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Implementation of National Agency for Science, Engineering, Infrastructure, and Innovation (NASENII) Programme for Economic Development: A Study of Nigeria

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Abstract

The current study examines the implementation of National Agency for Science, Engineering, Infrastructure, and Innovation (NASENII) Programme for economic transformation in Nigeria. The study adopted systems theory as theoretical frame work and adopted survey and documentary research design. Primary and secondary method of data collection was used to collect data and was analysed through statistical technique. The results revealed that the National Agency for Science, Engineering, Infrastructure, and Innovation (NASENII) has successfully implemented the national policy on science, technology, and innovation. The agency has achieved its goals by fostering a robust innovation ecosystem, strengthening Nigeria's science, technology, and innovation capabilities to support the evolution of a modern economy. These efforts have contributed to job creation, wealth generation, reduced reliance on imports, increased exports, and overall national development. Additionally, NASENII has laid the groundwork for sustainably driven scientific and technological innovations to flourish in the future. Inadequate fund and raw materials for production are the major challenges affecting the productivity of NASENII in Nigeria. The study recommends that Federal Government should vote for more funds in order to purchase raw materials for production in order to stimulate the growth of SMEs, agriculture, and power generation to reduce poverty.

Keyword: NASENII, Nigeria, science, sustainability, technology

Introduction

Nigeria is still at the incubating stage of technological take-off (Haruna,

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2015). This was due to nonexistence of the technological infrastructure policy framework of the Federal Ministry of Science, Technology, and Innovation. This led to the establishment of National Agency for Science, Engineering, Infrastructure, and Innovation (NASENII) in 1992. The agency aims to reduce the dependence of Nigerian industrial sector on imported inputs, specifically in the manufacturing of finished products and automobile production. Import substitutes in the fields of scientific research and innovation are a priority, but the expected results in terms of development have not yet materialized. Since scientific knowledge is the key to build robust science, technology, innovation, and invention capability and capacity required to advance the contemporary economy, it is imperative that specific strategies, methods, and institutions be put in place to facilitate this process. This calls for the establishment and ongoing revision of science and technology policies to propel the necessary growth (Olaopa et al., 2011).

Information technology, materials technology, and biotechnology are the three phases of technological advancement and innovation that drive the global economy and industrial/social development. Nigeria is ranked as a developing nation and the thrust of its national policies since independence can be summarized as an attempt to develop the country. In this regard, the objective of development is to provide food, shelter, education, health, and provision of infrastructure, transportation, and communication, along with creation of wealth through industrialization and efficient exploitation of natural resources. In order to compete with the expanding global market, countries must become proficient in the fields of science, innovation, and technological devices essential for industrial, as well as social and political development (Haruna, 2015). This is one of the reasons that NASENII was given the desired attention by the Federal Government of Nigeria in order to cater the issue of technological backwardness.

Despite the fact that it was established to strengthen the technological development, NASENII has witnessed several setbacks in the acquisition of knowledge for the growth of SMEs, agriculture, food security, power generation, and poverty reduction in the country. This has been termed as the epidemic limiting the development rate of Nigeria as compared to other counties of the world. Innovations and scientific progress are critical instruments for enhancing the performance of any nation, specifically for

the creation of local contents and promotion of activities that will encourage innovation and development of technology and communication.

In terms of advancements in technology, science, and innovative concepts, a lot of research has already been done. However, not much study has been conducted on the role of NASENII in implementing the national policy on science, technology, and innovation in Nigeria. Among few, the research by Ewesuedo (2011) on evaluation of national policy on science, technology, and innovation (STI) from 1998-2008 was quite significant. The study was carried out as a result of Nigeria's over dependence on foreign products and neglect of her indigenous technologies. Survey research was conducted based on two cases involving National Research Institute for Chemical Technology (NARICT) and Institute for Agricultural Research (IAR) from Zaria, Kaduna (State of Nigeria).

After reviewing the works of notable scholars, it has been discovered that there is paucity in the methodology adopted by previous researchers. Moreover, it was discovered that some of the researches are documentary in nature and not a causal relationship research and it has also been discovered that the empirical review in their works are massively shallow, therefore it could be misleading in attaining the objectivity of research work. Several previous studies have been conducted in foreign countries with systems that differ significantly from Nigeria's and many of these reviews have been marked by flawed research designs. To address this gap, the current study aims to evaluate the impact of national policies on science, technology, and innovation on economic transformation in Nigeria.

The main objective of this study is to examine the effectiveness of managing the implementation of National's s policy on science, technology and innovation for economic transformation in Nigeria: While the specific objectives are to:

i. Examine the extent to which National Agency for Science, Engineering, Infrastructure and Innovation (NASENII) has achieved its policy of objective of building a strong science, technology and innovation and innovative capability needed to evolve a modern economy in Nigeria?

ii. assess the effect of National's s Agency for Science, Engineering, Infrastructure and Innovation (NASENII) in achieving its policy objective of propelling the acquisition of knowledge for the growth of SMEs, Agriculture and Power generation to reduce poverty.

iii. determine the whether the National's s Agency for Science, Engineering, Infrastructure and Innovation (NASENII) has achieved its objective creating innovation and communication development.

iv. ascertain the magnitude to which the National's s Agency for Science, Engineering, Infrastructure and Innovation (NASENII) has enhanced the creation and development of enterprises using Nigeria's local content.

v. identified challenges affecting the full function of National's s Agency for Science, Engineering, Infrastructure and Innovation (NASENII) in Nigeria.

Conceptual Framework

Policies of NASENII on Science, Technologies, and Innovation

The fundamental objective of developing the Nigerian market is to provide a conducive atmosphere for the long-term industrial development of the country by making available the intermediate capital products necessary for the design, fabrication, and mass production of machines and equipment. The primary goal is to strengthen the local capital goods industry by helping small and medium-sized enterprises (SMEs) in acquiring the knowledge, skills, and resources they need to produce machinery that is up to international standards. There are now nine separate development institutes because of the organization's long history.

NASENII aimed at promoting and supporting Sustainable Development and for this reason, has designed its projects and programmes to intervene and contribute to all facets of National's Development. This aligns with the International Council for Science (2002), who argue that for science, technology, and innovation to effectively drive sustainable growth, society's goals for development and progress must be prioritized. Key sectors for intervention include energy, agriculture, education, and manufacturing. The advancement of the nation's technological and creative infrastructure will be supported by emerging technologies, while the water sector's focus on fostering a

knowledge-driven environment will enable large-scale manufacturing of standardized goods and services locally. NASENII's remit extends to the following main categories of capital goods research, production, and reverse engineering.

These include scientific instruments and supplies, engineering materials, and industrial and analytical chemical materials.

Comparison of Engineering Tools with Engineering Plans, Standards Power Tools, and Machinery

To carry out this mission, NASENII has constructed a number of research institutions to:

1. Offer engineering and technology facilities as a vehicle for technologies development.
2. Current scientific facilities, such as the Primary Science Kit (PSK) needed to demystify science to children, laboratory supplies (for example, burette, pipette, and others), and equipment for capacity building in areas ranging from electrical engineering to foundry technology and innovation.
3. Develop engineering designs and implement them.

Several African countries have tried out various institutional building strategies based on NASENII's policy/ National's hopes for expanding and maintaining institutions at the world-class level in order to advance their scientific and technology sectors.

NASENII in fulfillment of its core objectives have built capacity in various areas of science and technological endeavors. The number of people trained in Advanced Manufacturing Technology and innovation (AMT) has grown with each passing year indicating the growing interest in the fields of science, technology, and innovation. This is in contrast to Nanotechnology and innovation which has the same year of duration but has not had significant number of people trained in the field. This can be attributed to the fact that NASENII's focus is channeled towards actual research in nanotechnology and innovation, hence spends more on awarding grants to researchers than capacity development of the populace. The attention given to AMT can also be linked to the mandate of NASENII which emphasizes the need for the production of capital goods (Adewoye, 2006).

Empirical Review

Sani et al. (2014) examined science, technology, and innovation as a major tool for sustainable development. The researcher analyzed various techniques adopted by NASENII, such as Advanced Manufacturing Technology and innovation (AMT), nanotechnology and innovation, reverse engineering and development of science kits for schools, and others. The findings indicated that the gains in aforementioned domains have been achieved since NASENII's inception. The study highlights the science and engineering techniques introduced by NASENII to accelerate technological advancements, promoting economic growth and sustainable development for the country. The researchers explored the role of science, technology, and innovation in catering the developmental needs of Nigeria in addition to solving its problems and challenges in a sustainable way. The multiplier effect of the documentary research approach would result in the creation of jobs and wealth, use of local content, reduced importation, increased exportation and improved growth of all facets of national development through creating a niche for sustainably driven science and technological innovations.

In a study conducted by Siyanbola et al. (2016) scientific indicators were used. The findings revealed that policymaking, grounded in rigorous science and appropriate facts, is essential for achieving development goals. However, in many Third World countries, there is a disconnection between policy and development priorities, since policies are not founded on scientific truths. This study is made feasible through the collection and analysis of scientific evidence, such as STI markers and indicators or metrics used to assess and track progress, performance, and impact in these fields. These markers help governments, organizations, and researchers evaluate how advancements in science, technology, and innovation contribute to economic growth, societal well-being, and global competitiveness. The markers are often used to shape policy, allocate resources, and identify areas for improvement or investment. Even more crucially, the STI markers will help shape a sound STI strategy that promotes national development and economic expansion.

Salami and Soltanzadeh (2012) examined the fields of science, technology, innovation, and innovation policy in various countries (Brazil, India, China, South Korea, and South Africa), including LDCS countries (such as Iran). Comparative analysis was chosen as the research strategy

for this investigation. The researchers used leading practices of a few countries to develop a theoretical framework. After developing this model, three primary factors were identified, namely institutional framework, industrialized country participation in the growth process, and comparative advantage.

Mashi et al. (2014) studied innovation, science, and technology to determine their impact on national development in Nigeria. The research demonstrated that Nigeria has followed a wide range of policies to promote technical progress in order to speed up the country's economic growth. Economic growth in specific sectors was prioritized in the formulation of these sectoral development programs. Therefore, it is not an exaggeration to argue that Nigeria as a country has done quite well in terms of policy formation.

From the above review of related literatures, it could be deduced that there are few researches as to the appraisal of national policy on science, technology, and innovation in Nigeria, specifically in relation to the performance of NASENII in Nigeria. The gaps in the existed literatures prompted the current research to ameliorate the identified gaps related to the policies on science, technology, and innovation in Nigeria. In order to modernise its economy, improve the lives of its citizens, and become a respected player on the international stage, Nigeria has to invest heavily on STI. This necessitates a competitive and modernised economy. Here, the need for a new policy paradigm and careful oversight of the organisation responsible for this task arises.

Theoretical Framework

This study adopted system theory as theoretical base of the study. Several researchers have elaborated on the structure of the system and applied it to policy analysis in various ways after David Easton laid the groundwork for this in his writings (Dror, 1968; Egonmwan, 1991). Boundaries are created for systems so that they can be observed clearly and analysed, although all systems interact with and are influenced by their surroundings (Koontz et al., 1980). A conversion mechanism takes the inputs and releases the converted products into the environment (Olaopa, 2011). In turn, the output affects the system and its surrounding environment (Easton, 1957).

The theory of systems can be viewed as a whole, composed of

connected subsystems. According to Basu (2004), a system is a complex whole, a set of interconnected components or parts that receive inputs, act upon them in an organised manner, and produce certain outputs. Subsystems are the individual components that make up the whole. The subsystem's contribution to the total is evident in the increased output it generates compared to what might have been achieved by the individual components working alone. Analysis of both inputs and outputs is covered.

Moreover, the theory of systems is grounded in the idea that all parts are interdependent on one another for proper operation (Okoli & Onah, 2002). The theory prioritises the organization's continuous existence as a whole and elevates efficiency as the primary criterion for success. Ultimately, the success of the system is what the theory is focused on.

According to De Giorgi and Grimaldi (2015), a model of political system was first developed by David Easton who is regarded to be the pioneer of systems theory. The political system is an open system that takes inputs from the society or environment in form of demands and supports for particular policies and decision.

This theory is applicable to the current study because every policy serves as input in a system and the outcome or performance serves as output. In a closed system, when policymakers continuously respond to the effects of their prior decisions on their employees in the same working environment, the interaction between these aspects may manifest. However, in the actual world, there are a lot of factors that might affect how people choose to act. Political and economic events on a national and global scale, as well as natural calamities, all have an impact on the environment and eventually cause change. Citizen organisations and individuals' needs are a constant source of new information. Reviewing the results of prior actions can be done in a variety of ways, such as officials can give more or less weight to precedent, demands from citizens or other officials, or their own judgement of the success of current activity.

System theory in relation to the effect of NASENII on the implementation of national policy on science, technology, and innovation. In terms of NASENII, to achieve its defined objective, it requires high level of commitment from government in order to achieve a meaningful success. For NASENII, to be able to achieve its core

mandate, meaningful research has to be undertaken, adequate funding has to be given, right manpower should be recruited, maintained, and developed, and other facilities, such as equipment and infrastructure are also necessary. All these inputs have to undergo certain processes, such as the utilization of funds for conducting experiments, purchases of raw materials, and others.

NASENII is made up of multiple interdependent and interconnected sub-systems. The effective functioning of each sub-system is crucial for the institution's overall performance, as any dysfunction typically leads to underperformance. The institution relies on various inputs from its environment, including human resources, raw materials, machinery, and equipment. These inputs move into the process stage, where procedures such as raw material selection and arrangement, product heating and refining, drying, separation, and extraction take place. The process concludes with results being produced and evaluated.

At this stage, products move from completion to the output phase, where they are ready for distribution to the industry or environment. Once in use, feedback is expected from the industry regarding whether the product meets the required standards. This feedback is sent to the organization, where the research and development (R and D) department evaluates it to determine if the desired outcomes or standards have been achieved. Products initially pass through the input section, then proceed to the output section, and finally reach the environment, where they remain until the industry is satisfied with their performance.

Therefore, analyzing NASENII's performance by focusing solely on departments such as finance, administration, planning, statistics, IT, and innovation, without considering the critical role of the R and D department, will lead to inaccurate results. R and D forms the backbone of any research system or institution. The various institutes established by the agency work in alignment with NASENII's objectives to ensure its effective performance.

A relevant example is the finance and administration unit of NASENII. No matter how many these departments strive to improve the agency's financial performance, the agency's overall success will remain limited if the R and D department is underdeveloped and underutilized.

For the effective performance of NASENII, it is required that the various subunits, that is the institutes in the agency and the various tasking department must be able to work coherently and harmoniously together. In addition to this, the system approach shows that no organization can function properly until all its parts or systems carry out their assigned roles satisfactorily. The survival of an organization using the system approach will also be seen solely in terms of its ability to produce or export to its environment more outputs than the inputs it draws from the environment continually.

Methodology

This study adopted survey and documentary research design. Survey design involves the use of questionnaires to generate data in order to answer the research question(s) and/or analyze specific hypothesis.

Documentary research design, on the other hand, was employed to obtain information from previous researches and official records. The target population of this study comprises staff at NASENII in two selected institutions, namely National Engineering Design Development Institute (NEDDI) Nnewi and Anambra State and Scientific Equipment Development Institute (SEDI) Enugu State. The total population is 284 staff members selected through purposive and census sampling techniques. Selection of staff as the research population is based on the fact that they are the implementers of the policy. Purposive sampling technique was used to select two institutions from the North Central geo-political zone. While, census sampling technique was used to select staff members from two (02) selected NASENII's institutions; the entire population was selected as study's population because it is well defined and small in number.

Two methods of data collection used in this study are primary and secondary methods. Self-structured questionnaires consisting of closed-ended questions with the option ranging from Agreed, Disagreed, and Undecided, also known as five (3) Likert Scale, were administered to the staff.

Secondary data was collected from various documented sources, including textbooks from the Department of Public Administration library, Faculty of Administration library, and online e-libraries. Academic journals, such as the Journal of Technology and Innovation, Innovation

and Skill Acquisition, and Journal of Public Policy Analysis, were accessed through the Nasarawa State University library, departmental library, faculty library, and online databases. Official documents, including NASENII's quarterly progress reports, staff nominal roll, National Policy on Science and Technology, Innovation Policy documents, and the NASENII Programme Handbook, were obtained from the NASENII office.

Conference materials/articles, such as paper presented at National's Council on Science and Technology and innovation, trade fair and exhibition reports, and symposium paper. For the purpose of this study, two statistical techniques of data analysis were utilized. They are descriptive and simple percentage analysis. The descriptive statistics was used to present and interpret quantitative data. These include, frequency table, figure, and chart. Simple percentage analysis was used to analyze the collected data.

Data Analysis

Table 1

Age Distribution of the Respondents

	Frequency	Percent	Cumulative Percent
21-25	181	77.7	77.7
26-30	48	20.6	98.3
36-40	1	.4	98.7
41-Above	3	1.3	100.0
Total	233	100.0	

The majority of respondents (77.7%) are aged between 21 and 25. A significant proportion (20.6%) are aged between 26 and 30. Very few respondents fall into the older age categories, with only 0.4% aged 36-40 and 1.3% aged 41 and above. This distribution suggests that the respondent group is predominantly young, with nearly 98.3% aged 30 or younger.

Table 2

Gender of the Respondents

	Frequency	Percent	Cumulative Percent
Male	210	90.1	90.1
Female	23	9.9	100.0
Total	233	100.0	

Table 2 illustrates the gender distribution of respondents in the survey. Among the participants, 210 are male, making up 90.1% of the total respondents. In comparison, 23 respondents are female, accounting for 9.9% of the total. Since all data is valid, the percentage for female respondents also remains 9.9%.

Table 3

Marital Status of the Respondents

	Frequency	Percent	Cumulative Percent
Married	129	55.4	55.4
Single	103	44.2	99.6
Other	1	.4	100.0
Total	233	100.0	

The marital status of the respondents reveals that the majority, 129 individuals (55.4%), are married. A significant portion, 103 respondents (44.2%), are single, while a very small percentage, just one individual (0.4%), falls into the "other" category. Together, these figures sum up to a total of 233 respondents, with the data accounting for 100% of the sample. The cumulative percentage shows that 99.6% of the respondents are either married or single, with the remaining 0.4% in the "other" category.

Table 4

Educational Status of the Respondents

	Frequency	Percent	Cumulative Percent
B.Sc.	151	64.8	64.8
HND	41	17.6	82.4
Masters	34	14.6	97.0
ND/NCE	2	.9	97.9
Doctorate	5	2.1	100.0
Total	233	100.0	

The table above summarizes the educational qualifications of 233 respondents. The majority (151) of individuals (64.8%) hold a B.Sc. degree. Those with a Higher National Diploma (HND) account for 41 respondents or 17.6% of the total, raising the cumulative percentage to 82.4%. Respondents with a Master's degree are 34, representing 14.6% of the sample and bringing the cumulative total to 97.0%. Only 2 respondents (0.9%) possess a National Diploma or National Certificate in Education

(ND/NCE), contributing to a cumulative percentage of 97.9%. Lastly, 5 respondents (2.1%) have a Doctorate, rounding out the sample to 100%.

Table 5
Years of Working Experience

	Frequency	Percent	Cumulative Percent
0-5 years	155	66.5	66.5
6-10 years	46	19.7	86.3
11-15 years	24	10.3	96.6
16-20 years	2	.9	97.4
21-Above years	6	2.6	100.0
Total	233	100.0	

Table 5 provides a summary of the years of working experience which indicates that 155 individuals, which makes up 66.5% of the total sample, have 0-5 years of working experience. About 46 individuals, which makes up 19.7% of the total sample, have 6-10 years of working experience. Adding this to the previous category, the cumulative percent now reaches 86.3%. Moreover, 24 individuals, which makes up 10.3% of the total sample, have 11-15 years of working experience. The cumulative percent now reaches 96.6%. Similarly, 2 individuals, which makes up 0.9% of the total sample, have 16-20 years of working experience. The cumulative percent now reaches 97.4%. Lastly, 6 individuals, which makes up 2.6% of the total sample, have 21 or more years of working experience. The cumulative percent now reaches 100.0%, indicating that all categories have been accounted.

Figure 1 shows that 62% of the study's population reveals that NASENII has achieved its policy objective whereas 35% disagreed. It can be concluded that NASENII has achieved its goal of building a strong science, technology, and innovation along with innovative capability needed to evolve a modern economy in Nigeria.

Figure 2 shows that, 62.3% of the study population reveals that National Agency for Science, Engineering, Infrastructure, and Innovation (NASENII) did not achieve its policy of propelling the acquisition of knowledge for the growth of SMEs, agriculture, and power generation to reduce poverty as compared to the 34.7% which agreed. Hence, it can be stated that NASENII has not achieved its policy of propelling the

acquisition of knowledge for the growth of SMEs, agriculture, and power generation to reduce poverty.

Figure 1

NASENII Policy Objective

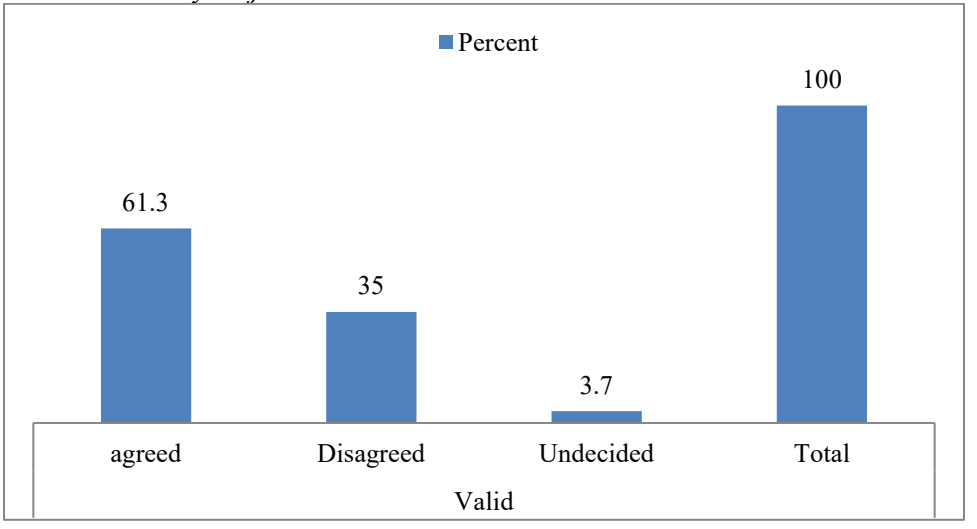


Figure 2

NASENII Policy of Propelling the Acquisition of Knowledge for the GROWTH of SMEs

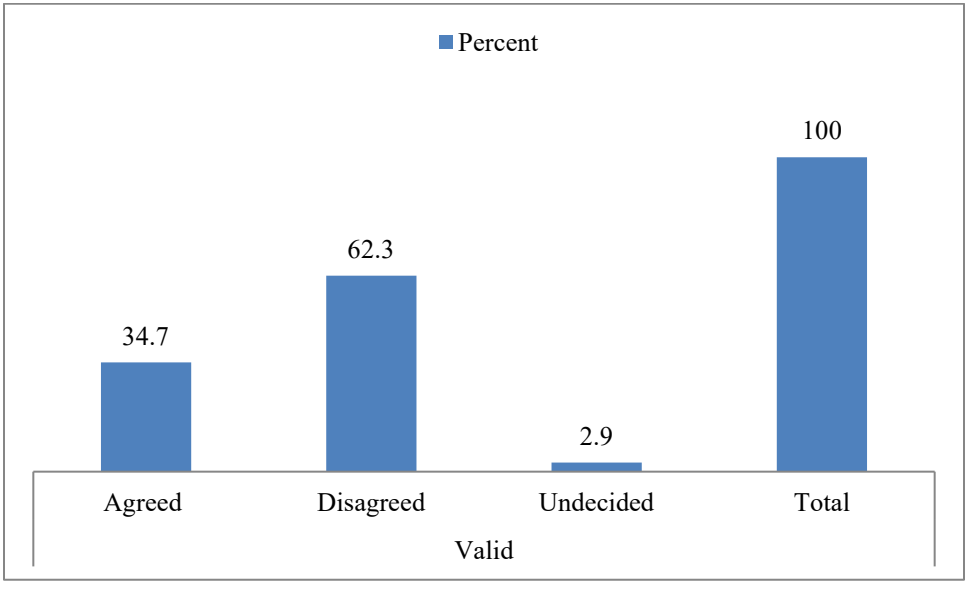


Figure 3

NASENII Policy of Creating Innovation and Communication Development

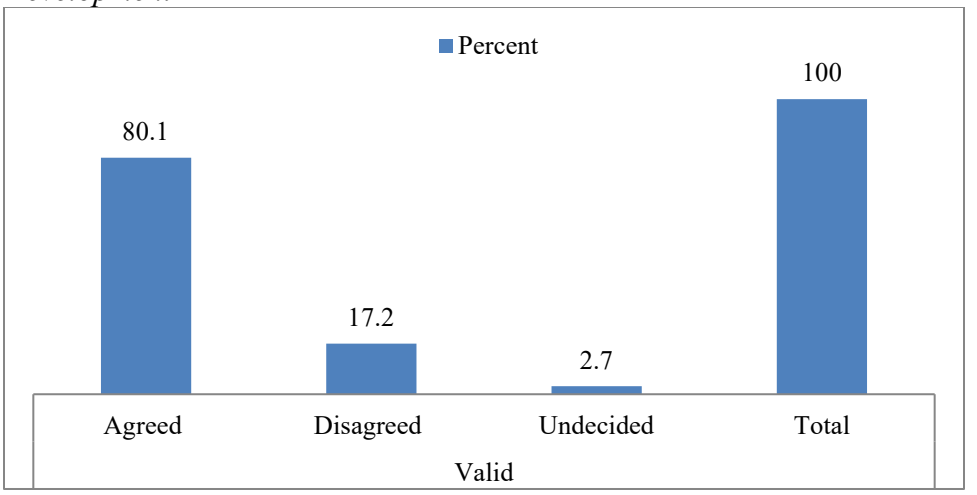


Figure 3 shows that 80.1% of the study's population reveals that NASENII did not achieve its policy of creating innovation and communication development as compared to 34.7% which agreed. Conclusively, NASENII failed to achieve its goal in this regard.

Figure 4

NASENII's Policy on the Creation and Development of Enterprises

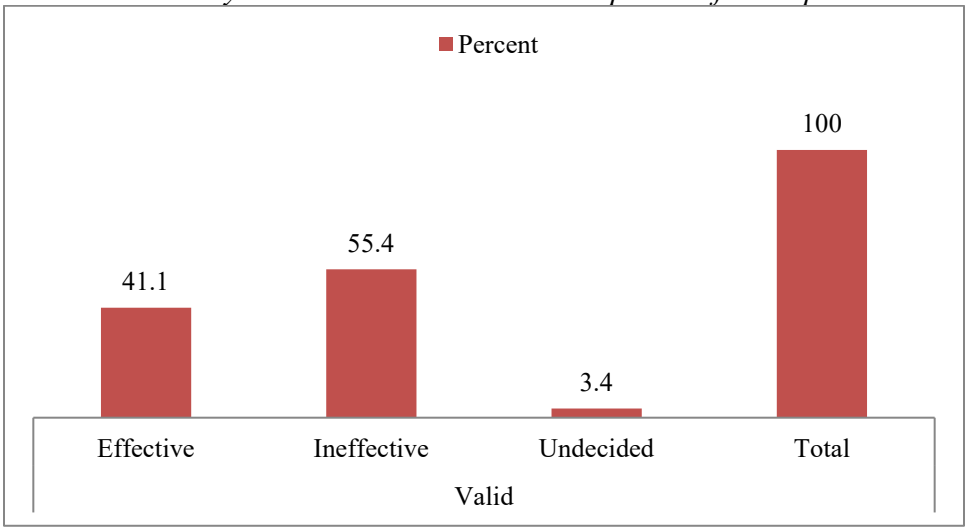
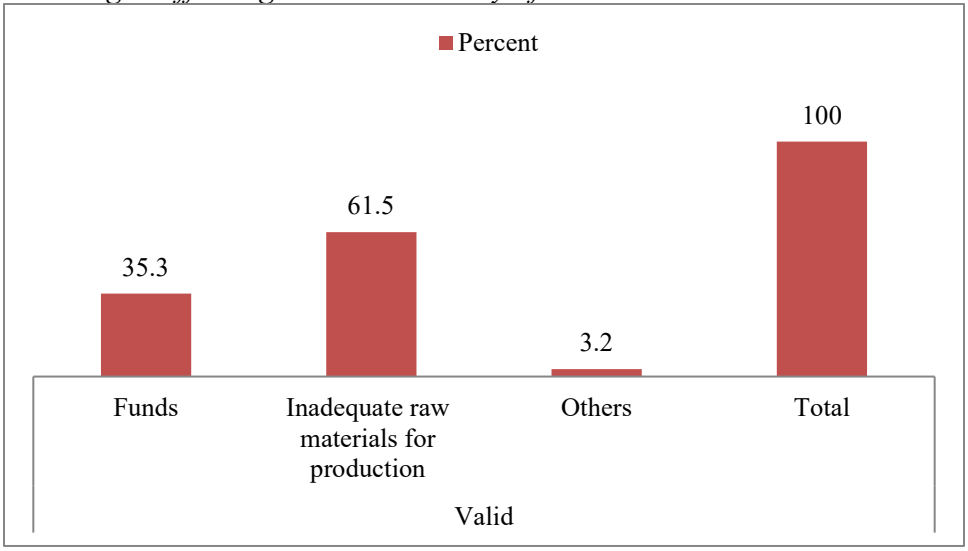


Figure 4 reveal that 41.1% of the population believes that NASENII's policy on the creation and development of enterprises using Nigeria's local content has been effective in contrast to the 55.4% which disagreed with it. It can be concluded that the agency's policy on the creation and development of enterprises using Nigeria's local content has been ineffective despite government's efforts over the years.

Figure 5

Challenges Affecting the Functionality of NASENII



It is evident that 35.3% of the staff members expressed that inadequate fund is a major challenge affecting the functionality of NASENII. Whereas, 61.5% said that inadequate raw materials for production is affecting the operations of NASENII, while 3.2% of the study's population reveals that other factors are challenges affecting the performance of agency. Therefore, inadequate fund and raw materials for production are challenges affecting the functionality of NASENII in Nigeria over the years.

Discussion

The National Agency for Science, Engineering, Infrastructure, and Innovation (NASENII) was established with the mandate to build a strong foundation in science, technology, and innovation (STI) for Nigeria's modernization. However, NASENII has not fully realized its objective of fostering the STI capability necessary to drive a modern economy in

Nigeria. Key factors contributing to this include inadequate funding, weak policy implementation, and insufficient collaboration with the private sector and research institutions. The agency's ability to harness Nigeria's scientific potential to support sectors like manufacturing, energy, and technology remains limited. Studies indicate that despite the existence of STI policies, challenges, such as poor governance and limited infrastructure hinder Nigeria's STI progress (Adeoti, 2019; Oyeyinka, 2021).

On the other hand, NASENII has made some progress in promoting knowledge acquisition aimed at the growth of small and medium-sized enterprises (SMEs), agriculture, and power generation. These efforts are in line with its objective of reducing poverty by stimulating economic activities in critical sectors. Through various technology transfer initiatives and capacity-building programs, NASENII has empowered SMEs with technical skills and innovation, fostering incremental growth in these areas (Oyelaran-Oyeyinka, 2020). However, these achievements are often impeded by bureaucratic inefficiencies and the slow adoption of new technologies by the private sector.

In terms of communication development and innovation, NASENII has successfully contributed to advancing ICT infrastructure, particularly in promoting technological solutions that enhance communication networks. These innovations have not only improved connectivity in urban and rural areas but have also supported digital literacy campaigns that are vital for national development. Yet, the impact is still limited, largely due to lack of strategic partnerships with the telecommunications industry and insufficient investment in research and development (R and D).

NASENII has also played a significant role in promoting local content development, particularly in the creation and development of enterprises using indigenous technologies. This focus on leveraging local resources and skills aligns with the government's objective of reducing dependence on foreign technology. Initiatives, such as the promotion of local manufacturing of scientific equipment and tools have shown promise in reducing import dependency and supporting industrialization (Ibrahim & Adamu, 2021).

Despite these advancements, several challenges continue to affect NASENII's ability to function optimally. These challenges include poor

coordination between federal and state governments, inadequate financial resources, and limited human capital in scientific research. Moreover, the agency's role in bridging the gap between academia and industry remains weak, leading to the underutilization of research outcomes that could otherwise drive industrial growth. Addressing these challenges will require sustained investment in R and D, more robust policy implementation, and stronger institutional frameworks to foster innovation and commercialization of local content.

Conclusion

In conclusion, NASENII has achieved notable progress in cultivating a dynamic innovation ecosystem, strengthening Nigeria's capabilities in science, technology, and innovation, which are essential in constructing a contemporary, knowledge-driven economy. The aforementioned accomplishments have significantly facilitated job creation, fostered wealth generation, reduced reliance on imports, enhanced exports, and promoted comprehensive national development. Moreover, NASENII has established a robust framework that will enable sustainable advancements in scientific and technological innovations to flourish in the future. Nonetheless, obstacles such as insufficient funding and restricted access to vital raw materials persistently impede the agency's productivity, highlighting specific areas that necessitate focused intervention to fully actualize NASENII's mission and its potential contribution to national development.

Recommendations

Based on the findings regarding the National Agency for Science, Engineering, Infrastructure, and Innovation (NASENII), the following recommendations could help address the challenges and strengthen its role in advancing Nigeria's science, technology, and innovation (STI) landscape.

Increase Funding and Resource Allocation

NASENII requires enhanced and consistent financial support from the federal government to effectively implement its initiatives. Increased investment in research and development and infrastructure, as well as providing operational funds, would empower the agency to achieve its long-term goals. Additional private sector partnerships should also be pursued to diversify funding sources, which will improve innovation

output.

Strengthen Policy Implementation and Governance

NASENII's impact has been limited by weak policy enforcement. The agency should focus on improving governance structures and mechanisms for policy implementation. Strengthening coordination between NASENII and relevant ministries (science, technology, and industry) will ensure better alignment of goals and policies. Also, clearer accountability mechanisms should be put in place to monitor progress, identify bottlenecks, and make adjustments as necessary.

Enhance Collaboration with Industry and Academia

Bridging the gap between academia, research institutions, and the private sector is critical for NASENII's success. The agency should foster stronger collaboration with universities, polytechnics, and private enterprises to commercialize research and foster technology-driven enterprises. These partnerships can lead to the creation of spin-offs and innovation clusters that contribute to industrialization and economic growth.

Promote SME Support Programs

NASENII has made progress in supporting small and medium-sized enterprises (SMEs) in sectors like agriculture and power generation. Expanding these efforts by developing targeted capacity-building programs, offering financial incentives, and creating incubation centers can stimulate entrepreneurship and further support poverty reduction. Engaging in public-private partnerships will also provide technology and capital SMEs that are necessary to scale their operations. While NASENII has contributed to communication development, the agency should focus more on enhancing digital infrastructure, especially in rural areas. This would require collaboration with telecom companies, fostering more public-private partnerships to ensure broader digital access. Investment in ICT and fostering digital skills development can enhance innovation in communication technologies and create new opportunities for growth.

Address Bureaucratic Inefficiencies

Reducing bureaucratic red tape within NASENII and related government institutions is essential to improving efficiency. Simplifying approval processes for projects, streamlining operations, and

decentralizing decision-making can help the agency respond more swiftly to emerging opportunities and challenges.

Practical Implications

For Nigeria's economy to undergo a major transformation, policymakers must manage the rollout of various innovation, science, and technology (STI) initiatives. Following are some proposed practical implications.

There must be strong coordination and collaboration among stakeholders, including government agencies, research institutes, universities, industrial sectors, and international partners, in order to achieve effective management. Smooth implementation can be facilitated by establishing procedures for regular communication, information sharing, and mutual decision-making.

Capacity building is essential because it helps both individuals and institutions better perform STI-related tasks. To that end, courses, seminars, and mentorship schemes are offered to help students develop their research, innovation, transfer, and commercialization abilities. It's important to do something about the severe lack of qualified workers in the STEM professions.

Conflict of Interest

The authors of the manuscript have no financial or non-financial conflict of interest in the subject matter or materials discussed in this manuscript.

Data Availability Statement

The data associated with this study will be provided by the corresponding author upon request.

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References

Adeoti, J. (2019). Innovation in Nigeria: Progress, challenges, and prospects. *Journal of African Development*, *21*(2), 45–63.

Adewoye, O. O. (2006). *Advanced manufacturing technology and*

innovation for endogenous development and global competitiveness [Paper presentation]. Proceedings of Advanced Manufacturing Technology and Innovation Workshop. Abuja, Nigeria.

Basu, R. (2004). *Public administration: Concepts and theories*. While House Publication.

De Giorgi, E., & Grimaldi, S. (2015). The Italian political system in the last twenty years: Change, adaptation or unfinished transition? *Contemporary Italian Politics*, *7*(1), 3–9. https://doi.org/10.1080/23248823.2014.1002246

Dror, Y. (1983). *Public policy making re-examined.* Routledge.

Easton, D. (1957). An approach to the analysis of political systems. *World Politics*, *9*(3), 383–400.

Egonmwan, J. A. (1991). *Public policy analysis: Concepts and applications*. S.M.O Aka and Brothers Press.

Ewesuedo, D. B. (2011). *Evaluation of the national policy on science and technology and innovation in Nigeria: A study of national research institute for chemical technology and innovation (NARICT) and Institute for Agricultural Research (IAR) Zaria (1998-2008*) [Doctoral dissertation, Ahmadu Bello University]. Open Repository, Ahmadu Bello University. https://kubanni.abu.edu.ng/items/fe77b459-1bf9-4870-af1f-9fc9d6801ded

Haruna, M. S. (2015, November 11). *Science, technology and innovation and national development* [PowerPoint presentation]. National Agency for Science and Engineering Infrastructure. http://dx.doi.org/10.13140/RG.2.2.13113.29286

Ibrahim, M., & Adamu, I. (2021). Local content development in Nigeria's science and technology sector: A review of NASENI's role. *African Research Review, 15*(2), 1–15.

International Council for Science. (2002). *Science and technology for Sustainable Development*. https://council.science/wp-content/uploads/2017/05/Rainbow-series-Vol9.pdf

Koontz, H., O'donnell, C., & Weihrich, H. (1980). *Management*. McGraw-Hill Companies.

Mashi, S. A., Inkani, A. I., & Yaro, A. (2014). An appraisal of the role of science and technology in promoting national development efforts in Nigeria. *The International Journal of Engineering and Science*, *3*(2), 56–67.

Okoli, F. C. (2002). *Public administration in Nigeria: Nature, principles, and application*. John Jacob's Classic Publishers.

Olaopa, O. R. (2011). *The politics of local government financing in Southwestern Nigeria, 1999–2009* [Unpublished doctoral dissertation]. University of Kwazulu Natal, South Africa.

Olaopa, O. R., Akindele, S. T., & Hassan, O. M. (2011). Science and technology research: Repositioning the thinking of policymakers in Nigeria: Research notes/commentaries. *African Journal of Science, Technology, Innovation and Development*, *3*(1), 204–227.

Oyelaran-Oyeyinka, B. (2020). *Industrialization and innovation in developing economies*. Palgrave Macmillan.

Oyeyinka, B. (2021). Science, technology, and innovation policy in Nigeria: An assessment. *African Journal of Science, Technology, Innovation, and Development*, *13*(4), 481–496. https://doi.org/10.1080/20421338.2020.1861234

Salami, R., & Soltanzadeh, J. (2012). Comparative analysis for science, technology and innovation policy; Lessons learned from some selected countries (Brazil, India, China, South Korea and South Africa) for other LdCs like Iran. *Journal of Technology Management & Innovation*, *7*(1), 211–227. http://dx.doi.org/10.4067/S0718-27242012000100014

Sani, N. J., Abarshi, R., & Haruna, M. S. (2014). Examined science and technology and innovation as a major tool for sustainable development (A case study of National Agency for Science and Engineering Infrastructure (NASENII). *International Journal of Advanced Studies in Engineering and Scientific Inventions*, *2*(1), 57–65.

Siyanbola, W., Adeyeye, A., Olaopa, O., & Hassan, O. (2016). Science, technology and innovation indicators in policy-making: The Nigerian experience. *Palgrave Communications*, *2*(1), Article e16015. https://doi.org/10.1057/palcomms.2016.15