

A STUDY OF THE FORMULATION AND FEASIBILITY OF IMPLEMENTATION STRATEGIES OF THE NIGERIAN SPACE POLICY

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ABSTRACT

This study examined the process of formulation of the Nigerian Space Policy (NSP) and the feasibility of the objectives and implementation strategies of the policy. These were with a view to enhancing the socio-economic development of Nigeria through effective application and development of Space Science and Technology. Two sets of questionnaire with structured and unstructured questions were used to collect data from some strategic people who participated in the formulation of the NSP and some stakeholder organisations. The study revealed that the stakeholders were not adequately represented in the NSP formulation and the participants' contributions in the phases of the policy formulation were generally poor. The implementation strategies of the policy were considered to be highly specific and result-focused by the coordinating bodies, while multifarious stakeholders found the strategies to be moderately measurable and achievable. The time-bound orientation of the implementation strategies was considered moderate across board. Low funding was reported on the policy implementation and leadership commitment was found to be moderate. Governmental stakeholders' involvement was found to be moderate by the coordinating bodies while multifarious stakeholders expressed limited involvement of various sectors of the government. Non-governmental organisations were found to have limited involvement in the policy implementation and moderate level of interactions among the stakeholders on the policy implementation was revealed in the study. The results are expected to be useful inputs in the review of the Nigerian Space Policy.

Keywords: Space Policy; Implementation; Nigeria; National Space Research and Development Agency

1. Introduction

The dawn of the space era in 1957 brought with it significant and progressive enhancement of human knowledge of the earth and outer space. It has also enabled the development of Space Science and Technology (SST) globally. SST has brought about remarkable socio-economic development in many parts of the world (International Space Exploration Coordination Group [ISECG], 2013). As an interdisciplinary subject, SST has promoted innovations by enhancing synergies in multiple areas of Science and Technology. It consistently aims at the “impossible” and the “incredible”, continuously moving forward the frontiers of knowledge (Abdulkalam, 2008). One of the remarkable features of SST is that in many cases what is perfected for use in space exploration becomes a technology that improves the quality of human life on the earth. This has impacted on the development of the microwave oven, infotainment, revolution in

communication and integrated picture of the earth and its resources. Innovative products such as cardiac stent and heart pacemaker, for healthcare, are also spin-offs of SST.

The knowledge of SST received a major boost in Nigeria by the establishment of the National Space Research and Development Agency (NASRDA) under the Federal Ministry of Science and Technology in 1999 (Boroffice, 2008). In order to effectively operate the space agency of Nigeria, the Nigerian Space Policy (NSP) was developed. The goal of the agency is to enable Nigeria attain indigenous competence in designing, developing 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. The NSP was approved by the Federal Government in 2001 (Boroffice, 2008). Some of the key ways by which the policy has been implemented are the establishment of seven major activity centres across the country; training of some Nigerian scientists and engineers who later participated in the building of two of the Nigerian satellites and the launching of five Nigerian satellites into outer space. Two of the satellites operate with some others belonging to other countries (in a group) in a Disaster Management Constellation (DMC).

The implementation of the NSP began immediately after its approval in 2001 and is still ongoing. After almost two decades of its implementation, there has been a dearth of information on review of the policy. This is at variance with what is recommended in the literature which stipulates that a public policy should be regularly evaluated and reviewed every five years (CONESTOGA, 2013; International Standards Organisation [ISO], 2017). Therefore, there exists no evaluation of the policy formulation process as well as the feasibility of the policy objectives and implementation strategies. This paper examines the process of formulation of the Nigerian Space Policy (NSP) and the feasibility of the objectives and implementation strategies of the policy. These are with a view to collecting information which could be valuable in the review of the policy; thereby enhancing the socio-economic development of Nigeria through effective application and development of Space Science and Technology.

2. Literature Review

Generally, a policy is a deliberate or premeditated plan of action and the actual action, introduced to solve a specific problem in a society or an organisation (Lennon, 2009). According to Lenon (2000) public policy is that category of policy that mainly has the involvement of the government in its formulation and implementation. Ikelegbe (2006) describes public policy as the intentions, decisions or actions of the government. It sets out the “what” and “how” of something that is to be done and may be expressed by laws, regulations, procedures or expenditures. National Collaborating Centre for Healthy Public Policy [NCCHPP] (2012) defines public policy as a strategic action led by a public authority in order to limit or increase the presence of certain phenomena within the population. The policy in focus for this study is a public policy, therefore the two terms policy and public policy shall be used interchangeably in the course of discussion.

Policy formulation is the developmental process of appropriate, relevant and acceptable courses of action with a view to fixing public problems (National Centre for Postsecondary Improvement [NCPI], 2003). Public Policies are vital in the administration of government affairs. No good policy comes from the government without being examined by either individuals or groups, though government would consider the pros and cons of any policy prior to releasing it for implementation. Policy formulation commonly occurs in four phases: problem identification, generation of ideas, analysis of ideas and policy adoption (Policy Analysis, 2017).

It has been observed internationally that good-looking and excellent adopted policies could end up achieving outcomes that are very different from their intent if not properly implemented. Therefore, implementation is very vital to effectiveness, efficiency and consistency of a policy (Torjman, 2005). Pressman and Wildavsky (1984) expressed policy implementation as a process of interaction between the setting of policy goals and commensurate actions geared toward accomplishing the goals. Policy implementation links the expression of governmental intention and the actual result. It comprises of the actions by public and private individuals, groups or organisations that are directed on the fulfilment of the set forth objectives in policy decisions (O’Toole, 1995). Policy implementation is said to entail leadership engagement; stakeholder involvement; social, political and economic factors; resource mobilisation; and decisions and actions shaped by operational issues at various levels along the policy-to-action continuum (Bhuyan *et. al.*, 2010).

The vision statement of NSP focuses on building home-grown human capital for the design and construction of suitable hardware and software in SST for maximal access to its potential benefits in terms of sound quality of life of citizens and adequate socio-economic development (NASRDA, 2001). The vision statement dove-tails into the mission statement, which expresses that the resulting SST capabilities shall be applied for food security, management of natural resources, operational and economical communication system, defence and security, and emergency management for safety of life and property, among others. The implementation architecture of the NSP could be illustrated with Figure 1.

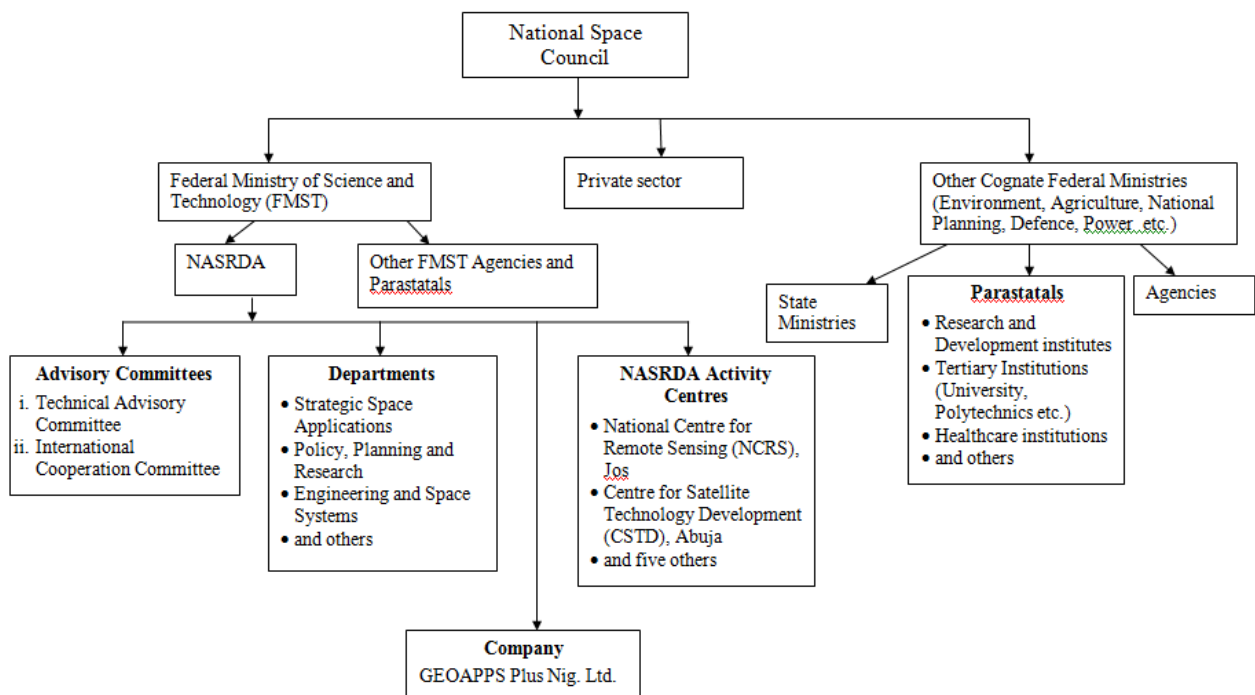


Figure 1: Nigerian Space Policy Implementation Architecture
Source: Author’s concept

3. Research Methodology

Primary data were used for the survey. A multi-stage sampling method was used to select the respondents for the survey. The Federal Ministry of Science and Technology (FMST) and NASRDA were purposively selected being the active NSP implementation coordinating bodies. Three NASRDA Activity Centres (NACs) located in Abuja, Jos and Ile-Ife were also selected, in

addition to five Federal Ministries and three State Ministries (one each in Oyo, Ondo and Lagos States), seven tertiary institutions, and seven private SST-oriented establishments. A total of 214 top and middle level scientific personnel were selected from the organisations. In addition, six (6) strategic respondents that took part directly in, or observed the NSP formulation were also selected to be part of the sample. The sample size was altogether 220 respondents. Two sets of questionnaire were used to collect the data. The first set was used to collect data from the policy formulation participants. It elicited information on participants' composition in the formulation of the NSP and their level of involvement in the process. The second set was used for the coordinating bodies, NASRDA centres and the multifarious respondents (ministries, universities etc). It elicited information on awareness of the policy in the organisations, perception of the policy objectives and implementation strategies, personnel capability, and adequacy of fund and facilities. Out of the 220 copies of questionnaire administered, 171 were retrieved giving an overall retrieval rate of 77.7%. Qualitative method and descriptive statistics were used to analyse the data. Qualitative method was used to analyse the data on policy formulation due to the small number (six) of the respondents. Descriptive (quantitative) statistics were used to analyse other data.

4. Results and Discussion

4.1. Socio-demographic characteristics of the respondents

The summary of the background information about the respondents is shown in Table 1. Majority (81.9%) of the respondents were male while 18.1% were females. Nearly 80% of them were between 31 and 50 years of age at the time of the survey. Master's degree was the most commonly held highest educational attainment (42.0%) although about a quarter possessed a PhD degree. Almost half (45.6%) of the respondents had spent at least 10 years on their jobs.

Table 1: Socio-demographic Characteristics of the Respondents

Parameters	Frequency	%
Gender		
Male	140	81.9
Female	31	18.1
Age		
30 years and below	17	10.2
31-40	49	29.5
41-50	80	48.2
above 50 years	20	12.0
Highest Academic qualification		
Ph.D.	40	25.5
Masters	66	42.0
Bachelors	45	28.7
HND	6	3.8
Years spent at work		
less than 10 years	81	54.4
10-19 years	51	34.2
20 years and above	17	11.4

4.2. Analysis of the Nigerian Space Policy formulation process

Information on the formulation process of the NSP was gathered from six purposively selected respondents who were involved in the policy formulation. The respondents included two retired professors from Obafemi Awolowo University, a Director of one of the NASRDA centres, and three Directors at NASRDA, Abuja (two of them are also members of the Technical Advisory Committee on the Policy). Three of the respondents actually took part in the formulation process of the Space Policy while the others were close observers on the assignment.

4.3. The Composition of the NSP formulation team

Most of the participants were said to have postgraduate degrees. It was gathered that many sectors of the economy were formally invited for the policy formulation. However, those that actually participated consistently in the assignment were Environment, Security and Defence, Land and Housing, Science and Technology, ICT and Agriculture while few other sectors partially turned up. The institutional affiliations of the team included University, Government Ministry, Parastatals, Nigeria Academy of Science, Nigeria Academy of Engineering and the Private sector. Despite the fact that different sectors participated in the policy formulation, most of the respondents submitted that the composition of the NSP formulation team was somewhat weak because some other important stakeholders were not adequately represented.

4.4. Trend of activities in the formulation process

Policy formulation typically consists of four phases (problem identification, generation of ideas, analysis of the proposed ideas and policy adoption). These were followed in formulating the NSP. Most of the respondents argued that the participants' involvement or contributions in the phases of the policy formulation were generally poor. As expected in any typical policy formulation process, some problems were identified during NSP formulation. Irregular attendance of the participants at meetings, difficulty in managing the diverse opinions and inaccessibility to the necessary data/information were reported as some of the challenges that came up during the NSP formulation project. Of all the challenges, inconsistency of the participants and diversity of opinions were considered most significant. Five of the six key informants indicated involvement in the implementation of the policy after its enactment. They were Directors of NASRDA activity centres, Directors in NASRDA, Abuja and member in the Technical Advisory Committee on the policy.

4.5. Feasibility of the policy objectives

This section reports results about the level of NSP awareness by the respondents and their organisations. The results on the feasibility of the policy objectives are also discussed.

4.6. Awareness of the Nigerian Space Policy

At the organisational level, the NSP awareness in the NASRDA centres (NACs) was judged to be moderate (36.4%), very high (27.3%) and high (18.2%) respectively (Table 2). The prevailing positive responses about the NSP awareness in the NACs could be attributed to the fact that the centres were purposely established for research and development on SST. Among the multifarious stakeholders (MFS) 43.3% responded that the NSP awareness was moderate in their organisation, 25.2% said it was low while 13.4% said it was very low. The NSP awareness could be said to be obviously low among the multifarious organisations. Therefore, extra effort would be needed to properly incorporate the policy and its programmes into the establishments' operations.

4.7. Quality of the policy objectives

The concept of S.M.A.R.T. was applied to examine the quality of the objectives of the Nigerian Space Policy. The concept evaluates goals, objectives or targets against the criteria of how **Specific** (clear), **Measurable**, **Achievable**, **Result-focused** (relevant) and **Time-bound** they are (Doran, 1981). Each criterion was examined on a five-point Likert scale ranging from 1 (very low) to 5 (very high). The calculated means of the responses on quality of the policy objectives are presented in Table 3. The results show that the policy coordinating bodies and NASRDA centres judged the policy objectives to be highly specific while multifarious stakeholders found the objectives to be moderately specific.

Table 2: NSP Awareness in the respondents’ organisations

Level of Awareness	NASRDA Activity Centres (NAC)	Multifarious stakeholders (Ministries, Universities, Private sector etc)
Very low	–	17 (13.4%)
Low	4 (18.2%)	32 (25.2%)
Moderate	8 (36.4%)	55 (43.3%)
High	4 (18.2%)	14 (11.0%)
Very high	6 (27.3%)	9 (7.1%)

Table 3: Calculated Means of the Quality of Policy Objectives

Quality Description of the Policy Objectives	Mean Rating		
	NSP Coordinating Bodies	NASRDA centres	Multifarious stakeholders
Specificity	4.06	4.05	2.76
Measurability	3.25	3.68	2.75
Achievability	3.65	3.73	2.85
Result-focused capability	3.86	3.82	2.78
Time-bound orientation	2.56	3.41	2.62

Key: 1=Very Low; 2= Low; 3= Moderate; 4= High; 5=Very High.

A similar trend of results was also observed on the achievability and result-focused capability of the policy objectives. The measurability criterion of the policy objectives was judged moderate by the coordinating bodies and multifarious stakeholders while the NASRDA centres adjudged the objectives to be highly measurable. The analysis of results on the time-bound orientation of the policy objectives revealed that all the respondents found the objectives to be moderately time-bound.

4.8. Feasibility of the implementation strategies

The concept of S.M.A.R.T. was also applied here to examine the quality of the implementation strategies put up for the NSP. Furthermore, the evaluation results of certain aspects of the

implementation strategies for NSP, such as funding, facility adequacy, personnel operational adequacy, training and retraining strategies, leadership and stakeholders’ involvement, stakeholder’s interaction, international collaborations and so on, are reported as sub-sections.

4.9. Quality of the implementation strategies

The calculated mean results on the quality of the implementation strategies are presented in Table 4. It can be deduced from the results that the coordinating bodies and NASRDA centres found the implementation strategies to be highly specific and result-focused while the multifarious stakeholders expressed the strategies to be moderately specific and result-focused. On the measurability and achievability criteria of the implementation strategies, the coordinating bodies judged the two criteria to be high while NASRDA coordinating bodies and multifarious stakeholders opined that the criteria were moderate. The results further reveal that all the respondents found the implementation strategies of the policy to be moderately time-bound.

4.10. Funding of the NSP implementation

The primary source of funds on NSP implementation for the coordinating bodies and the NASRDA Activity Centres (NAC) was the government (94% and 100% respectively). Among the multifarious stakeholders, 57.5% of the respondents also indicated government as their primary source of funding on the policy. Additional 23% and 10% of multifarious stakeholders also indicated private sourcing and foreign donors respectively as the primary sources of funding for NSP implementation in their organisations (Table 5).

Table 4: Calculated Means of the Quality of Implementation Strategies

Quality Description of the Implementation Strategies	Mean Rating		
	NSP Coordinating Bodies	NASRDA centres	Multifarious stakeholders
Specificity	3.56	3.50	2.63
Measurability	3.50	3.27	2.68
Achievability	3.88	3.41	2.70
Result-focused capability	3.75	3.55	2.77
Time-bound orientation	2.67	3.18	2.65

Key: 1=Very Low; 2= Low; 3= Moderate; 4= High; 5=Very High.

Table 5: Sources of Fund for NSP Implementation in the Organisations

Sources of Fund for NSP implementation		NSP Coordinating Bodies N=16	NASRDA Centres N=22	Multifarious stakeholders N=87
Primary source	Government	15 (93.8%)	22 (100%)	50 (57.5%)
	Local donor(s)	1 (6.2%)	–	6 (6.9%)
	Foreign donor(s)	-	–	9 (10.3%)
	Private sourcing	-	–	20 (23.0%)
	None	-	–	2 (2.3%)
Other sources*	Government	5 (31.2%)	9 (40.9%)	28 (32.2%)
	Local donor(s)	–	1 (4.5%)	12 (13.8%)
	Foreign donor(s)	6 (37.5)	2 (9.1%)	21 (24.1%)
	Private sourcing (consultancy etc)	–	3 (13.6%)	30 (34.5%)
	None	4 (25%)	7 (31.8%)	30 (34.5%)

**Multiple responses applied*

The results show that all the groups under study had other sources of funds for the policy implementation. Most respondents (about 37.5%) from the Coordinating Bodies (CB) indicated foreign donors. Private sourcing, foreign and local donors were indicated by the NAC and Multifarious Stakeholders (MFS) as other sources of funds for the policy implementation. However, a significant number of respondents indicated no other source of funds for the policy implementation while the Government was also mentioned by some as the additional source of funds for NSP implementation in their organisations.

Most of the CB respondents (62.5%) indicated that the funds available for them, on NSP implementation, were just about average while majority (40.9%) of NAC said it low. The prominent response (35.2%) for MFS was very low funding, though 32.4% and 31.5% also expressed low and moderate funding respectively (Table 6).

Table 6: Adequacy of the Funds for NSP Implementation

Sufficiency of the obtainable funds	NSP Coordinating Bodies (CB)	NASRDA Centres (NAC)	Multifarious Stakeholders (MFS)
Very Low	1 (6.2%)	6 (27.3%)	38 (35.2%)
Low	3 (18.8%)	9 (40.9%)	35 (32.4%)
Moderate	10 (62.5%)	5 (22.7%)	34 (31.5%)
High	2 (6.2%)	2 (9.1%)	1(0.9%)
Very High	–	–	–
Mean rating	2.07	2.14	1.98

Key: Very Low =1; Low=2; Moderate= 3; High=4; Very High=5.

4.11. Involvement of the NSP leaders

Active leadership for the NSP is provided by NASRDA and FMST. The National Space Council (NSC) to be chaired by the Nigerian President was listed in the policy document to be the apex body for NSP matters. Though inaugurated in 2013 by the then president (Jonathan, 2013), NSC was yet to launch out into full operation at the time the survey for this study was conducted.

The results presented in Table 7 show that in each category of stakeholders, most of the responses indicated moderate performance of the leadership on NSP. Cooperation among the coordinating bodies and the organisational leadership of other stakeholders was also examined. The results reveal that most of the respondents from the three categories observed moderate cooperation among the NSP implementation leadership and leaders of other stakeholders (Table 7).

Table 7: Leadership Involvement in the Implementation

Issues on Leadership Involvement in NSP Implementation		NSP Coordinating Bodies	NASRDA Centres	Multifarious stakeholders
Commitment of the Coordinating/bodies (FMST and NASRDA)	Very Low	1 (6.2%)	1 (4.5%)	8 (6.3%)
	Low	1 (6.2%)	5 (22.7%)	32 (25.4%)
	Moderate	8 (50%)	9 (40.9%)	59 (46.8%)
	High	5 (31.2%)	5 (22.7%)	24 (19.1%)
	Very High	1 (6.2%)	2 (9.1%)	3 (2.4%)
	Mean rating	2.94	2.77	2.58
<u>Cooperation</u> among the organisational leaders and Coordinating/Monito	Very Low	1 (6.2%)	2 (9.1%)	18 (14.5%)
	Low	3 (18.8%)	6 (27.3%)	41 (33.1%)
	Moderate	10 (62.5%)	11 (50%)	52 (41.9%)

ring bodies	High	2 (6.2%)	3 (13.6%)	11 (8.9%)
	Very High	–	–	2 (1.6%)
	Mean rating	2.81	2.68	2.50

Key: Very Low =1; Low=2; Moderate= 3; High=4; Very High=5.

4.12. Involvement of the stakeholders

Most of the respondents from the coordinating bodies (46.7%) and NASRDA centres (68.2%) indicated that the government stakeholders, across various sectors were moderately involved in NSP implementation. Most of the respondents from the multifarious stakeholders (52.4%) indicated limited involvement of the government organisations. (Table.8). It could also be deduced from the Table that the non-governmental stakeholders had limited involvement in the NSP implementation as most of the responses across the three respondent categories indicated this. The multifarious stakeholders gave 50% response; NASRDA centres gave 59.1% response while the coordinating bodies gave 60% response.

Table 8: Stakeholders Involvement in NSP Implementation

Issues on Stakeholders’ Involvement in NSP Implementation		NSP Coordinating Bodies	NASRDA Centres	Multifarious stakeholders
Involvement of Governmental stakeholders/organisations.	None – only the FMST & NASRDA (1)	–	1 (4.5%)	12 (9.7%)
	Limited involvement of various sectors (2)	5 (33.3%)	4 (18.2%)	65 (52.4%)
	Moderate involvement of various sectors (3)	7 (46.7%)	15 (68.2%)	40 (32.3%)
	Wide multisectoral involvement (4)	3 (20%)	2 (9.1%)	5 (4%)
	Very wide multisectoral involvement (5)	–	–	2 (1.6%)
	Mean rating	2.87	2.82	2.35
Involvement of <u>non-governmental</u> stakeholders.	None – only the Governmental (1)	2 (13.3%)	–	17 (13.7%)
	Limited involvement (2)	9 (60%)	13 (59.1%)	62 (50%)
	Moderate involvement (3)	3 (20%)	7 (31.8%)	38 (30.6%)
	Wide involvement (4)	1 (6.7%)	2 (9.1%)	6 (4.8%)
	Very wide involvement (5)	–	–	1 (0.8%)
	Mean rating	2.20	2.50	2.29

Oyebisi (2018) submits that interactions/collaborations among the stakeholders would facilitate SST development and applications in the country. Practically the output of one stakeholder could be the input of another (Altman and Petkus, 1994). The current study examined the state of

interactions/collaborations among the NSP stakeholders. The results presented in Table 9 reveal moderate state of collaborations/interactions (46.2%), followed by low state of collaborations (36.7%) among the stakeholders. Some of the collaborations among the organisations, mentioned by respondents include:

- i. Project design and execution (e.g. there is collaboration between Centre for Space Transport and Propulsion (CSTP), Epe and Centre for Space Technology Development (CSTD), Abuja for cube satellite development and launching;
- ii. collaborations among relevant centres on geodesy and geo-dynamics in terms of earth movement.
- iii. Human Resource Development (e.g. Centre for Space Science and Technology Education (CSSTE) Ife collaborated with African Regional Institute for Geospatial information Science and Technology (AFRIGIST), Ife and Federal University of Technology, Akure (FUTA) for postgraduate programmes).
- iv. Use of resource persons from other centres/organisations (e.g. for the post graduate programmes in CSSTE, Ife).
- v. Provision of NigeriaSat-1 and 2 imageries by CSTD, Abuja for other organisations in need of them.
- vi. Collaboration of some NASRDA centres on research and development with some universities (e.g. CSTP, Abuja and Federal University of Technology, Akure).

Table 9: Level of Interactions/Collaborations among the NSP Stakeholders

	Response	%
Very Low	15	9.50%
Low	58	36.70%
Moderate	73	46.20%
High	12	7.60%
Very High	-	-
Total	158	100

4.13. Application of SST in the organisations

The policy emphasised the need for the application of the SST in many sectors of the economy including natural resources management and food security, disaster warning and mitigation, defence and security etc. This study examined various forms of SST and the extent of their applications in the different organisations. The forms of SST examined were Global Positioning System (GPS), Remote Sensing and Geographic Information System (GIS), Satellite Meteorology and Script writing.

The results of the analysis of the responses on SST applications are provided in Table 10. The widest application was for GPS (74.8%). This was followed by Remote Sensing and GIS (72.4%) and Satellite Meteorology (30.7%); script writing to enhance the open-source SST software had the least (26.8%) application among the stakeholders. Some of the reported specific ways of applying SST in the organisations were: monitoring of programmes, projects and policies of the Federal Government and capital expenditures from the national budget; soil survey and mapping; production of suitability and fertility maps; land use and land cover evaluation; establishment of control points to carry out perimeter survey of land; and environmental hazard vulnerability mapping, among others.

Table 10: Forms of SST Incorporated into the Multifarious Organisations' Operations

Forms of SST	Organisational Incorporation (n=127)	%*
a) Global Positioning System (GPS)	95	74.8
b) Satellite Meteorology (Satellite-based atmospheric data collection etc.)	39	30.7
c) Remote sensing and Geographic Information System (GIS)	92	72.4
d) Script writing to enhance the open-source SST software	34	26.8

*Multiple responses applied

Table 11: Adequacy of personnel on SST

Adequacy of the Scientific Personnel		NASRDA Centres	Multifarious stakeholders
a). SST knowledge & skills for the fulfilment of organisational mandate.	Very Inadequate	1 (4.8%)	33 (28.9%)
	Inadequate	2 (9.5%)	36 (31.6%)
	Fairly adequate	9 (42.9%)	32 (28.1%)
	Adequate	6 (28.6%)	8 (7.0%)
	Highly adequate	3 (14.3%)	5 (4.4%)
b). No. of scientific staff (lectures, technologist etc)	Very Inadequate	–	21 (18.4%)
	Inadequate	3 (14.3%)	34 (29.8%)
	fairly adequate	7 (33.3%)	40 (35.1%)
	Adequate	7 (33.3%)	14 (12.3%)
	Highly adequate	4 (19.0%)	5 (4.4%)

4.14. Adequacy of the personnel

The capability of the members of staff directly involved in the policy implementation is an important factor for the success of the policy execution (Altman and Petkus, 1994). The results presented in Table 11 shows that more than two-fifths (42.9%) of the respondents from NASRDA Activity Centres (NAC) indicated that the state of SST knowledge and capability of the scientific officers in fulfilling the mandate of their various centres was “fairly adequate”. Less than a third (28.6%) said it was “adequate”. On the contrary, the multifarious stakeholders generally expressed dissatisfaction with the adequacy of SST knowledge and skills of their concerned personnel. About a third (31.6%) indicated inadequate and an additional 28.9% and 28.1% of these stakeholders indicated “very inadequate” and “fairly adequate” respectively.

In terms of quantity, around 60% of the NAC respondents said that the number of their scientific staff was either “adequate” or “fairly adequate” while about a quarter noted that it was highly adequate. Most of the multifarious stakeholders’ responses (35.1%) indicated that the number of the scientific personnel in their organisation was fairly adequate, 29.8% indicated “inadequate” and another 18.4% indicated “very inadequate”.

4.15. Personnel capacity building on SST

The study gathered that a good number of the respondents approached on the survey were actually making conscious efforts towards capacity development in SST in order to be relevant in their respective organisations. Regarding knowledge acquisition, it was expressed that some organisations gave assistance in some way to members of staff.

4.16. Channels of knowledge acquisition

It can be seen from Table 12 that among the NAC respondents, training (academics, workshop etc) within Nigerian borders and on-the-job interactions were the prevalent channels of knowledge acquisition. Foreign training and the use of internet and library had also been significantly explored. On the part of the multifarious stakeholders, a pattern of response somehow similar to that of the NAC was gathered. Training within Nigeria was the prevalent means of capacity building in SST for the personnel while on-the-job interactions and material sourcing were very close alternatives (59.1% and 57.5% respectively).

Table 12: Channels and organisational aids for personnel knowledge acquisition on SST

Channels of SST Knowledge acquisition*	NASRDA Centres (n=22)	Multifarious stakeholders (n=127)
a) Training or Re-training (academics, workshop, etc.) within the country	20 (90.9%)	76 (59.8%)
b) Training or Re-training outside the country	18 (81.8%)	29 (22.8%)
c) On-Job training and Interactions	20 (90.9%)	75 (59.1%)
d) Material sourcing (library, internet etc)	17 (77.3%)	73 (57.5%)
Organisational Assistance on SST Knowledge acquisition*		
a. Sponsorship (Partial or full) for training or programmes within the country	16 (72.7%)	50 (39.4%)
b. Sponsorship (Partial or full) for training or programmes outside the country	15 (68.2%)	25 (19.7%)
c. Enrichment of Library	9 (40.9%)	38 (29.9%)
d. Provision of internet facilities	10 (45.5%)	80 (63.0%)
e. None	1 (4.5%)	17 (13.4%)

* Multiple responses applied

4.17. Organisational assistance in SST knowledge acquisition

Swarajyalakshmi (2005) submits that human resources possess infinite potential capabilities which make them distinct from other resources. Therefore, personnel capacity building is of great necessity for such organisations that value growth and vibrant performance. Sponsorship for training within and outside the country, enrichment of library, and provision of internet facilities were expressed by the respondents as the ways by which many of the organisations assist their personnel for capacity development on SST (Table 12).

More than 70% of the NAC respondents indicated that personnel in their centres do enjoy sponsorship for training within the country by their organisations and about 70% gave positive response for personnel training abroad being sponsored by their centres. Enrichment of library and provision of internet facilities had less than 50% responses each as ways by which NASRDA centres aid their personnel for capacity development. In addition, the respondents expressed that in most cases where a centre might not be able to sponsor the personnel, study leave with full salary payment would be granted.

It was revealed that provision of internet facilities was the most prominent way of assistance by the multifarious organisations for personnel capacity development on SST, as more than 60% responses emerged. Sponsorship for training within the country, and library enrichment were also prominent options as about 40% and 30% responses were respectively gathered on them. However, 13% responded that no assistance came forth, so far, from their organisations to support the personnel for capacity development on SST.

4.18. Adequacy of facilities

Availability of appropriate and functional facilities is important for the proper implementation of a policy. Facilities for SST operations usually include computers and their peripherals, SST-based software and hardware, Global Positioning System receiver, Data (satellite imagery, atmospheric indices readings etc.), laboratory and so on. Most of the facilities examined in the survey were said to be available with fair (average) adequacy (Table 13). This applied to Data satellite imagery (34.4%), computer system (45.6%), specialised software (37.4%), GPS receiver (39.3%) and specialised equipment (28.4%). However, laboratory (with its equipment) and field trip vehicle were mostly thought to be inadequate.

4.19. Government assistance for the private sector on SST

Encouraging the private sector to participate in the development and application of SST is part of the implementation strategies outlined in the NSP (NASRDA, 2001). The policy coordinating bodies and the multifarious stakeholders were asked to mention ways by which the government had assisted the private sector in SST. No form of government assistance for the private sector in SST could be gathered from this survey. This suggests that such assistance was scarcely available. The private sector therefore stands the chance of impaired participation in SST ventures because the technology could be capital intensive and this on the long run would have adverse effect on the development of indigenous capacity in SST.

Table 13: Adequacy of Facilities

	Very Inadequate	Inadequate	Fairly Adequate	Adequate	Highly Adequate
a. Data (e.g. imagery, atmospheric, etc.)	34 (22.1%)	28 (18.2%)	53 (34.4%)	28 (18.2%)	11 (7.1%)
b. Computer System and accompanying facilities (e.g. printers)	15 (9.5%)	28 (17.7%)	72 (45.6%)	28 (17.7%)	15 (9.5%)
c. Specialised software (to meet the organisation's peculiar needs)	30 (19.4%)	32 (20.6%)	58 (37.4%)	26 (16.8%)	9 (5.8%)
d. GPS receiver	25 (16.7%)	25 (16.7%)	59 (39.3%)	33 (22.0%)	8 (5.3%)
e. Specialised equipment (e.g. A0 plotter, A0 scanner, etc)	37 (25.0%)	31 (20.9%)	42 (28.4%)	28 (18.9%)	10 (6.8%)
f. Internet facilities	28 (18.4%)	33 (21.7%)	48 (31.6%)	28 (18.4%)	15 (9.9%)
g. Laboratory and its equipment	39 (25.5%)	44 (28.8%)	37 (24.2%)	27 (17.6%)	6 (3.9%)
h. Library facilities	32 (21.3%)	46 (30.7%)	49 (32.7%)	20 (13.3%)	3 (2.0%)
i. Others: Field work Vehicle	5 (16.7%)	25 (83.3%)	–	–	–

Oyebisi (2018) submits that as a result of low technological capacity in Nigeria, the home-grown firms have turned to foreign sources for technology acquisition, with minimal or no modification. Invariably, this has brought about acute underutilization of the indigenous resources, including both environment and human resources. By extension, collaborations among various economic sectors are continually hindered. Hitt *et. al.* (2000) also explain that foreign technologies are actually conceived and constructed for foreign economies. Therefore, firms (or countries) that combine imported technology with intra-firm technology transfer and indigenous development are more likely to achieve technological paradigm shifts and would boost their competitiveness.

The growth and development of Surrey Satellite Technology Limited (SSTL) in the United Kingdom is an apt lesson that Nigeria could learn from. Abiodun (2017) states that a research and development project in 1985 conceived and brought forth SSTL. The then small initiative/venture was subsequently fostered by staff, radio amateurs and students of the University of Surrey to become the present day, internationally-recognized private organisation in the area of space science and technology. Nigeria government consulted SSTL for the development and launching of the Nigeria's three Earth observation satellites: NigeriaSat-1, NigeriaSat-2 and NigeriaSat-X. The company also offered Know-How-Technology-Trainings (KHTT) for some Nigerian engineers and scientists. This resulted in the NigeriaSat-X being built

by Nigerians in the SSTL laboratory (Boroffice, 2008 and Isoun, 2013). Invariably, Nigeria’s success assurance on SST could be stepped up if concrete guidelines and programmes are put in place to motivate its private sector.

4.20. Feedback reporting on NSP implementation

The NASRDA centres and the multifarious stakeholders are expected to give feedback on the NSP implementation activities and programmes. The implementation leading agency, NASRDA, was identified by the stakeholders as the primary body that collates and manages the feedback information. Regular meetings, periodic report and dedicated conferences or exhibitions were the media of feedback delivery explored in this study.

As shown in Table 14, periodic report was the most widely used (81.8%), followed by regular meetings (63.6%) in the NASRDA activity centres (NAC). Among the multifarious stakeholders, periodic reporting and dedicated conferences were the most frequently mentioned. More than 50% of NAC respondents attested that their centres had access to some other organisations’ operational information. On the other hand, many of the multifarious organisations were not so informed about the performance of many other organisations on SST. This was evident as 67% responses expressed lack of access to other stakeholders’ reports. Lack of access to other stakeholders’ information on the policy information might, on the long run, impair the overall implementation process.

USAID (2001) and Kellogg (2004) argue that having adequate access to other stakeholders’ feedback would enable implementers to assess the provisional or present achievements, make necessary course corrections and view themselves as part of the larger effort. Most of the responses from the coordinating bodies and multifarious stakeholders judged the effect of giving and receiving feedback on NSP implementation to be “averagely helpful”, while the prominent responses (46.2%) from the NASRDA centres indicated “mostly helpful” (Table 15).

Table 14: Feedback Presentations on NSP Implementation

	NASRDA Centres (N=22)	Multifarious Stakeholders (N=127)
Mediums of Feedback*		
Regular meetings of the stakeholders	14 (63.6%)	24 (18.9%)
Periodic report submission	18 (81.8%)	28 (22%)
Dedicated Conferences, Exhibitions, etc.	13 (59.1%)	28 (22%)
Access to other stakeholders’ report	(N=16)	(N=97)
Yes	9 (56.2%)	32 (33%)
No	7 (43.8%)	65 (67%)

*Multiple responses applied

Table 15: How Helpful the Feedback Presentations were on NSP Implementation

	NSP Coordinating Bodies	NASRDA Centres	Multifarious stakeholders
Not helpful	1 (9.1%)	1 (7.7%)	6 (9.23%)
Somehow helpful	3 (27.3%)	1 (7.7%)	21 (32.31%)
Averagely helpful	4 (36.4%)	4 (30.8%)	21 (32.31%)
Mostly helpful	3 (27.3%)	6 (46.2%)	10 (15.38%)
Totally Helpful	–	1 (7.7%)	7 (10.77%)
Mean rating	2.82	3.38	2.86

5. Conclusion

This research aimed at understanding the formulation and level of implementation of the Nigerian Space Policy. Underrepresentation of the necessary stakeholders at the policy’s formulation, low level of awareness of the policy, moderate stakeholder commitment, low funding and dearth of necessary structured assistance to the private sector are part of the causes for the crawling pattern of NSP implementation and productivity. The study concludes that the Nigerian Space Policy could enhance the socio-economic development of the country if all relevant stakeholders are involved in its timely review and implementation.

On this note, the following policy actions are recommended:

- (i) User needs analysis should be well-considered in compiling the implementation strategies.
- (ii) The Policy when being reviewed should be tuned with the global focus of Space research in the present. However, the Nation’s basic need should be considered.
- (iii) Proactive Human Resources Development on SST should be taken into consideration by the government and all stakeholders in order to speedily achieve the indigenous critical mass of man-power for SST development.
- (iv) Strategies should be made specific and proactive by the government on how to encourage and assist the private sector on SST development and enterprises.

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