

FEDERAL REPUBLIC OF NIGERIA

**SCIENCE, TECHNOLOGY AND INNOVATION (STI)
POLICY**

SEPTEMBER, 2011

STATEMENT OF COMMITMENT

“We are going to run our economy based on Science and Technology....because no where in this World now that you can move your economy without science and technology. For the next 4 years we will emphasize so much on S&T because we have no choice, without that we are just dreaming....”

Dr. Goodluck Ebele Jonathan, GCFR
President, Federal Republic of Nigeria
In Birnin Kebbi, Kebbi State, 2011

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FOREWORD

The global economic landscape is experiencing rapid changes. Globalisation, especially is creating considerable new opportunities and new challenges. Its impact on national economies is driven by significant progress in S&T as exemplified by a plethora of breakthroughs in Biotechnology, Space Research, Energy Development, and Information & Communication Technologies (ICT), among others. It is therefore obvious that if Nigeria, given its natural endowments, is to successfully transform its economy and take her rightful place in the comity of nations, S&T and its integration in national socio-economic development processes must be accorded the highest priority. It is in this regard that the transformation agenda of President Goodluck Jonathan Administration which calls for a fundamental and far-reaching reorientation of the Nigerian State towards holistic socio-economic development in the framework of Vision 20:2020 must be understood.

In Nigeria, various administrations since independence have shown interest and increasing appreciation of the role of S&T in national socio-economic development. The realisation of this fact motivated the Federal Government to re-establish the Federal Ministry of Science and Technology (FMST) as a separate entity in 1985. Since then, Nigeria has expended a great deal of efforts on S&T policy development through a combination of the untiring efforts of its scientists, engineers and technologists, international cooperation and government support.

The first National Science and Technology Policy in the country was produced in 1986. The policy was designed to create harmony in the pursuit of knowledge about the environment through research and development (R&D). The aim was to use S&T knowledge to ensure a better quality of life for the people. The policy was reviewed in 1997 to give lay more emphasis on coordination and management of S&T system, sectoral developments, collaboration and funding. In 2003, the S&T policy underwent yet another review to take account of lapses observed in the implementation of the 1997 policy, especially on the need to address the institutional frameworks that should foster interaction among the various elements of the National System of Innovation (NSI).

The review also incorporated a programmatic approach to policy formulation. It emphasised the need for a coherent, systematic and comprehensive approach to the determination of technological programmes. The policy gave prominence flagship programmes of Government of the day such as Biotechnology, Information and Communication Technology (ICT), Space Science & Technology, Energy and Engineering Materials. However, the 2003 'policy' document is now seen as a compendium of key S&T sub-sectoral policies, and rather voluminous. Furthermore, it did not adequately attend to the issue of S&T culture and the harmonisation of S&T policy with other socioeconomic policies.

In 2005, the need to carry out a system-wide reform was consummated and implemented under the Nigeria/UNESCO Science, Technology and Innovation (STI) reform initiative. It adopted the National Innovation System (NIS) approach as a framework for Science, Technology and Innovation (STI) system reform. The reform, among others issues, stressed that economic development initiatives, institutional governance, research and development (R&D) agenda for the country, funding mechanisms,

Intellectual Property (IP) and STI Infrastructure development be addressed in any revised STI policy. Thus the need to design a new policy that will address these challenges becomes indispensable .

The new STI policy, taking advantage of the experiences in the design and implementation of S&T policy in the last two decades and a half, is a product of a novel, all-inclusive, participatory policy making; involving consultative meetings with various stakeholders across the length and breadth of the country as well as International Development Partners. The participatory approach to the design of policy has heightened awareness and provided opportunities for various actors to articulate their views and make inputs into the new policy. The approach has also promoted collective ownership of the policy by all stakeholders

One notable feature of this policy is the emphasis on ‘Innovation’, which has become a global tool for fast-tracking sustainable development. This policy is a clear demonstration of the country’s renewed commitment to ensure that our R&D engagements enhance new business development, encourage employment generation, wealth creation through the creation and growth of SMEs, that are ultimately translated into goods and services in the market place .

I wish to acknowledge and commend the efforts of all the staff of the Federal Ministry of Science and Technology (FMST) and her Agencies particularly the National Centre for Technology Management (NACETEM) for anchoring the development of the new STI policy. Specifically, I want to appreciate the various contributions of members of the Academies of Science and Engineering, the Chambers of Commerce and Industry, Manufacturers Association of Nigeria (MAN), National Universities Commission (NUC), Committee of Vice-Chancellors (CVC), the Military, cognate Ministries as well as our Development Partners for their support and useful contributions to the revised policy. My special appreciation goes to members of the Science and Technology Committees of the National Assembly; former Honourable Ministers of Science & Technology – especially my predecessors, Prof. Mohammed Ka’oje Abubakar, Dr. Alhassan Bako Zaku; and many policy experts and eminent Nigerians for their time and invaluable inputs to the successful completion of this policy.

I want to assure all Nigerians that this new National Science, Technology & Innovation (STI) policy vividly articulates workable strategies for achieving the Transformation Agenda of the present Administration. I therefore call upon all stakeholders to strongly support the Policy and actively assist in its thorough implementation.

God Bless Nigeria

**Honourable Minister of Science and Technology
Federal Republic of Nigeria,
August, 2011.**

1.0 PREAMBLE

The cardinal objectives of accelerating development, competitiveness and creation of wealth for all Nigerians marks the beginning of Nigeria's intent to formulate and implement the Vision 20:2020 Economic Transformation Blueprint (NV20:2020). Achieving the objectives of this Vision will be anchored on three pillars of optimising the nation's key sources of economic growth, guaranteeing the productivity and wellbeing of Nigerians and fostering sustainable economic development. The 2011 Science, Technology and Innovation (STI) policy was designed in tandem with the objectives and pillars of the NV20:2020 so as to resolve practically the long term disconnect between economic planning and science and technology. The new policy on STI thus have as its core mission the evolution of a new Nigeria that harnesses, develops and utilises STI to build a large, strong, diversified, sustainable and competitive economy that guarantees a high standard of living and quality of life to its citizens. Specifically, the new STI policy was designed to provide a strong platform for science, technology and innovation engagement with economic transformation that is citizen centred.

To effectively foster a seamless engagement of STI with the desired transformation, the policy have recognised also the weaknesses of the nation's system of innovation and thus set out to strengthen structures for the coordination, promotion, and management of interactions within the system. This is to reduce and eventually eliminate the current high level of "stand alone" research efforts scattered all over the country and forge synergies among system components that will identify common problems and resources for research, tie research agenda to national priorities and reduce the time-to-market of research activities. In forging seamless interactions within the system of innovation, the policy will support the creation of, and maintenance of up-to-date, reliable and accessible database of Nigeria's STI resources (human and material) and activities, needed for sound economic planning and policy making.

As a system that optimally allocates resources among competing needs and encourages interactions among individuals, businesses firms and government an economy in its working permeate and affect every strata of the population. The transformation of Nigeria's economy based on science and technology therefore is the transformation of Nigeria's people, organisations and or institutions as science and technology thinking entities. The new STI policy will vigorously promote activities for STI communication and inculcation of STI culture in Nigerians. The success of the new economic transformation blue print will especially require the institution of science and technology thinking as a way of seeing and doing things at all levels from the household and small businesses levels to all tiers of government.

It is our collective interest as a people and a nation to therefore pursue the implementation of this policy which has been designed to drive the Economic Transformation Agenda and deliver its objectives as an integral part of the NV20:2020.

2.0 NATIONAL SCIENCE, TECHNOLOGY AND INNOVATION POLICY

2.1 National STI Policy Vision Statement

By 2020, Nigeria will have a large, strong, diversified, sustainable and competitive economy that effectively harnesses the talents and energies of its people and responsibly exploits its natural endowments to guarantee a high standard of living and quality of life to its citizens

2.2 National STI Policy Mission

Evolving a nation that harnesses, develops and utilises STI to build a large, strong, diversified, sustainable and competitive economy that guarantees a high standard of living and quality of life to its citizens.

2.3 General Policy Objective

Build a strong Science, Technology and Innovation capability and capacity needed to evolve a modern economy

2.4 Specific Policy Objectives

The specific objectives are to:

- i. Facilitate the acquisition of knowledge to adapt, utilise, replicate and diffuse technologies for the growth of SMEs, agricultural development, food security, power generation and poverty reduction.
- ii. Support the establishment and strengthening of organisations, institutions and structures for effective coordination and management of STI activities within a virile national innovation system.
- iii. Encourage and promote creation of innovative enterprises utilising Nigeria's indigenous knowledge and technology to produce marketable goods and services.
- iv. Support mechanisms to harness, promote, commercialise and difuse locally developed technologies for the production of globally competitive goods and service that intensively utilises Nigeria's raw materials.
- v. Facilitate and support the creation and maintenance of up-to-date, reliable and accessible database on Nigeria's STI resources and activities.
- vi. Promote activites for effective STI communication and inculcation of STI culture in Nigerians.
- vii. Create and sustain reliable mechanisms for adequate funding of STI activities in Nigeria.

viii. Initiate, support and strengthen strategic bilateral and multilateral co-operations in scientific, technological and innovation activities across all sectors of the economy.

3.0 POLICY STRATEGIES

3.1 STI Promotion

3.1.1 Rationale

There is need to popularise and inculcate STI culture in Nigerians for rapid socio-economic transformation.

3.1.2 Objective

Create awareness in the society on the relevance of STI culture for the improvement of quality of life and sustainable economic development.

3.1.3 Strategies

- i. Encouraging relevant stakeholders to provide students at primary and secondary schools, as well as technical colleges with broad-based curricula comprising relevant scientific knowledge and vocational skills.
- ii. Promoting broad-based curricula comprising relevant scientific knowledge and vocational skills for schools and colleges.
- iii. Providing policy incentives to Nigerian youths for career development in S&T fields.
- iv. Popularising STI through regular technology fairs, exhibitions, S&T clubs and the mass media (films, newspapers, radio, television, internet, etc.)
- v. Supporting programmes of the professional S&T bodies concerned with building STI capacity.
- vi. Improving conditions of service of STI professionals to encourage creativity and innovation.
- vii. Utilising as much as possible Nigerian STI personnel and institutions for consultancy when such expertise is available.
- viii. Recognition of individual or institutional contributions to development through application of STI.
- ix. Empowering women in the utilisation of STI for economic development.
- x. Increasing local content in industrial processes and engineering infrastructure development activities.

- xi. Encouraging the establishment or strengthening of S&T Ministries at the State level.
- xii. Encouraging the development and use of local languages for the transfer of STI knowledge to the formal and informal sectors of the economy.
- xiii. Promoting inventions and innovations that address immediate local needs.

3.2 Human Resource Development in STI

3.2.1 Rationale

The imperatives of self-sufficiency and global competitiveness require development of national capability in STI to stimulate inventions and generate innovations for sustainable development.

3.2.2 Objective

Develop capability in STI for competitiveness in the production of technological goods and services.

3.2.3 Strategies

- i. Producing world class scientists, engineers and technologists who are well grounded in theory, practice of basic sciences and the needs of entrepreneurship.
- ii. Providing adequate support for continuous training of academic staff in tertiary and research institutions.
- iii. Strengthening curricula in technological entrepreneurship and management of technology for science and engineering students.
- iv. Mainstreaming students in the Arts and Social Sciences to appreciate the relevance of STI to profitability in business as well as national development.
- v. Encouraging and providing opportunities for the products of informal training schemes in STI to go for further formal training.
- vi. Strengthening capacity building institutions within the military, public and private sectors of the economy.
- vii. Facilitating on-the-job standardised training for professionals in STI organisations.
- viii. Promoting academic-industry exchange programmes to enhance knowledge sharing.

3.3 Research and Development

3.3.1 Rationale

There is need to prioritise strategies (i.e. R&D sectoral issues) for multidisciplinary mission-oriented R&D activities in S&T geared towards the generation, acquisition, storage, application and diffusion of S&T knowledge for national development.

3.3.2 Objective

Foster sectoral innovative R&D activities, at the level of R&D institutions and firms, that are largely demand-driven and market-oriented in line with national developmental goals.

3.3.3 Specific Sectoral Strategies

3.3.3.1 Agriculture

- i. Enhancing agricultural productivity through cultivation of improved crop varieties and breeds of livestock and fisheries.
- ii. Encouraging technology uptake and diffusion of agricultural innovations to farmers.
- iii. Encouraging labour-saving and low-cost gender-sensitive processing agricultural technologies.
- iv. Developing appropriate and innovative technologies for breeding, feeding, health and management of livestock and poultry.
- v. Encouraging agricultural waste management and utilisation.
- vi. Developing indigenous technologies for value addition of agricultural produce.

3.3.3.2 Water Resources

- i. Developing R&D, demonstration and deployment capabilities in the management of surface and ground water resources for sustainable exploitation
- ii. Promoting the use of safe, clean, efficient and sustainable water technologies for national development.
- iii. Promoting R&D in water conservation and utilisation techniques for domestic, agricultural, energy and industrial use.
- iv. Facilitating the adaptation of appropriate water technologies for rural development.
- v. Developing capacity and capabilities for water management and environmental sustainability.

3.3.3.3 Biotechnology Research

- i. Promoting the understanding of biotechnology and its applications for national development.
- ii. Building capacity and capabilities in biotechnology research and its applications.
- iii. Harnessing indigenous knowledge on natural products and commercialising discoveries as well as positioning Nigeria in the biogeneric market.
- iv. Ensuring growth and opportunities in the application of advanced bio-processing and bio-manufacturing processes.
- v. Facilitating brand recognition for Nigerian biotechnology products and benchmark progress.
- vi. Promoting the documentation and use of bio-genetic resources and eliminate bio-piracy.
- vii. Ensuring compliance with biosafety and bioethics guidelines in biotechnology R&D.

3.3.3.4 Health Research & Innovation (Natural Products, Natural Medicine, Pharmaceutical Research, etc)

- i. Ensuring that research priorities are targeted towards meeting health and nutritional requirements and challenges in Nigeria.
- ii. Promoting effective linkages and collaborations among knowledge institutions and industries engaged in health sector.
- iii. Strengthening demand-driven R&D in natural and orthodox medicines as well as pharmaceutical research.
- iv. Facilitating the development of biological diagnostic tools, vaccines and encourage R&D in alternative and molecular medicine as well as genomics.
- v. Developing standards for monitoring and evaluation of health products.
- vi. Promoting ethics and standards in research.
- vii. Promoting documentation and dissemination of natural health research

3.3.3.5 Energy

- i. Developing R&D, demonstration and deployment capabilities in thermal (coal, oil and gas), nuclear, solar, wind, biofuels, hydro and other renewable energies.
- ii. Promoting the use of safe, clean, efficient and sustainable energy technologies for national development.

- iii. Encouraging the development of energy conversion technologies for sustainable power generation.
- iv. Facilitating the adaptation of appropriate energy technologies for rural development.
- v. Encouraging the development and deployment of locally produced power equipment for sustainable power industry.
- vi. Supporting national vision to acquire technologies for sustainable power industry.

3.3.3.6 Environmental Science and Technology

- i. Promoting the integration of environmental concerns in all development policies and ensuring public understanding of the scientific basis of their actions on the environment
- ii. Developing an appropriate and effective waste management system to reduce pollution emission from waste generation.
- iii. Encouraging the use of clean technologies in production system.
- iv. Developing capacity to monitor, predict and mitigate adverse effects of natural phenomena such as floods, drought and desertification.
- v. Encouraging science and technology intervention that promotes sustainable development.
- vi. Encouraging integration of environmental factors with standard national accounts/asset to improve environmental monitoring systems.
- vii. Promoting the development of a national environmental data base to support economic development.

3.3.3.7 Mines and Materials Development

- i. Encouraging R&D in the exploration, exploitation, utilisation and value addition of mineral resources.
- ii. Building capacity and enhancing capability in solid minerals processing technologies and new materials development.
- iii. Strengthening the development and transfer of technologies for sustainable utilisation of mineral resources.

3.3.3.8 Ferrous, Non-Ferrous and Chemical Technologies Research

- i. Encouraging R&D in the exploration, exploitation and utilisation of ferrous, non-ferrous, and petroleum resources.
- ii. Building capacity and developing indigenous capability in iron and steel, petrochemical and engineering plastics development.
- iii. Promoting intense R&D activities to develop internationally competitive textiles and leather industries.

3.3.3.9 Information and Communications Technology (ICT)

- i. Encouraging capacity building in ICT in Nigeria.
- ii. Encouraging and supporting collaborative R&D activities among industry, higher educational institutions as well as private and public research institutions for software and hardware development.
- iii. Developing indigenous capabilities for the local manufacture of ICT hardware, software and other accessories through technological substitution and transfer.
- iv. Encouraging knowledge in ICT as a critical component of STI in Nigeria
- v. Creating ICT databank in support of STI.
- vi. Encouraging the incorporation of ICT knowledge in all sectors in Nigeria.
- vii. Supporting ICT multidisciplinary training modules as fundamental prerequisite to prepare, drive and enhance all sectors of Nigeria's development.
- viii. Establishing Science Parks with ICT Backbone and Software development.
- ix. Developing special conversion programs to transform existing Engineers to ICT Specialists.
- x. Facilitating National ICT Innovation Competition at all levels of education.
- xi. Encouraging Industry-University-Government Networking on STI Initiatives.

3.3.3.10 Space Research and Investments

- i. Developing adequate capacity in space technological infrastructure and research for socio-economic development.
- ii. Deploying space technology infrastructure in national development.
- iii. Enhancing indigenous capabilities in space research and satellite technologies.
- iv. Developing space research as a critical component of national security.

- v. Space Science and Technology is diverse, there is need to develop multi-disciplinary research irrelevant fields and coordinate activities in areas such as:
 1. Basic Space Science and Astronomy
 2. Remote Sensing
 3. Satellite Technology Development
 4. Geodesy and Geodynamics
 5. Space Transport and Propulsion
 6. Space Science and Technological Education
 7. Atmospheric research

- vi. Creating meaningful Nigerian Space Science and Technology programme that should enhance technological advancement such as:
 - i. Exploring national (Nigerian Universities and other research institutions) and international cooperation in space science, technology and application.
 - ii. Creating a conducive environment that can attract Nigerian scientists who are home and abroad.
 - iii. Creating enabling environment to enhance the development of space science and technology infrastructure in national institutions.

3.3.3.11 Industrial Research, Development and Production

- i. Ensuring R&D activities are directed towards the development of appropriate technologies for the production of industrial goods and services in Small, Medium, and Large Scale firms.
- ii. Developing local capacity for design and production of machine tools and spare parts for rapid industrial growth and development.
- iii. Fostering interactions among universities, or higher education research institutions, industries and investors to generate innovations.
- iv. Ensuring value-addition to the nation's natural resources for industrial development.
- v. Fostering the development of technological entrepreneurs to facilitate innovation.

3.3.3.12 New and Emerging Technologies (Nanotechnologies and New Materials)

- i. Building institutional capacity and capabilities in new and emerging technologies.
- ii. Encouraging collaborative R&D activities between industry, higher education and research institutions on new and emerging technologies. (external collaborations)

3.3.3.13 Raw Materials and Manufacturing

- i. Developing capacities in storage, retrieval and updating of data and information on earth-based raw materials.
- ii. Promoting access to, and stimulating interest on, earth-based raw materials locally and internationally.
- iii. Mapping and quantifying biomaterial resources that are available in the country.
- iv. Creating the various value chains from available biomaterials.
- v. Harnessing and adapting indigenous knowledge for sourcing earth-based raw materials and biomaterials.
- vi. Creating a database of new and emerging materials.
- vii. Identifying and promoting the adoption of new and emerging technologies for raw materials, new product development and materials processing technologies for national industrial growth.
- viii. Building institutional capacity and capabilities in earth based raw materials, biomaterials, new and emerging materials and technologies such as Advanced Manufacturing Technologies (AMT).
- ix. Promoting effective linkages and collaborations among institutions, Agencies and relevant stakeholders in earth-based raw materials, biomaterials, new and emerging technologies.
- x. Strengthening the development and proliferation of technologies and innovations for sustainable utilization of earth-based raw materials, biomaterials, new and emerging materials and new products.

3.3.3.14 Defence & National Security

- i. Supporting and facilitating STI capacity and capability building in the operations of the armed forces and other security services.
- ii. Promoting strategic military R&D for national security and development.
- iii. Encouraging the development and deployment of advanced technologies in military hardware and operations through reverse engineering.
- iv. Promoting the use of STI to prevent and control crimes and threats to national security.
- v. Deploying STI for the protection and security of indigenous technology, innovation and related intellectual property.

- vi. Establishing a Corps of STI intelligence officers in the NIA/Foreign Affairs.
- vii. Establishing an STI “Desk” in the office of the National Security Adviser (NSA) for protection of indigenous technology.
- viii. Fostering linkages of R&D collaborations among the academia, military, industries/businesses for the benefit of National military industrial complex.
- ix. Encouraging the sourcing of about 5% of military hard and softwares locally.

3.3.3.15 Transport System

- i. Promoting R&D to support activities in the road, rail, water and aviation transportation system.
- ii. Encouraging investment in local innovation in the transport and aviation sectors.
- iii. Facilitating the adoption and use of R&D outputs and local innovations for all forms of transportation and construction (i.e. road, rail, water and aviation).
- iv. Conducting R&D activities in accident investigation and mitigation
- v. Strengthening evolving mechanisms and strategies for information management system to establish and operate inter modal urban mass transport system.
- vi. Facilitating R&D activities and innovations that will fast-track massive delivery of community-based technologies for rural / access roads construction and maintenance.
- vii. Strengthening the STI component in the design, construction and maintenance of roads.
- viii. Promoting the use of STI for efficient transport management for socio-economic and industrial development.
- ix. Investigating potentials for expanded public transportation service and transit-oriented development to reduce transport emission while providing efficient mobility option.
- x. Developing a quality-assured, web-based knowledge database on research capacities of tertiary institutions, transportation technology, and technology needs in transport industry in Nigeria.
- xi. Encouraging research and development in technological devices for monitoring and tracking transport/traffic operations.

3.3.3.16 Youths, Sports and Tourism Development

- i. Encouraging R&D in sports medicine and materials, psychology, nutrition, physical education and other disciplines for the able-bodied and physically challenged.

- ii. Promoting STI in recreational activities to enhance healthier and physically strong citizenry.
- iii. Promoting competition and award schemes in STI among youth in and outside the educational system.
- iv. Facilitating programmes and schemes for mentoring the youth in career development in STI.
- v. Encouraging application of STI in tourism development.
- vi. Incorporating STI into Sports education
- vii. Ensuring the development of appropriate curricula to enable the acquisition and application of appropriate R&D skills in regular Universities, particularly Universities of Technology and Polytechnics.
- viii. Developing sports infrastructure using STI.
- ix. Collaborating and harmonizing STI operations in the sub-sector with relevant government Ministries, Agencies as well as the private sector.
- x. Fostering collaboration between STI agencies and appropriate tourism and sports bodies.

3.3.3.17 Works, Land, Housing and Urban Development

- i. Establishing codes/standards and strengthen capacity for effective design, management and production of relevant technologies in building, construction and urban development
- ii. Defining the roles of federal, state, local governments and other stakeholders in dealing with issues of urban development, housing and land administration.
- iii. Promoting the application of STI in the production and utilisation of local materials for building and construction to facilitate mass-housing delivery.
- iv. Promoting effective linkages and collaborations among knowledge-based institutions, professional bodies and the construction industries.
- v. Promoting R&D and innovative schemes for evolution of Green construction culture in Nigeria (Green homes and Green cement).
- vi. Encourage activities and regulatory roles that promote public safety in building and construction and mitigating effects of natural disasters.

- vii. Promoting the development standards for design, specifications and materials in building and construction.
- viii. Institutionalising strategies for funding R&D activities in Building, Land and Urban development including extra-budgetary steps like duties and tariffs.
- ix. Establishing framework for ICT-based land administration and management of land ownership and mitigating effects of environmental disasters through best use of land and resources.

3.3.3.18 Wood Resources

- i. Promoting R&D in the cultivation, exploitation and application of wood resources, with value addition, to pulp, paper and timber industries.
- ii. Promoting the application of STI to create new products to provide support for Nigerian pulp, paper and timber.
- iii. Generating environmentally sustainable forest management practices, increasing capacity of processing and value adding facilities.
- iv. Facilitating emerging wood resources technology related to biofuels, biochemicals, biocomposites, nanocellulose, building and construction industry (timber and plywood products in innovative zero energy houses, wood plastic composites.).
- v. Building capacity through education, research and know-how technology training.
- vi. Ensuring utilisation of Nigerian grown timber in construction of highly efficient structural systems.

3.3.3.19 Science Laboratory Technology (SLT)

- i. Facilitating the provision of minimum standard laboratories in secondary, tertiary and STI institutions for learning, teaching, services and Research & Development.
- ii. Supporting activities in the educational, research, medical and industrial laboratories.
- iii. Adopting and promote the principles of Good Laboratory Practice (GLP) in conformity to international best practice
- iv. Fostering training and employment of certified science technologists for proper management and maintenance of laboratories.
- v. Developing and promoting the documentation of laboratory equipments for planning and development.

- vi. Ensuring the monitoring, inspection, accreditation and certification of laboratories in R&D institutions in both public and private sectors by relevant regulatory bodies.

3.4 Intellectual Property Rights

3.4.1 Rationale

There is need to create and protect Intellectual Property Rights (IPR) and give recognition to creative Nigerians in order to stimulate the development of inventions as well as create wealth for IP owners and country.

3.4.2 Objectives

- i. To encourage the generation, protection and effective management of Intellectual Property to promote creativity and innovation activities in the country.
- ii. To ensure the harmonisation and coordination of IPR activities in Nigeria.
- iii. To facilitate the conversion of IPR into goods and services to create jobs and wealth

3.4.3 Strategies

- i. Ensuring adequate intellectual property recognition, promotion and protection of creativities, traditional knowledge, indigenous technology and other intellectual assets.
- ii. Building local capacities in intellectual property management for effective transfer of technology.
- iii. Promoting a sustainable culture on intellectual property at all educational levels.
- iv. Establishing and strengthening Technology Transfer Offices for effective management and utilisation of Intellectual Property Rights in the National System of Innovation.
- v. Providing appropriate incentives for creativity and innovation to stimulate creativity and innovations.
- vi. Developing a viable IP policy especially regarding royalties and ownerships mechanism for equitable distribution of benefits accruing from inventions, traditional knowledge, biodiversity resources and innovations among stakeholders.
- vii. Establishing, regularly updating and facilitating access to intellectual property data bank and portals.
- viii. Ensuring a dynamic development of the IPR system to address new and emerging creativities including initiating when appropriate, the enactment and review of IP laws to incorporate all aspects and issues relating to plant breeders rights, traditional knowledge and genetic resources.

- ix. Encouraging partnership with International IPR systems and organisations such as WIPO, ARIPO, OAPI, USPTO, SIPO, JPO.
- x. Supporting the development of IP assets through incubation and commercialisation processes.
- xi. Developing the required human capital to protect and enforce IP legislature and standards.

3.5 Technology Transfer and Diffusion

3.5.1 Rationale

There is need to develop capacity and capability in technology transfer processes in order to stimulate rapid technological and industrial development.

3.5.2 Objectives

- i. To establish mechanisms for the promotion, commercialisation and diffusion of locally developed technologies, to drive the development of Small, Medium and Large industrial firms.
- ii. To facilitate the transfer of technologies including knowledge to utilise, adapt, diffuse and replicate imported and local technologies.
- iii. To facilitate the sustained development of theoretical and practical skills to acquire and transfer technologies.

3.5.3 Strategies

- i. Build the critical mass of highly skilled manpower to transfer technology.
- ii. Establish Technology Transfer Offices in Tertiary Institutions.
- iii. Increasing investment in technology incubation centres and establish functional S&T parks.
- iv. Encouraging private sector participation in the establishment and management of Technology Incubation Centres and Science Parks.
- v. Supporting universities and research institutes to establish Technology Incubation Centres and Science Parks for the commercialisation of R&D results.
- vi. Developing comprehensive and accessible data bank of all commercialisable R&D results, inventions and innovations for ease of reference.
- vii. Conducting periodic monitoring and evaluation and establish a feedback mechanism for technology transfer and diffusion process.

- viii. Conducting Technology Needs Assessment (TNA) to determine technology gaps for appropriate actions.
- ix. Improving on the incorporation of high-level imported technologies for local technology development.
- x. Providing technology support services and other incentives to transferees.
- xi. Extension and enforcement of local content law for technology transfer.
- xii. Using procurement as a deliberate strategy for national development to be utilised accordingly for technology transfer.

3.6 Standardisation and Quality Assurance

3.6.1 Rationale

Globalisation drives new technologies, products and processes across national boundaries. Consequently, there is need for adherence to quality and international standards in carrying out scientific, industrial and commercial activities for global competitiveness.

3.6.2 Objectives

- i. To enforce standards and quality assurance to ensure competitiveness of technological goods and services produced in Nigeria.
- ii. To ensure the development and application of green technologies that promote Clean Development Mechanisms (CDM).
- iii. To ensure that all imported goods and services conform to requisite international and national standards.

3.6.3 Strategies

- i. Building capacity and capability of standard quality assurance and environmental auditing.
- ii. Providing innovative tools for standard and quality assurance in the design, development, production, installation and services in industries.
- iii. Developing processes and instruments for the establishment and review of standards and quality assurance systems for national development.

- iv. Providing a model framework for the establishment and review of an environmental management system.
- v. Promoting environmentally friendly technology and processes that comply with International Conventions and Protocols (C&P)

3.7 STI Information Management System

3.7.1 Rationale

Establish an effective information management system designed to provide real-time access to functional and updated database on STI activities in order to provide a platform for accessing, sharing and exchanging information.

3.7.2 Objectives

- i. To develop relevant and accessible database on STI.
- ii. To facilitate the development and management of STI knowledge base.

3.7.3 Strategies

- i. Developing national STI indicators that will be revised periodically in line with international standards.
- ii. Establishing and maintain a national database on STI input/outputs within an agency of FMST and strengthen the existing information management system on R&D in all sectors.
- iii. Creating active networks for interaction, cooperation and exchange of ideas among STI actors and stakeholders within and outside the country.
- iv. Establishing a mechanism within the FMST to coordinate the management of STI Information system.
- v. Establishing information system nodes in all agencies of FMST and other cognate ministries.
- vi. Linking the National STI information system with the National Bureau of Statistics for local and international usage.
- vii. Facilitating ICT infrastructure deployment to all S&T institutions.

3.8 Women and STI

3.8.1 Rationale

There is need to mainstream women in STI and provide more incentives to increase women's participation.

3.8.2 Objectives

- i. Strengthening the political and institutional framework to promote women's participation in STI.
- ii. Encouraging the promotion of gender balance in STI disciplines and R&D institutions in the country.
- iii. Making provision for greater involvement of women in STI to accelerate national development.
- iv. Increase access of women and girls to STI.
- v. Integrate gender assessment as necessary component of quality assurance of STI products in Nigeria.

3.8.3 Strategies

- i. Encourage the establishment of women STI desk at both the ministry level and relevant public and private agencies involved in STI activities.
- ii. Support women to participate and hold leadership positions in STI endeavours.
- iii. Provide funding and other incentives for continuing education of women in STI.
- iv. Provide scholarships and mentoring to increase female enrollment and retention in STI disciplines.
- v. Provide a framework to encourage and increase women's employment in STI sectors.
- vi. Mentor a vibrant national and sub-national women and STI fora that will regularly engage in reflections on the role of women in STI, national development, and network them with their international counterparts.
- vii. Support efforts to promote gender mainstreaming in STI.

4.0 FUNDING STI ACTIVITIES

For the policy to achieve the desired impact, there is need evolve reliable and sustainable funding frameworks from government, private sector and development partners

4.1 Rationale

Adequate funding for STI infrastructure and activities for sustainable development through viable mechanisms.

4.2 Objective

To ensure investment of adequate resources in research, development and innovation for sustainable development.

4.3 Strategies

a) Establishing a National Research and Innovation Fund (NRIF) with a minimum of 1% of GDP strategically sourced from the public, private, international etc the following existing institutions:

- i. Raw Materials Research and Development Council (RMRDC)
- ii. Education Trust Fund (ETF)
- iii. Industrial Training Fund (ITF)
- iv. Automotive Development Fund (ADF)
- v. National Communication Development Fund (NCDF)
- vi. Information Technology and Development Fund
- vii. Agricultural Development Fund
- viii. Ecological Fund
- ix. Lottery Fund
- x. Sugar Development Fund
- xi. Development/Donor Agencies, etc.

b) Government Allocations

- i. Adequate annual budgetary allocation to fund research and development activities in STI.
- ii. Operational Funding shall be made available for:
 - a. Critical investments in STI infrastructure; and
 - b. Routine activities of the nation's STI system.

c) Public and Private Partnership

- i. Foster in-house and local contractual R&D activities in public and private enterprises by making such investments tax deductible.
- ii. Provide incentives to encourage public and private enterprises to invest at least 5% of their profit before tax to the NRIF.
- iii. Encourage industrial firms to:
 - a. Establish and equip "in-house" R&D units; and

- b. Give grants and endowments competitively to individuals and institutions to actively engage in R&D in Nigeria.
 - c. Establish, equip and fund laboratories in universities and research institutes.
- iv. Encourage development finance institutions (e.g Bank of Industry) to set a fixed percentage of their loanable funds at low rate of interest for financing manufacturing industries.

d) International R&D Funds

Develop robust mechanisms to attract international funding for R&D and innovation in Nigeria.

e) Venture Capital

Promote and support establishment of venture capital schemes to provide risk capital to small and medium technology-based businesses.

5.0 STI Partnership and Collaborations

5.1 Rationale

Nigeria must become an active player in the global web of STI activities contributing to and benefitting from global pool of STI knowledge for sustainable development.

5.2 Objective

Establish and improve on existing cooperation in regional and international scientific and technological development programmes for the enhancement of industrial development and competitiveness.

5.3 Strategies

- i. Facilitating the acquisition and advancement of new and emerging technologies through international STI collaboration and Foreign Direct Investment (FDI).
- ii. Strengthening collaborative research and development activities with regional and international agencies.
- iii. Encouraging the nation to join and participate in international STI information networks.
- iv. Promoting international exchange programmes for staff and students in tertiary institutions, military and public service capacity-building institutions that are engaged in STI research activities.

- v. Mobilising and actively engage Nigerian STI professionals in the Diaspora for national development.
- vi. Establishing relevant STI centres of excellence in new and existing institutions.
- vii. Encouraging multidisciplinary teams of experts for collaborative R&D and commercialisation efforts.
- viii. Facilitating Nigeria's integration into the global knowledge Network through creating avenues for strategic engagements with partners and multiple voices on Global STI issues
- ix. Creating incentives for cross-border collaboration that empowers Nigeria's scientific, technological and industrial transformation
- x. Facilitating access to STI (knowledge) produced abroad through formalised liberal technological agreements, including trade agreements and patent laws.
- xi. Providing advice and knowledge that could lead to the establishment of the infrastructure of innovation.
- xii. Promoting creative competition amongst States to measure technological and investor friendly environment in the States.
- xiii. Facilitating reversal of brain drain.
- xiv. Increasing foreign funding through international collaboration and internationalization of research, science, technology and innovation.
- xv. Encouraging knowledge centres to provide support for Nigeria's emerging industrial clusters through linkages and collaboration.
- xvi. Facilitating effective partnership through the alignment of culture, social values and work ethics of Nigeria to the requirements of modern, entrepreneurial, scientific, technological and innovation goals.

6.0 GOVERNANCE

To enhance effective coordination, direction and management of STI activities in Nigeria, it is essential to establish and strengthen relevant institutions and structures needed to provide sound STI administration, good governance as well as quality leadership at all levels of governments.

6.1 Rationale

To demonstrate leadership at the highest level indicating top priority, create a platform for inclusiveness, ownership and sustainability and inter agency collaboration among key actors and stakeholders.

6.2 Objective

To create an appropriate organisational environment of complementary relationships and network that minimises frictions and institutional lapses for the coordination, management, promotion and application of STI in production of goods and delivery services for socio-economic development.

6.3 Strategies

- i. Create a governance structure that is inclusive and broad based
- ii. Reconstitute boards and committees to reflect the current policy intent and directions.
- iii. Create specific roles to avoid role duplication and confusion.
- iv. Establish an appropriate legal framework for effective organisational management and control.
- v. Strengthen the States' ministries of S&T and FMST as the coordinating institutions for all STI activities in the country.
- vi. Establish appropriate departments or structures in the FMST and States' ministries of S&T to facilitate linkages among FMST, cognate Ministries/Agencies, research institutions and industries.
- vii. Strengthen the National Research Development and Coordinating Council (NRDCC) to coordinate R&D activities and promote linkages/collaborations among relevant institutions as well as the private sectors.
- viii. Encourage all S&T institutions, the public and private sectors in the country to carry out programmes and activities that are in consonance with the National STI Policy.
- ix. Carry out mandatory periodic evaluation and monitoring of the performance of the national innovation system.

- x. Ensure the establishment of appropriate STI ministries/policy organs at the states and local government levels.
- xi. Establish other relevant STI research institutions to fast-track sustainable development.

7.0 INSTITUTIONAL AND LEGAL FRAMEWORK

7.1 Rationale

The lack of long term commitment to STI has been a major impediment to our nation's economic development. Therefore, there is a need to accord STI a central role in national economic planning and development through the establishment of effective institutional and legal framework as well as linkages at various levels within the NIS.

7.2 Objective

Develop appropriate legal framework to institutionalise long term commitment (backed by legislation) to the implementation of STI policy within the context of national economic development.

7.3 Strategies

- i. Review the National Science and Technology Act, CAP 276 of 1977 and the FMST Act No 1, 1980 to incorporate the new STI Policy.
- ii. Restructure the FMST to address the demand of the new STI perspective.
- iii. Strengthen the National Council for Science, Technology and innovation, restructure FMST Departments, enable STI Research Institutes and agencies as well as STI committees at the Federal, State and Local government levels for effective implementation of the STI policy.
- iv. Establish a National Research and Innovation Foundation (backed by legislation) for STI that manages competitive grants for sustainable long term for the NIS.
- v. Establish a monitoring and evaluation system for the policy to be managed by FMST.

7.4 Governance System

7.4.1 Rationale

To provide strong leadership, effective coordination and adequate resources for all STI activities within the National Innovation System.

7.4.2 Objective

To position STI as a national top priority endeavour to guarantee sustainably high standard of living and quality of life for its citizenry and fast track industrial and economic development.

7.4.3.1 National Research and Innovation Council (NRIC)

The National Research and Innovation Council (NRIC) shall perform the functions below:

7.4.3.2 Functions

- i. Set national priorities on R&D
- ii. Set directions to coordinate STI activities (including R&D) in line with national priorities.
- iii. Establish new research institutes and strengthen existing ones as it may deem necessary.
- iv. Facilitate fund raising activities to support innovation activities in areas of national needs and priorities.

7.4.3.3 Governance of National Research and Innovation Council (NRIC)

- i. The Chairman will be the President of the Federal Republic of Nigeria, and FMST will serve as the secretariat.
- ii. The Council shall consist of the following as members:

Honourable Ministers:

Federal Ministry of Science and Technology

Ministry of Information and Communication Technology

Ministry of Agriculture

Ministry of Industry

Ministry of Education

Ministry of Health

Ministry of Power

Ministry of Energy

Ministry of Works, Housing and Urban Development

Ministry of Petroleum Resources
Ministry of Environment
Ministry of Water Resources

7.4.4.1 State Science, Technology and Innovation Council (SSTIC)

7.4.4.2 Functions

- i. Provide leadership and directions for STI activities at the state level
- ii. Promote science education and disseminate science, technology and innovation information
- iii. Align policies and programmes with those of the NRIC
- iv. Promote and implement decisions and programmes of NCSTI

7.4.4.3 Governance

- i. The Chairman will be the Executive Governor of the State while the States' Ministry of Science and Technology or its equivalent will serve as the secretariat.
- ii. The Council shall consist of the following as members:
Honourable Commissioners of STI and STI related ministries
Representatives of members of the State House of Assembly
Representatives of State chapter of organised private sectors and relevant professional bodies

7.4.5.1 National Council on Science, Technology and Innovation (NCSTI)

7.4.5.2 Functions

- i. Set broad directions to coordinate STI activities (including R&D) in line with national priorities
- ii. Collate and disseminate annual reports of achievement from all public STI agencies
- iii. Facilitate active interaction/brokerage among government, industry and national research system

7.4.5.3 Governance

- i. The Chairman will be the Honourable Minister, Federal Ministry of Science and Technology (FMST) and FMST will serve as the secretariat.

- ii. The Council shall consist of the following as members:
- State Commissioners of Science, Technology and Innovation (SCSTI) or its equivalent
 - Federal cognate Ministries, Departments and Agencies
 - Academies of Science and Engineering
 - Nigerian National Merit Awardees in SET
 - The Armed and other security Forces
 - Organised private sector
 - Development Partners

8.0 CONCLUDING REMARKS

This policy reflects the renewed commitment and aspirations of the government and people of Nigeria to deploy ST as the fulcrum of all activities to fully realise its potentials as a global player among industrialised countries in the next 10 years the within a short time. The policy seeks to build a nation that is able to provide a high standard of living and quality of life for its citizens. The policy is thus formulated to give STI effect to the national economic blueprint that will place Nigeria among the top 20 economies in the world by 2020. This policy therefore shall be faithfully implemented as an integral part of the Vision 20:2020 economic transformation blue print.

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3. All Directors of the Federal Ministry of Science and Technology (FMST)
 - a. Engr. W. K. Jimoh – Director, Information and Communications Technology (ICT)
 - b. Mr. O. Ogenyi - Director, Planning, Research and Policy Analysis (PRPA)
 - c. Mr. Y.S. Mohammed – Director, Technology Acquisition and Assessment (TAA)
 - d. Mr. A. H. Yusuf – Director, Human Resource (HRM)
 - e. Mr. Mohammed A. Hassan – Director, Finance and Accounts (F&A)
 - f. Dr. S.O. Fadoju – Ag Director, Chemical Technology and Energy Research (CTER)
 - g. Dr. M.T. Gwaza – Ag Director, Physical and Life Sciences (PLS)
4. All Directors- General of FMST Agencies
 - a. NASENI – Prof. O. O. Adewoye
 - b. NACETEM – Dr. Willie O. Siyanbola
 - c. FIIRO – Dr. (Mrs.) G. Elemo
 - d. NITDA – Prof. C.O. Angaye
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 - o. NOTAP – Dr. U.B. Bindir
 - p. NNMDA – Mr. T.F. Okujagu
 - q. NIGCOMSAT – Engr. T. Ahmed Rufai
 - r. ECN – Prof. A.S. Sambo
 - s. SHETSCO – Prof. Sunday A. Thomas
 - t. NISLT – Dr. I. F. Ijagbone
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 - a. Education – Prof. Tunde Adeniran
 - b. Environment – Prof. A.M.A. Imavbore
 - c. Health – Prof. E.M. Essien
 - d. Commerce and Industry – Dr. Ike Abugu
 - e. Information Communications Technology – Prof. (Mrs.) Nike Osofisan

- f. Technology Incubation, Intellectual Property, Technology Transfer and – Engr. Tukur Ahmed
 - g. Transport – Prof. Micheal Filani
 - h. Mines and Steel – Prof. Siyan Malomo
 - i. Land Housing and Urban Development - Prof. J.I. Ighalo
 - j. Institution and Legislative Framework – Prof. Ibidapo Obe, Co-Chair- Prof. Oyebanji Oyelaran
 - k. Space –Prof. E.E. Balogun
 - l. STI Governance and Funding – Prof. OdeOjowu
 - m. Energy – Prof. C.C. Okoro
 - n. Agric and Water Resources – Prof. Ambrose Voh
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