *China International Studies*, (80), pp. 124–139. Available at: http://ezproxy.umgc.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=asn&AN=142034534&site=eds-live&scope=site.

Appendix A: Ethical Compliance Approval

Mr Kehinde Abolarin

School of Psychology, Politics and Sociology Faculty of

Social and Applied Sciences

21st September 2020

Dear Kehinde

Confirmation of ethics approval: Doctoral Research Project

Your ethics application complies fully with the requirements for ethical and governance review, as set out in this University's Research Ethics and Governance Procedures, and has been approved.

You are reminded that it is your responsibility to follow, as appropriate, the policies and procedures set out in the Research Governance Framework and any relevant academic or professional guidelines.

Any significant change in the question, design or conduct of the study over its course will require an amendment application, and may require a new application for ethics approval.

It is a condition of approval that you **must** inform ethics@canterbury.ac.uk once your research has completed.

Wishing you every success with your research.

On behalf of

Faculty of Science, Engineering and Social Sciences Ethics Panel

dennis.nigbur@canterbury.ac.uk

Appendix B: Participant Information Sheet

Title:

Nigeria Foreign Policy: A Focus on the Development of the National Economy

PARTICIPANT INFORMATION

A research study is being conducted at Canterbury Christ Church University (CCCU) by Kehinde Damilola Abolarin

Please refer to our Research Privacy Notice for more information on how we will use and store your personal data.

Background

Since its independence in 1960, Nigeria has acted as, and been portrayed as, a regional hegemon in Africa. Nigeria's influence in Africa is predicated on its crude oil revenue, large economy, and military power. However, the state has faced many domestic and external hurdles in the way of this position. Nigeria's regional hegemony is threatened by the unstable global oil price and domestic challenges. Nigeria needs to address its domestic issues and find an enduring source of power for sustainable influence in Africa. The research examines the potential contribution of Nigeria's space capabilities to addressing domestic issues and strengthening its regional influence, including space relations.

What will you be required to do?

Participants in this study will be required to

- Respond and share their thoughts and experience on the research questions which will be via online (Zoom, Skype, telephone, Microsoft Teams, and Blackboard Collaborate)

Disclaimer: Please note that the online communication platforms will handle your user and call data in ways that are governed by your user agreement with them. These agreements are separate from this informed consent procedure, and the researcher and Canterbury Christ Church University have no responsibility for them.

To participate in this research you must:

Be a state actor, academic and/or government official within the foreign affairs and policy sector in Nigeria

Procedures

You will be asked to participate in an online interview where you will respond to research questions. We will discuss which online platform that suits you. E.g. Microsoft Teams, Skype, Zoom. You will be able to choose the time and date that work best for you. You may decline to answer any particular question during the interview, and you are welcome to withdraw at any stage during the interview or afterwards.

Feedback

Will be presented to the participants in the form of a report.

Confidentiality and Data Protection

All data and personal information will be stored securely within CCCU premises in accordance with the Data Protection Act 2018 and the University's data protection requirements. Data can only be accessed by the researcher; this will normally be the same person listed in the initial paragraph of this sheet. After completion of the study, all data will be made anonymous (i.e. all personal information associated with the data will be removed).

The following categories of personal data (as defined by the General Data Protection Regulation (GDPR) will be processed:

- Name, job title and signature. But only the job title will be used to describe each participant in the analysis.

We have identified that the public interest in processing the personal data is:

- To introduce the research participants. Personal data will be used for interpretation of research findings.

Data can only be accessed by, or shared with:

- The researcher, supervisor(s) and internal auditors.

The identified period for the retention of personal data for this project:

- Entire duration of my research.

You can read further information regarding how the University processes your personal data for research purposes at the following link: Research Privacy Notice - https://www.canterbury.ac.uk/university-solicitors-office/data-protection/privacy-notices/privacy-notices.aspx

Dissemination of results

The research results/findings would get circulated through reports and recommendations to Nigeria's foreign affairs ministries. I also hope to reach state practitioners and academic audiences by publishing in high profile journals and presenting at international conferences.

Process for withdrawing consent to participate

You are free to withdraw your consent to participate in this research project at any time without having to give a reason. To do this, please get in touch with me via my contact below.

Any questions?

Please contact the researcher Kehinde Damilola Abolarin on:

01227 923856

kehinde.abolarin@canterbury.ac.uk

School of Law, Policing and Social Sciences.

Canterbury Christ Church University

North Holmes Road,

Canterbury,

Kent.

CT1 1QU

Appendix C: Consent Form

Canterbury Christ Church University

CONSENT FORM

Title of Project: Nigeria Foreign Policy: A Focus on the Development of the National Economy

Name of Researcher: Kehinde Damilola Abolarin

Contact details:

Address:

School of Law, Policing and Social Sciences
Canterbury Christ Church University
North Holmes Road, Canterbury, Kent. CT1 1QU

Tel: 01227 923856

Email: kehinde.abolarin@canterbury.ac.uk

	Please initial box
1. I confirm that I have read and understand the participant information for the above project and have had the opportunity to ask questions.	
2. (If applicable) I confirm that I agree to any audio and/or visual recordings.	
3. I understand that any personal information that I provide to the researchers will be kept strictly confidential and in line with the University Research Privacy Notice	
4. I understand that my participation is voluntary and that I am free to withdraw my participation at any time, without giving a reason.	
5. I agree to take part in the above project.	

Name of Participant:	Date:	Signature:
Name of person taking consent *(if different from researcher)*	Date:	Signature:

Researcher:	Date:	Signature:

Copies: 1 for participant

1 for researcher

Appendix D: Interview Guide

Space technology and the domestic environment

- Tell me about yourself and your experience and involvement in Nigeria's space programme and foreign relations.
- To what extent does Nigeria stand to benefit from its space programme?
- To what extent can Nigeria gain locally through its investment in space technology?
- To what extent are the national agencies and economic institutions involved in the space programme?
- To what degree of benefit will diversifying the Nigerian economy have for the country?
- Which sector would you say the country can leverage as an alternative to crude oil?
- How is Nigeria's space expertise contributing to national development and the space programme?

Space technology and Nigeria's foreign policy (regional influence and external relations)

- Tell me about Nigeria's space ambitions in Africa.
- To what extent does Nigeria feel the need to keep up with other African states in terms of space technology?
- To what extent does space technology (policy) form part of Nigeria's current foreign policy? In what ways?
- To what extent is NASRDA involved in Africa? Does its opinion matter? Which other institutions are involved?
- What would you say are the main priorities for Nigeria's foreign policy and its interests in space in Africa?
- How and to what extent can the space infrastructure contribute to Nigeria's economy and regional affairs?
- How is Nigeria's space expertise contributing to national development and the space agenda?

Space collaboration and Nigeria's space diplomacy and capabilities

- Share with me your knowledge of Nigeria's space collaboration.
- Can you guide me to the policy documents / meeting minutes / press releases regarding decisions made by the government on the space collaborations / programme?
- To what extent is Nigeria's space programme primarily public, or do private / foreign companies also have an input?
- To what extent have foreign powers helped or hindered Nigeria's space ambitions?
- Which states / relationships / memberships are particularly keen or helpful?

Can you think of any other issues or points that I have not raised but that you consider important?