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**NATIONAL SCIENCE, TECHNOLOGY AND
INNOVATION POLICY
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**NATIONAL SCIENCE, TECHNOLOGY AND
INNOVATION POLICY
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THEME:

**HARNESSING STI FOR SOCIO-ECONOMIC
TRANSFORMATION,
INCLUSIVE GROWTH AND NATIONAL COHESION**

PREPARED BY:

The National Working Group

***SPONSORED UNDER: UNESCO-Sida INITIATIVE ON
STRENGTHENING STI SYSTEM IN AFRICA***

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PRESIDENTIAL STATEMENT

Like many African countries, Sierra Leone has a very young growing population coming of age during the 21st Century industrial Revolution. The Midterm population Census that was conducted in December 2021 puts the population of youthful age under 15 years at 42% and a rural population with 62% (people living outside cities). Today's world (including Sierra Leone) is characterized by emerging new digital and complex global challenges including climate change, the consequences of Russia's 'Special Military Operation' in Ukraine, effects of the COVID-19 pandemic that are all exacerbating the widening economic inequalities within and among nations. The good news is that advances in science, technology, and innovation are dictating the growth of industries, transforming the global economy, security and governance. Governments of developing countries like Sierra Leone should prepare to be digital, and create platforms for their citizens to participate in the global economy.

Sierra Leone has the ambition to leverage the transformative potential of Science, Technology, and Innovation (STI) to position herself as a globally-competitive knowledge-based economy. This strategic orientation is founded on the premise that knowledge is essential to addressing socio-economic challenges and a key driver of growth, and competitiveness as well as indispensable in achieving high quality of living.

Under my leadership as President, Sierra Leone developed a 10-year National Innovation Digital Strategy (2019-2029) aimed at guiding the country's investments and policies for governance frameworks for present and future development. I firmly believe that advances in technology will help public service leaders make effective data-driven decisions. The global development indices put Sierra Leone close to the base due to high levels of illiteracy, youth unemployment, and low human capital development (HCD). These indices served as the impetus for prioritizing HCD in the Medium-Term National Development Plan (MTNDP) (2019 – 2023)

It is on record that in January 2001, the then Cabinet approved the establishment of a Science and Technology Council and Secretariat under the supervision of the Ministry of Development and Economic Planning (MoDEP). The Council led to the development of Directorate of Science, Technology and Innovation (DSTI) in 2018. To demonstrate the strong political will of the government in incorporating STI into governance, DSTI works closely with the presidency and relevant Ministries.

The UNESCO Sida-STI project in Africa, for which Sierra Leone is one of six African beneficiary countries, is an initiative for strengthening STI systems in Africa. Among the objectives of the first phase of the project are Mapping and Benchmarking STI institutions in the country and developing an NSTI policy. Through the astute commitment and professionalism of the science experts in the UNESCO Regional

Headquarters in Abuja, Dr. Enang Moma, the STI Policy Consultant, Professor Williams Siyanbola, and the UNESCO's Global Observatory on STI Policy Instruments (GO-SPIN) training led by the STI Policy consultant, Guillermo A. Lemarchand, among others, the STI Consultative Working Group has been able to produce a draft of the NSTI policy.

As a nation, we are aware that a new National STI Policy is required to encourage productive collaboration among Sierra Leone's scientists, technologists, and research organisations and with their international counterparts in critical areas of national interest. There is also the need to reverse the downward trend in enrolment in STEM education at higher educational institutions. The polytechnics, through the new STI policy, must be encouraged to educate and train high-level technicians and technologists in larger numbers to provide high skilled support for the national STI System.

The New STI Policy has the following priority themes: Promoting competitiveness in productive sectors of the economy; creating job opportunities and employment; expanding industrialization; enhancing the quality of life through innovation; developing scientific human resources; promoting an information society; optimizing the sustainable use of the natural and environmental resources and; commercializing research findings (*from Mind to the market initiative*).

NSTI is underpinned by three pillars: Social Transformation, Economic Transformation and Good Governance. STI cuts across various areas of intervention set under the three NSTI pillars including job creation, urbanization, industrialization, export promotion, environment protection, improved agricultural productivity, ensuring a healthy population, natural resource exploitation, promoting research and development (R&D), stimulating innovation, as well as developing competitive and capable Sierra Leone.

In pursuit of these medium and long-term development prospects, the government intends to integrate and mainstream STI in national policies and strategies through effective and efficient application of knowledge, scientific research, and technological innovation towards addressing societal challenges, exploring opportunities, and ultimately establishing a globally competitive knowledge-based economy.

This NSTI is a valued gift for our country and could not have come at a better time.

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President Maada Bio

President, Republic of Sierra Leone

STATEMENT BY THE HONOURABLE MINISTER OF TECHNICAL AND HIGHER EDUCATION

Scientific advances and technological change are important drivers of continuous productivity growth at all stages of economic development, and veritable resources for the closing of the large income gap between developed and developing countries. The Government of Sierra Leone acknowledges the connection between the implementation of the new National STI Policy and the realisation of the right to share in scientific advancement and its benefits. The ability to create, distribute and exploit knowledge has become a major source of competitive advantage, wealth creation, and improvements in the quality of life. The Modern-Day Development Standard is characterised by strong systems for knowledge creation and strategic utilisation of development relevant to knowledge supported by human capital development is anchored on Sierra Leone's Medium-Term National Development Plan (MTNDP), **“Improving People’s Lives through Education, Inclusive Growth, and Building a Resilient Economy”** which is critical for the sustainable economic development of Sierra Leone. Consequently, the Ministries of Basic and Senior Secondary Education (MBSSE) and Technical and Higher Education (MTHE) are mandated to ensure human capital development through Free Quality School Education (FSQE) at the basic level and strengthen the quality of Technical Vocational and Education Training (TVET) and Higher Education are delivered to Sierra Leoneans through the formulation of well-informed policies and the advancement of quality projects and programmes. In that respect, the steady support, encouragement and active participation in the STI policy development process by the Dr David Sengeh, the Minister in charge of DSTI and MBSSE is deeply appreciated.

Furthermore, the two Ministries of Education and in particular the Ministry of Technical and Higher Education have the mandate to enhance Sierra Leone's Research and Development (R&D) capability to build a strong National System of Innovation. To achieve this, it would require in particular, the provision of adequate scientific and technical infrastructure; promotion and development of innovation strategies, and a strong local research capacity. These functional areas are the cornerstones for diversifying the economy and promoting growth as well as infrastructure and economic competitiveness for poverty reduction as articulated in the MTNDP of Sierra Leone. The Ministries (MBSSE & MTHE) therefore have the critical roles of promoting knowledge creation; skills development; adequate and equitable funding, and access to quality basic and senior secondary and technical and higher education; and promoting research, science and technology, and innovation activities.

For Sierra Leone to be an active part of the global scientific and technological developments and commitments, UNESCO, through MTHE, has developed the first-ever Science Technology and Innovation policy that lays a premium on R&D in key

thematic areas articulated in MTNDP that emphasis more innovation capacity enhancement. The theme of the National Science, Technology and Innovation Policy is **“Harnessing STI for Socio-Economic Transformation, Inclusive Growth and National Cohesion”** aimed at establishing a base for local production and application of science, technology, and innovation in all sectors of the economy to achieve the goals set out in MTNDP as well as responding to African Union (AU) Agenda 2063, Science Technology Innovation Strategy for Africa (STISA) 2024 and above all the global Sustainable Development Goals (SDGs).

Sierra Leone, as a developing country, will benefit from the transformation brought by STI with the right policies put in place. Public spending on R&D will increase national competitiveness, better integration into the global value chain, and a better understanding of the role played by science and technology in economic transformation. This has triggered the government of Sierra Leone to the necessity of the STI policy.

Above all, the explicit goal of the NSTI Policy is “To build a strong science, technology and innovation capability and capacity needed to evolve a modern economy” with policy philosophy as “Leadership”, “Funding”, “Partnership” “Indigenisation” and “Acculturation”. We would therefore encourage all stakeholders’ active participation in the implementation of the NSTI policy to achieve the goal of the policy by exploring the role of science, technology, and innovation in the new economy in fostering scientific and technological progress for economic growth and greater social well-being of our people.

Professor Alpha Tejan Wurie

*Minister of Technical and Higher Education,
Republic of Sierra Leone.*

ACKNOWLEDGEMENT

The First National Science, Technology, and Innovation Policy of Sierra Leone has been developed through a multi-sectoral approach. The policy was designed through a participatory and consultative process involving all key stakeholders that are fundamental to the development and promotion of research, science, technology, and innovation in Sierra Leone. A National Consultative Working Group (NCWG) whose competences for developing an STI policy were enhanced by UNESCO STI experts and consultants was constituted and inaugurated by the Honorable Minister of Technical and Higher Education. This group formed the core working group for crafting the initial draft of the policy which was reviewed by other national actors/stakeholders in the STI ecosystem including business enterprises. In that regard, the technical/experts' support provided by Professor Williams Siyanbola, the UNESCO STI Consultant, to the NCWG throughout the policy development process is hereby deeply acknowledged. The Government of Sierra Leone is indeed thankful to all the key stakeholders for their invaluable contributions culminating in the production of this policy.

A special acknowledgment goes to the Swedish International Development Agency (Sida) for providing the funds for the development of this policy through the UNESCO-Sida STI project “*Strengthening STI ecosystem for Sustainable Development in Africa*” of which Sierra Leone was a beneficiary.

I wish to acknowledge the efforts and support of the Minister and his deputy in the Ministry of Technical and Higher Education for driving the policy development process from inception to completion. Their display of passion and political will has helped to facilitate public buy-in and acceptance of the policy. A special thanks goes to the Secretary General, Sierra Leone National Commission for UNESCO, Dr Mohamed Kamanda, for anchoring the meetings and other activities for the development of the policy. I want to also appreciate the invaluable contributions of members of the Consultative Working Group towards the development of this document.

My special appreciation goes to the Head, Dr. Enang Moma and staff of the Science Sector of UNESCO Regional Headquarters, Abuja for her tenacity and the driving force behind this project.

The good people of Sierra Leone are encouraged to embrace the New STI policy which is geared towards addressing the science and technology gap in the country, developing skilled workforce across board, and creating a sustainable inclusive growth for the good of all.

Gilbert Heavens Cooper

Permanent Secretary

Ministry of Technical and Higher Education,

Sierra Leone

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LIST OF ACRONYMS

ACC	Anti-Corruption Commission
AI	Artificial Intelligence
ARIPO	African Regional Intellectual Property Organization
AU	African Union
CSOs	Civil Society Organizations
DSTI	Directorate of Science, Technology and Innovation
ECOWAS	Economic Community of West African States
EPA-SL	Environment Protection Agency-Sierra Leone
FQSE	Free Quality School Education
GBV	Gender Based Violence
GDP	Gross Domestic Product
HIV/AIDs	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
HRMO	Human Resource Management Office
IoT	Internet of Things
IPR	Intellectual Property Rights
JLSC	Judicial and Legal Service Commission
LGSC	Local Government Service Commission
M&E	Monitoring and Evaluation
MBSSE	Ministry of Basic and Senior Secondary Education
MIALGRD	Ministry of Internal Affairs, Local Government and Rural Development
MoA	Ministry of Agriculture
MoDEP	Ministry of Development and Economic Planning
MoE	Ministry of Environment
MoFED	Ministry of Finance and Economic Development
MoGCA	Ministry of Gender and Children's Affairs
MoLG	Ministry of Local government
MoSW	Ministry of Social Welfare
MoTI	Ministry of Trade and Industry
MTHE	Ministry of Technical and Higher Education
MTNDP	Mid-Term National Development Plan
MTNP	Mid-Term National Plan
NaMED	National Monitoring and Evaluation Directorate
NCTVA	National Council for Technical, Vocational, and Other Academic Awards
NGOs	Non-Governmental Organizations
NSTC	National Science and Technology Council
NSTI	National Science, Technology, and Innovation
PaSC	Parliamentary Service Commission
PIUs	Project Implementation Units
PSRU	Public Sector Reform Unit
R&D	Research and Development
RDIs	Research and Development Institutions
RS SR	Recommendation on Science and Scientific Researchers
S&T	Science and Technology
SLARI	Sierra Leone Agricultural Research Institute

SMART	Specific, Measurable, Achievable, Relevant, and Time-bound
STEM	Science, Technology, Engineering, and Mathematics
STI	Science, Technology, and Innovation
STISA	Science, Technology, and Innovation Strategy for Africa
TEC	Tertiary Education Commission
TVET	Technical, Vocational, and Education Training
UNCSTD	United Nations Conference on Science and Technology for Development
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNESCO	United Nations Educational Scientific and Cultural Organisation
WIPO	World Intellectual Property Organisation

CHAPTER 1 : INTRODUCTION

1.1. BACKGROUND

Sierra Leone is a low-income country with a GDP of 4.2 Billion in USD 2021, with large natural resources. It has the potential to leverage the transformative powers—of science, technology, and innovation (STI) to position itself as a globally competitive knowledge-based economy. This strategy is founded on the premise that knowledge is essential to addressing social-economic challenges, a key driver of growth and competitiveness, and is indispensable in achieving a high-quality standard of living.

It is a proven fact that STI is an important tool for a nation's development, playing pivotal roles in poverty eradication/reduction, and helping in the transformation of societies by empowering people to make informed decisions and choices for better living. It also supports the achievement of sustainable development. However, tapping into the benefits of STI can only be achieved by creating robust STI systems, inclusive scientific education and appropriate policy frameworks using novel approaches. Technological advancements in developed countries are largely due to the unprecedented breakthroughs in research, development, innovation and entrepreneurship while Sierra Leone unfortunately continues to rely on rudimentary production techniques.

Sierra Leone has a weak capacity to cope with the rapid advances that are taking place in the global STI domains. Generally, the country is still lagging in the optimal utilisation of available production, business, information, and communication technologies. Most of the country's exports are unprocessed with little or no value addition. More importantly, capital-intensive industries that form the basis for industrial development are limited to the mining sector. This situation is linked to the existing conditions of widespread poverty, low level of technological capability, under-utilization of indigenous technology, low levels of STI appreciation, poor financing, and inadequate availability of S&T expertise and institutions, amongst other challenges.

1.2. EXISTING INSTITUTIONS FOR STI

Recognising the importance of STI in overall socio-economic development, the Government is currently engaged in promoting a coordinated and coherent approach to advancing STI in the country.

In Sierra Leone, steps had been adopted in line with global best practices to institute and implement a Science, Technology and Innovation Policy, which will direct national actions to efficiently utilise STI for the achievement of expressed national aspirations and goals.

Sierra Leone's history of science and technology dates back to the 1800 when Fourah-Bay College was established and affiliated to Durham University-UK between 1876-1967 to serve the sub-region and later became University of Sierra Leone in 1968. In 1978, the Government instituted a non-statutory and *ad hoc* interim Science and Technology Committee within the Central Planning Unit of the Ministry of Development and Economic Planning (MoDEP) with the mandate to prepare the country's paper for the second UNCST Conference held in Vienna in 1979. The Committee later organised many seminars and workshops that emphasised the importance of Science and Technology for Sierra Leone in the years leading to 2009. For instance, in 1994, with funds from UNCTAD and UNECA, a draft policy was formulated (*National Science & Technology Policy, 2009*). The main policy goals identified include the alleviation of poverty; improving the standard and quality of life of people, and improving the local technological abilities.

In January 2001, the Cabinet approved the establishment of a Science and Technology Council (NSTC) and Secretariat under the supervision of MoDEP. In December 2001, the Council was launched, and by February 28-29 2002, the Council organised a workshop on the theme ***“Making Science and Technology work for the poor.”*** That workshop was the first in a series of planned activities which culminated in the formulation of the first Science and Technology Policy document with financial support from UNDP/UNESCO. The council eventually led to the establishment of The Directorate of Science, Technology, and Innovation (DSTI) in 2018 through various policies and political proclamations initially as an integral part of the Ministry of Technical and Higher Education. Today, to demonstrate the strong political will of the government in incorporating STI into governance, the DSTI is domiciled in, and works very closely with the Presidency and also collaborates with other relevant Ministries. It is envisioned that the DSTI will provide advice to the President of the Republic of Sierra Leone on STI and related issues. Other functions would include: advising the President on global trends in STI relevant for national development; developing and applying STI knowledge for development; appraising various government programmes and projects from the perspective of STI development and application; and advising the President on means to ensure the effectiveness of research and development in Sierra Leone. It is also worthy of note that, there are a couple of public universities and private universities, polytechnics, and teacher training colleges that offer courses in Science, Technology, Engineering, Mathematics (STEM), and other related disciplines.

Indeed, in developing the prevailing national development policy, STI strategies have been continuously enshrined taking a cue from relevant international, regional, and national development agenda such as:

- AU Agenda 2063
- The Sustainable Development Goals (SDGs, 2015)
- Sierra Leone Vision 2025

- National Science and Technology Policy-2002;
- ECOWAS Policy on S&T (ECOPOST 2012); and
- Sierra Leone Medium-Term National Plan - MTNP (2018-2023)

Recognising the importance of S&T in overall socio-economic development, there is now a strong commitment by all stakeholders and actors through the formulation of a new National STI Policy to harness STI for the improvement of the quality of life of the Sierra Leonean people. To facilitate the process, a plan of action has been put in place which includes the re-constitution of the National Science Technology and Innovation Council (NSTI).

1.3. HISTORICAL PERSPECTIVE AND JUSTIFICATION FOR NSTI POLICY

The first S&T Policy was developed in 2002 and this saw the establishment of the National Science and Technology Council. The policy was part of the post-war strategies toward economic recovery as the country officially concluded the ten-year civil conflict in 2000. In fact, almost all policies developed in that era were geared towards mental rehabilitation, demobilization of ex-combatants, and economic recovery among others. Twenty years have elapsed since the last S&T policy was developed, and there is now a dire need for a review of the policy; unfortunately, due to some intrinsic problems, the National Science & Technology Council which should direct the review of the policy became defunct. Additionally, there has been a geometric growth in technological advancement with novel technologies such that the S&T policy cannot adequately address the aspirations and needs of the present society. For instance, Artificial Intelligence (AI), the Internet of Things (IoTs), and Machine Learning (ML) are all novel technologies that have emerged in the last decade or so. There is therefore the need for a different approach to reskill or upskill the labour market and re-direct thought processes towards innovation. This requires a robust policy framework for proper appreciation and effective application.

Moreover, Sierra Leone is a signatory to many international conventions/agreements including the 2017 UNESCO RS|SR which looks at member states' conformity and compliance to the set criteria as enshrined in the key recommendations. In most cases, these agreements require knowledge and the use of specific and standardised tools to collect the requisite data and information to measure and benchmark the country's progress toward the achievement of the stipulated goals. These cannot be achieved without the appropriate legal instruments to drive the process; hence the need for a new STI policy to address this gap. A major concern for building Sierra Leone's STI capacity is the inadequacy and failure to steadily develop the universities' capacity to educate and train scientists and technologists in large enough numbers to the level of the Ph.D. Strategically, Universities that are engaged in producing scientific and technological human resources up to the PhD. level through the new STI policy

would be encouraged and supported to increase their capacity to conduct demand-driven R&D and support local industries and markets.

A National STI Policy is required to encourage productive collaboration between Sierra Leone's scientists and technologists, and international research organisations in critical areas of national interest. There is also the need to reverse the downward trend in enrolment in Science, Technology, Engineering and Mathematics education at higher educational institutions. The polytechnics, through the new STI policy, would be encouraged to educate and train high-level technicians and technologists in larger numbers to provide adequate high skilled human capital to support national STI System.

Additionally, major contributors to national science, technology, and innovation capacity are the professional associations and bodies which should meet annually to share the results of their research and practice, pass resolutions to guide the government on development issues, and advance STI. Unfortunately, these professional bodies hardly meet; instead, there are uncoordinated activities undertaken, and most of their outputs are unknown to the public. The New STI Policy has recognised the value of professional bodies, especially for R&D and promotion of STI in all sectors. To that end, the policy has identified the following priority themes:

- Promoting competitiveness in productive sectors of the economy;
- Creating inclusive job opportunities and employment;
- Expanding industrialisation;
- Enhancing the quality of life through innovation;
- Developing scientific human resources;
- Promoting an information society;
- Optimising the sustainable use of natural and environmental resources;
- Commercialising research findings (*from the Mind to the market*).

CHAPTER 2 : VISION, MISSION, AIM, OBJECTIVES AND STRATEGIES

2.1. VISION

To transform Sierra Leone into a knowledge-based economy built on a functional national innovation system to enhance the living standards of the citizens.

2.2. MISSION

To establish a vibrant STI environment for the building of capacities and infrastructure, mobilisation of resources, and deployment of STI for enhancement of education, research, industries, and quality of living.

2.3. GOAL

To build a strong science, technology, and innovation capability and capacity needed to evolve a modern economy and improve the quality of life of the people.

2.4. THE POLICY PHILOSOPHY:

- 2.4.1 **Leadership:** Developing a strong leadership through a strong political will to protect and support value enhancement in the STI ecosystem, maintaining a high-level commitment to empowering STI stakeholders and the private sectors to participate in R&D that will lead to an informed decision-making strategy for the advancement of STI.
- 2.4.2 **Funding:** Developing a more reliable and efficient funding mechanism with sustained investments to enhance financial resources for STI activities with a long-term vision through public and private financing, and development partners' funding.
- 2.4.3 **Partnership:** Establishing a robust STI ecosystem where all feasible mechanisms are satisfactorily addressed for collaboration, enhancement, competitiveness, and partnership building.
- 2.4.4 **Indigenisation:** Strengthening Sierra Leone's local R&D capacity and capabilities in the production of technologies that are normally largely imported. Setting up infrastructure and strengthening existing mechanisms to adapt existing technologies to suit the local needs. These initiatives will primarily meet the needs of local technology production, as well as reduce large-scale import of technology.
- 2.4.5 **Acculturation:** Making STI a way of life by developing capacities and capabilities in effective STI policy development, implementation, monitoring and evaluation with special inclination for STI knowledge generation and sharing, technological infrastructure development and acquisition, adoption and improvement of new technologies/innovations thereby addressing broader socioeconomic challenges of our people.

2.5 THE SPECIFIC POLICY OBJECTIVES

The Specific Policy objectives are:

- i. Promote Effective STI governance at all levels;
- ii. Re-establish and restructure the National Science, Technology, and Innovation Council;
- iii. Revitalise the teaching of science at Basic, Secondary, and Tertiary levels of education;
- iv. Accelerate Human Capital Development in STI and STEM;
- v. Promote the mastery of indigenous technologies and their application in industries;
- vi. Promote gender equity, equality, and inclusivity;
- vii. Promote R&D and innovation;
- viii. Promote Open Science;
- ix. Promote Scientific Freedom and Responsibility
- x. Promote research in New and Emerging Technologies;
- xi. Strengthen intellectual property rights;
- xii. Develop reliable funding mechanisms/strategies to supplement annual national budgetary allocations to STI.
- xiii. Promote industrial and national competitiveness

CHAPTER 3 : POLICY OBJECTIVES AND STRATEGIES

3.1. STI ADMINISTRATION AND GOVERNANCE

Objective 1: Promote effective STI governance

Rationale: *This is to establish an enabling environment as well as coordination mechanisms aimed at strengthening linkages between science, economy, and society and to encourage research and innovation.*

Strategies

- i. Develop STI legal and regulatory frameworks - Strengthen STI laws, regulations, and guidelines to foster quality standards, efficiency, and regional integration;
- ii. Align STI policy with national development goals - to enhance acceptability and implementation; and
- iii. Strengthen STI coordination across all sectors - to strengthen policy making in terms of skills, capabilities, and expertise.
- iv. *Use scientific knowledge in an inclusive and accountable manner to inform national policy and decision making, and to advance international cooperation and development*
- v. Strengthen Science-Policy-Society interfaces through collaborative and multi-stakeholders' participation in all stages of the policy cycle

Objective 2: Re-establish and restructure the National Science, Technology, and Innovation Council (NSTIC)

Rationale: *To ensure strong advocacy for STI in the country, to provide STI advice to the government, and to ensure effective coordination and harmonisation of the nation's STI policy and programs.*

Strategies

- i. Reconstitute or resuscitate the National Science, Technology, and Innovation Council - a body of experts to be set up under the STI apex body to perform the role of reviewers of the implementation strategies/plans of all STI activities;
- ii. Establish National Science, Technology, and Innovation Council Secretariat at MTHE;
- iii. Strengthen and relocate DSTI to the Ministry of Technical and Higher Education;
- iv. Establish monitoring and evaluation unit with DSTI to support the implementation of the STI policy, and to ensure that the activities initiated can provide maximum benefits to the populace

3.2. HUMAN CAPITAL DEVELOPMENT

Objective 3: Revitalise the teaching of Science at Basic, Secondary, and Tertiary levels of education

Rationale: *To promote and awaken the interest in science among students in the formative years of education and to train a critical mass of medium-level technical personnel to address the technological skills gap in the country.*

Strategies

- i. Initiate curricular development and implementation, where the need arises, in partnership with relevant stakeholders
- ii. Train more science teachers at Universities and Teacher Training Colleges;
- iii. Establish and equip science laboratories at all levels;
- iv. Establish incubation hubs to promote experiential learning; and
- v. Incentivise science and technology teachers across the board.
- vi. Establish functional internship programmes for STEM students to acquire industrial experience
- vii. Establishment of specialised High Schools and Technical/Vocational institutes (e.g Telecommunication High School; Agriculture High School, Technical Training schools/Centres, etc)
- viii. Inclusion of mandatory entrepreneurship module in Science and Engineering Curriculum

Objective 4: Accelerate Human Capital Development in STI and STEM

Rationale: *In line with the National Medium-term Development Plan 2019-2023 and the Education Sector Plan- 2022-2026, Sierra Leone needs intensive capacity building to address the gaps in medium-level manpower and develop pedagogies that strengthen critical thinking & creativity, and problem-solving.*

Strategies

- i. Strengthen the quality of Basic, Secondary, and Tertiary education in STEM;
- ii. Stimulate and support research and innovation culture and mindset;
- iii. Invest in and promote Technical, Vocational, and Education Training (TVET);
- iv. Train skilled and competent technical workforce to manage, operate and maintain highly specialised equipment and infrastructure;
- v. Develop harmonised curriculum for TVET at secondary and post-secondary education levels; and
- vi. Align TVET training to enable TVET graduates' access to Higher Education

- vii. Create Schools and Innovation hubs in partnership with Higher Education Institutions, private industries, and local communities for sharing resources and capacities relevant to curriculum review and faculty development;
- viii. Establish innovation and entrepreneurship centres in universities and polytechnics and encouraging innovation through awards and competitions
- ix. Encourage research in innovation among faculty members to facilitate internal research collaborations and exchange programmes in STI;
- x. Strengthen Distance Learning programmes with appropriate technological amenities to improve their quality and accessibility to learning materials;
- xi. Create national research and innovation programmes on assistive technologies and learning resources to promote the use of technology for an interactive, personalised learning environment for learners with special needs;
- xii. Establish Online platforms including e-Libraries, e-repositories and virtual laboratories for skill building-to promote learning, research, and innovation at all levels through the provision of virtual resources.

3.3. INDIGENOUS TECHNOLOGY DEVELOPMENT AND MANAGEMENT

Objective 5: Promote the mastery of indigenous technologies and their applications in industry

Rationale: *Formal and informal indigenous knowledge has been instrumental in establishing novel home-grown solutions used to address complex community challenges.*

Strategies

- i. Conduct a mapping and documentation of Sierra-Leone indigenous knowledge and technologies
- ii. Support the development, promotion, protection, application, diffusion, and commercialisation of indigenous knowledge, local technologies, and adaptation of imported technologies;
- iii. Invest in indigenous herbal medicines and non-chemical pest control measures in agriculture;
- iv. Build capability and methodology to identify the scientific content of indigenous knowledge and technologies, adopt and improve those that are useful for wider dissemination and diffusion;
- v. Provide value addition to indigenous products e.g. Garri (Cassava) processing, palm oil production, weaving (-'Kontri cloth' weaving, gara tie-

- dying (batik), ginger beer and other food based products /extraction machines, etc.;
- vi. Strengthen indigenous innovation/development of critical local products/components through collaborations among agencies, technical technology institutions, and industries;
 - vii. Strengthen Sierra Leone's local R&D capabilities in the production of technologies and mechanisms to adapt existing technologies to suit the local market;
 - viii. Build technology support frameworks for research that will enable public and private players to innovate, commercialise and deploy need-based technologies including indigenous technologies; and
 - ix. Create institutional mechanisms for the development and flow of sustainable technologies across the country to promote growth as well as upgrading existing indigenous and traditional technologies to attain sustainable development.
 - x. Encourage grassroots and inclusive innovation with specific STI policy instruments and innovation schemes

3.4. GENDER EQUITY, EQUALITY, AND INCLUSIVITY INCLUDING PHYSICALLY CHALLENGED

Objective 6: Promote gender equity, gender equality, and inclusivity

Rationale: *Women are grossly under-represented in STI/STEM activities in the country. The undermentioned Strategies will support and improve women's participation in STI/STEM.*

Strategies

- i. Promote gender-sensitive STEM education;
- ii. Encourage equity in education, research, innovation, and STI-driven entrepreneurship granting, award and scholarships;
- iii. Establish and improve programmes that support girls (and women's) participation in STEM;
- iv. Support the careers of women scientists and innovators, strengthen their networks, and provide special incentive packages for female science students as instruments of motivation;
- v. Promote equal access to essential services, rights, and opportunities in STI for people with disabilities and the under privileged (e.g, indigenous peoples, migrants)
- vi. Promote women to leadership positions in the field of STI and encourage the participation and contributions of persons with disabilities, especially women

who face multiple discrimination, in decision-making procedures concerning STI;

3.5. RESEARCH AND DEVELOPMENT IN PRIORITY SECTORS

Objective 7: Promote R&D and Innovation Culture

Rationale: *The STI Policy aims at promoting a culture of science, technology, innovation, research, and publication through public and private awareness campaigns and the development of accessible information system to enhance scientific thinking and productivity.*

Strategies

- i. Establish platforms for the dissemination of research findings to the public
- ii. Facilitate the packaging of research findings to be disseminated to the public;
- iii. Promote research and innovation culture in higher institutions of learning;
- iv. Transform research institutes into high-performing organisations
- v. Design and implement policy instruments to support research performers and innovators, to strengthen research commercialization Create adequate and sustainable STI infrastructure; and
- vi. Invest in R&D and innovation with the support and collaboration from the public and private sectors.

3.5.1 Health

Objective: Promote a healthy and strong population

Rationale: *A healthy population is a reservoir of a strong workforce that is able to learn, adapt, create, and deploy STI for national development*

Strategies

- i. Promote preventive and regenerative health care;
- ii. Support biomedical research in prevalent diseases in the areas of prevention, diagnosis, therapy, and management;
- iii. Improve access and services in the general health care delivery system;
- iv. Promote technologies in support of sanitation, environmental and occupational health;
- v. Promote research and development in the area of bio-medical engineering and instrumentation as well as the potential of information technology application in the health delivery system;

- vi. Enhance the development of human resources for healthcare delivery using STI;
- vii. Promote and supporting research into plant medicine to complement allopathic medicine including the commercialisation of the research results; and
- viii. Establish specialised health centres to promote health tourism.

3.5.2 Food Security and Modern Agriculture

Objective: To ensure production of adequate food supplies through productive and environmentally sustainable agriculture, maximising stability in the flow of food supplies, and ensuring access to available supplies to the populace.

Rationale: *The STI need to promoting sustainable agricultural production both as inputs to industrial processes, value-added exports, and the eradication of hunger, poverty and malnutrition*

Strategies

- i. Promote the research and application of new technologies including safe biotechnology, which hold potential for increasing food productivity;
- ii. Reduce pre-harvest and post-harvest losses in agricultural production in both cash and food crops;
- iii. Promote the development of food processing industries and enhance value addition for the local market and exports;
- iv. Strengthen the production of non-traditional export commodities to enhance the diversification of the economy;
- v. Strengthen the linkage between research and agricultural extension;
- vi. Develop appropriate and innovative technologies for breeding, feeding, health, and management of livestock and poultry;
- vii. Encourage effective agricultural waste management and utilisation;
- viii. Develop indigenous technologies for value addition to agricultural produce;
- ix. Enhance agricultural productivity through the cultivation of improved crop varieties and breeds of livestock and fisheries; and
- x. Encourage technology uptake and diffusion of agricultural innovations by farmers, including the application of tissue culture in the cultivation of annuals and biennials e.g. bananas, plantains, tubers, etc.

3.5.3 Energy

Objective: Provide a system for steady supply of clean and affordable power for domestic and industrial uses.

Rationale:

Industrial development, private and public production of goods and services, and consumption of goods and services for continuous improvement in the standards of living leverages on the steady supply of adequate and affordable power

Strategies

- i. Promote R&D in sustainable energy resources, energy conservation, and management;
- ii. Support R&D in clean energy technologies and renewable energies;
- iii. Provide funding and incentives for R&D in energy research, development, and management;
- iv. Develop R&D, demonstration and deployment capabilities in thermal (coal, oil and gas), nuclear, solar, wind, biofuels, hydro and other renewable energies.;
- v. Promoting the use of safe, clean, efficient and sustainable energy technologies for national development;
- vi. Facilitate the development and production of energy conversion technologies for sustainable power generation;
- vii. Facilitate the adaptation of appropriate energy technologies for rural development; and
- viii. Support national vision to acquire technologies for sustainable power industry.

3.5.4 Environmental Sustainability, Natural Resources and Climate change

Objective: To preserve the natural environment for the benefits of present and future generations, minimize the deleterious impacts of climate change and promote responsible exploitation of natural resources

Rationale: *The environment provides inputs for all forms of production, comfort for their consumption and healthy living, and the continuity of present human activities in the future*

Strategies

- i. Promote R&D in key areas including climate change and Deforestation; global warming and air quality in urban areas; and global warming and green-house gas emissions;
- ii. Support and encourage equitable sharing of R&D results in energy use, emissions control, air quality, atmospheric warming; and consumer behaviors;
- iii. Promote the integration of environmental concerns in all development policies and ensuring public understanding and of human actions on the environment;
- iv. Develop an appropriate and effective waste management system to reduce pollution emission from waste generation;
- v. Encourage the use of clean technologies for domestic and industrial uses;

- vi. Develop capacity to monitor, predict and mitigate adverse effects of natural phenomena such as floods, drought and desertification;
- vii. Encourage science and technology intervention that promotes sustainable environmental development;
- viii. Promote the development of a national environmental data base to support policy making and economic development; and
- ix. Provide standards for the exploitation of natural resources for the current needs of the country without compromising the benefits of future generations.

3.5.5 National Cohesion and Security

Objective: To facilitate and promote equal opportunity, good relations, harmony and peaceful co-existence of Sierra Leoneans and elimination of all forms of ethnic or racial discrimination and other factors that predispose the country to conflict

Rationale: *Recognition of the fact that the broader goal of economic transformation for the sustainable development of the country can be better achieved in a peaceful environment that supports the aspirations of all citizens and harnesses their potentials for national development.*

Strategies

- i. Support appropriate R&D activities in STI that would contribute to a safe and secured society and foster economic growth;
- ii. Encourage R&D in smart technologies with the potential of creating systems to identify and communicate threats;
- iii. Conduct in-depth assessment and mapping of the state security resources and personnel to identify critical gaps; and
- iv. Promote the use of ST&I to prevent and control crimes and threats to national security.

3.5.6 Youth and Talent Hunt for Innovation

Objective: To secure future development of the country by empowering youths with adequate 21st century skills and infrastructure for creativity, critical thinking and innovation.

Rationale: *Youths are repositories of talent energy, adventures and innovativeness which are critical for national development if properly harnessed and directed to productive uses*

Strategies:

- i. Expand Research and Development infrastructure through establishing, renewing, upgrading, and equipping R & D facilities for youths;
- ii. Build youth's capacity and capabilities to support and evolve robust innovation systems;
- iii. Promote innovation and entrepreneurship at appropriate levels of the educational system;
- iv. Encourage activities that bring out the talents and STI capabilities of the youth, including both boys and girls, the physically challenged and the under privileged such as: holding regular science and mathematics clinics and software development clubs;
- v. Promote STI competitions among the youth;
- vi. Establish Awards schemes that reward creativity and innovation among the youth;
- vii. Provide scholarships for promising STEM students;
- viii. Initiate frameworks/mechanisms to identify talents and young scientists;
- ix. Establish mentoring programmes in STI for the youth; and
- x. Establish STI learning spaces and critical infrastructure like tech hubs and broad band internet at the District levels.

3.5.7 Tourism

Objective: To position Sierra Leone as a foremost tourist destination in Africa for economic diversification, foreign exchange earnings and employment creation.

Rationale: *The country has abundant natural habitats and eco-diversity that can be transformed into a modern technology driven-tourism industry and facilitating the development of other sectors to service it.*

Strategies

- i. Embed tourism in the curriculum and training at secondary and tertiary institutions with a focus on key areas related to the following: technology in tourism (information and communication technologies, Tourism and smart tourism geared towards ambient or artificial intelligence), emerging technology trends in the tourism industry (use of 5G networks and mobile applications), managerial and technological innovation for competitiveness of firms to generate economic growth;
- ii. Capture, recognize and align culture and tourism with the following existing policies such as Culture and Entertainment Policy, Tourism Master Plan and Eco-Tourism Policy; and

- iii. Promote responsive educational system that motivates and stimulates creativity, enhances cultural understanding and appreciation, and develops moral values and ethical behavior drawing largely from our traditions and cultural values.

3.5.8 Sports and Recreation

Objective: Promote sports as a vocation and recreation.

Rationale: *Modern sports are technology-intensive in their infrastructure, tools, training, and practice. There is the necessity of mainstreaming science and technology into sports to make it globally competitive and attractive to the large youth population.*

Strategies

- i. Promote and support R&D in sports science and human kinetics;
- ii. Encourage youth participation in sports and recreation activities using relevant advances in STI; and
- iii.
- iv. Leverage technology to promote community outreach and talent identification programmes.

3.6. OPEN SCIENCE

Objective 8: Promote Open Science to strengthen the national STI ecosystem

Rationale: *Open Science fosters more equitable participation in science through diverse steps including increasing access to research facilities and outputs, more transparency, and accountability in research, inclusiveness, better resource utilisation through minimal restrictions on the re-use of research outputs and infrastructure, ensuring exchange of knowledge between producers and users of knowledge.*

Strategies:

- i. Promote open science for collaboration, management, and sharing of research facilities and data at all levels;
- ii. Establish data and knowledge repositories;
- iii. Developing a virtual communication and interaction platforms;
- iv. Conducting analyses on projects' funding, outcomes, and technological capabilities;
- v. Promote education and skills development for research data collection and research integrity – research ethics; and
- vi. Facilitate the establishment of open learning space across the country.

3.7. NEW AND EMERGING TECHNOLOGIES

Objective 9: Promote New and Emerging Technologies

Rationale: *Emerging technologies play vital role in the modernization of industries. New technologies help in transforming enterprises into a digital world, in manufacturing, energy, health, and mobility markets.*

Strategies:

- i. Support deployment of new and emerging technologies in agriculture and agricultural research;
- ii. Promote and enhance the deployment of Information and communication technologies and other emerging technologies (e.g IoTs, Machine Learning, AI, Robotics) at all levels of government and across all communities in the country;
- iii. Promote the advancement in Biotechnology, Engineering, and Energy innovations;
- iv. Support smart environmental practices; and
- v. Facilitate the build-up of ICT infrastructure and key competencies in new technologies.
- vi. Make conscious effort to develop and use the new and emerging technologies in an ethical manner only;

3.8. INTELLECTUAL PROPERTY RIGHTS (IPR)

Objective 10: Strengthen Intellectual Property Rights (IPR)

Rationale: *There is a need to create and protect Intellectual Property Rights (IPR) and give recognition to inventors/innovators to stimulate the development of inventions as well as create wealth for Intellectual Property (IP) owners and the country.*

Strategies:

- i. Encourage the generation, protection, and effective management of Intellectual Property Rights to promote invention and innovation activities in the country;
- ii. Review and reinforce policy for the protection of intellectual Property Rights;
- iii. Facilitate the use of industrial and other property rights for the development of science and technology; and
- iv. Promote the culture of patenting in research.

3.9. FUNDING STI

Objective 11: Develop funding mechanisms/strategies to supplement the annual budgetary allocations

Rationale: *A robust cohesive financial landscape remains at the core of creating an STI-driven economy. The policy would work in tandem with the fiscal and industrial policies of the government to attract public as well as private sector funding contributions to strengthen the national STI ecosystem.*

Strategies

- i. Government to make adequate budgetary provisions based on the identified needs in achieving the objectives of the Policy and the Medium-Term Development Plan;
- ii. Create and expand STI financing landscape in public and private sectors;
- iii. Attract multilateral and/or bilateral donor funding support from the united national community;
- iv. Mobilize adequate financial resources through partnerships with NGOs, Development Partners (international, regional, and national), and private sector actors; and
- v. Establish a special fund dubbed “The National Research and Innovation Fund as a reliable STI funding sourced to supplement Annual Budgetary Allocation”.

3.10. SCIENCE ACCULTURATION

Objective 12: To make science, technology and innovation a way of life, means of daily living and engagement with work and business.

Rationale: *Provision and access to goods and services are becoming increasingly science and technology-intensive. Countries are therefore developing the capacities of their nationals to accept, adapt to and innovate with the changes that science and technology is forcing on the way people live.*

The country has not embraced science and technology and its benefits to any appreciable extent, especially in the way of life of its people. This lack of science and technology culture limits the application of STI in industry and hence, low productivity witnessed within the industrial system. At the social level, the country’s belief system portrays a lot of superstition as a common phenomenon that is most often attributed to some unseen factors. To reverse this trend and promote science and technology as a way of life, Government needs to harness all available resources to create public awareness of the benefits of science and technology and, to seek solutions to socio-

cultural and economic problems through the use of science, technology and innovation.

Strategies

- i. Facilitate the packaging of research findings to be disseminated by the mass media;
- ii. Facilitate the training of human resources in STI writing and communications; and
- iii. Popularize STI through the establishment, investment, and management of science museums, STI Fairs and Exhibitions to allow public participation in STI activities from all parts of the country.
- iv. Promote scientific thinking and problem solving through competitions and creativity Fairs
- v. Raise awareness among the general populace about the cardinal role of science, technology, and innovation (STI) in national economic development.
- vi. Inculcate in people the ability to create a positive environment for the production and utilization of new science, technology, and innovation (STI) knowledge.

3.11. INFORMATION COMMUNICATION TECHNOLOGIES AND DIGITAL SERVICES

Objective 13: To foster a transition to a digital economy

To greatly improve the lives of the general population by creating more connected societies, breaking technological barriers, making service delivery quicker and more efficient, and providing workable solutions to different challenges both locally and internationally.

Rationale: *Technological advancement has pervaded many activities and has enabled seamless service delivery for increased productivity and economic advancement across all sectors. The application of emerging technologies around the globe (including Robotics, Big data, Machine learning, virtual reality, GMOs, IoTs, AI, Blockchain, etc) cannot be over-emphasized. It is strategically important for the country to be connected to this wave of technological advancement to guard against digital colonization which may befall non-adopters.*

Strategies

- i. Build technological capability for national competitiveness;

- ii. Encourage interest and participation in critical domains including financial technology cybersecurity, data privacy, and security and advanced digital identification technology;
- iii. Promote digital contents in teaching and learning at all levels of education (e.g. e-learning);
- iv. Promote digitization of business and business-related services (e.g. e-commerce);
- v. Promote digitalization of government services (e.g. E-governance) and their access;
- vi. Promote access to broadband internets in schools and government offices;
- vii. Promote research and development in digital transformation systems; and
- viii. Enable creative industry design solutions for producing and packaging content and making it available to digital consumers.

3.12. STANDARDISATION AND QUALITY ASSURANCE

Objectives 14: To design systems for the enforcement of standards and quality assurance to ensure the competitiveness of goods and services; and ensure that all imported goods and services conform to requisite international and national standards.

Rationale: *Quality and standards are considered to be essential for rapid and sustainable industrial development due to the globalisation of trade among others. Sierra Leone depends on external markets for goods and services and also exports to the out markets. The standards adopted for these exchanges must be internationally acceptable.*

Strategies

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

3.13 SCIENTIFIC FREEDOM AND RESPONSIBILITY

As implied by the term "Scientific freedom and Responsibility," Sierra Leone acknowledges that open communication of findings, theories, and opinions is fundamental to its STI policy and scientific methods and, offers the best assurance of the objectivity and veracity of research findings.

Rationale:

The Government recognises the intense and rapid development of science and technology has had many benefits for economic, social and cultural rights. It therefore upholds the freedom to engage in scientific inquiry, to seek and share information, and to associate freely, including the freedom to participate in and benefit from scientific and technological advancements. However, the government also acknowledges that these Rights and Obligations go hand in hand, with the obligation of scientists to share their knowledge in the public sphere and the responsible practice of science.

Objectives:

Government to adopt the measures required to eliminate circumstances (such as threats, harassment and violence) and combat attitudes that foster inequality and discrimination which stifle the ability of researchers to freely promote science, whether in academia or elsewhere. This, when implemented fully, would help Sierra Leonean scientists to:

- i. Investigate, elucidate, and defend the scientific truth in the spirit of intellectual freedom, including protection from outside influences, *inter alia through appropriate monitoring mechanisms and the advancement of freedom of association*;
- ii. Encourage sharing of scientific information between researchers, decision-makers, and the public as much as possible, while being respectful of pre-existing rights;
- iii. Ensure adequate credit is given for contributions to scientific knowledge, while striking a balance between the preservation of intellectual property rights and knowledge sharing and open access, as well as protecting the traditional knowledge's system and products;
- iv. Conduct research in a responsible manner that respects human rights in particular, for transnational research involving human subjects;
- v. Promote the participation and contributions of persons with disabilities, including women who face multiple discrimination, in decision-making procedures concerning science; and
- vi. Raise public awareness to eliminate stereotypes that exclude women and other groups from science or adopting policies for both men and women to balance domestic life with scientific careers.

Strategies:

For all people and groups to be able to exercise their rights to scientific freedom and responsibility without discrimination, including based on religion, national origin, sex, sexual orientation and gender identity, race and ethnic identity, disability, poverty, and any other relevant status, the Government of Sierra Leone will ensure that:

- i. Scientist conduct pertinent research using top-notch scientific techniques in a manner that is consistent with the many other RS|SR rules (transparency, ethics, respect for human rights, etc.);
- ii. Peer review (based on accepted scientific quality standards) is a need for all scientific publishing, including publishing in open-access journals;
- iii. Special attention is given to the protection of women's free, and informed consent in treatments or scientific research on sexual and reproductive health;
- iv. Priority is given to scientific and technological innovations that serve especially the needs of persons living in poverty and ensure that these group of people have access to technological innovations;
- v. Children living in poverty, particularly those with disabilities, have full access and rights to participate in, and enjoy the benefits of scientific progress and its applications, as they are entitled to special care and assistance;
- vi. Local, traditional, and indigenous knowledge are respected for their self-determination, to both the educational and technological means, and also take all measures to respect and protect the rights of indigenous peoples, including the protection of the moral and material interests resulting from their knowledge, of which they are authors, individually or collectively; and
- vii. Genuine consultation is obtained for free, and informed consent whenever the State party or non-State actors conduct research, take decisions or create policies relating to science that have an impact on indigenous peoples or when using their knowledge.

CHAPTER 4 : FUNDING MECHANISM

Science, technology, and innovation activities and ventures are not cheap. There is a need for government to establish reliable funding mechanisms in addition to the normal annual budgetary allocations/appropriations. To that extent, additional funding sources must be initiated, articulated and embraced. Such STI funding sources would include the following:

- National R&D and Innovation funds
- Levies on private businesses, especially medium to large-scale businesses
- Donor/Development Partners Funds, Philanthropic and Diaspora donations would be strategically sourced

Other viable sources include:

- Venture capital funds;
- Intellectual Property Rights; and
- Taxes derived from other activities, like national lottery and betting ventures, etc.

The National Science Technology and Innovation Council would advise the government regarding the appropriate mechanisms to be adopted and implemented.

The Government acknowledges that the advancement of its society and the economy depend on adequate investments in R&D in Science, Technology, and Innovation. Thus, the government has agreed to establish reliable funding mechanisms in addition to the annual budgetary allocation/appropriations including the following:

4.1. NATIONAL R&D AND INNOVATION FUNDS (NRDIF)

Objective:

To provide a dynamic environment for research and development that will provide sufficient funding to produce qualified graduates, support innovative R&D, and cutting-edge goods and services to meet the demands of the economy and society at large.

Rationale: *At the moment, the government contributes most of the funding for research and development because of the weak industrial base. The government needs to establish a National Research and Development and Innovation Fund (NRDIF) to support not only research and development but also Innovations activities and provide a coordinated funding structure within the STI ecosystem.*

Strategies

- i. Government to ensure at least 1% of GDP is allocated and set aside to support Research and Development, Innovation in the major sectors of the national economy.
- ii. Create a fundraising scheme to augment government's allotment for research and innovation activities.
- iii. Establish and maintain other sustainable and trustworthy mechanisms to provide sufficient funding for R&D and Innovation activities in the country.

4.2. LEVIES ON PRIVATE BUSINESSES, ESPECIALLY MEDIUM TO LARGE-SCALE BUSINESSES

Objectives:

- i. To support government and enhance private sector spending on research, and development and innovation.
- ii. To enlist the private sector's involvement and contributions as a crucial partner in the drive for the nation's socioeconomic growth.

Rationale: *Through a variety of programmes, the private sector is urged to contribute to the financing of R&D and Innovation activities in Sierra Leone. Public-Private Partnerships (PPPs) is to be initiated as a significant method for implementing and nurturing R&D and Innovation. This is very practical for commercialising R and D endeavors. Independent businesses would be floated to fully commercialise the R&D outputs for significant innovations.*

Strategies

- i. Establish a tax incentive programme that is both appealing and prevents the national tax base from being undermined by those who donate to the established funds or directly to R&D&I operations.
- ii. Encourage the private sector to support funding for research and development (R&D), and innovation efforts, particularly to meet the needs of micro, small, and medium-sized businesses (MSMEs). For funding internal R&D and for transferring technology to or from national and foreign technology providers, MSMEs typically have limited resources.

4.3. DONOR/DEVELOPMENT PARTNERS' FUNDS, PHILANTHROPIC AND DIASPORA DONATIONS

Objectives

- To actively coordinate national engagement with NGOs and International Community to source funds to support R&D and innovation activities in the country.
- Attract and coordinate individual and collective remittances, or in-kind contributions such as human resource, including professional experience, technical expertise, contacts, and direct services to drive and influence R&D&I in the country.

Rationale: *Development partners provide arrays of opportunities for capacity building and access to resources which often are not available locally. Guidance provided by development partners have helped in developing local policies and facilities which have contributed significantly to development efforts in many developing countries. The Government recognises donor funds, philanthropy, and donations (private resources donated out of altruistic interest to advance human welfare) as one of the most familiar if least understood, aspects of diasporas' engagement with Sierra Leone. Better coordination is required in R&D because there are not enough resources available. The Ministry of Technical and Higher Education (MTHE) oversees regulating research projects carried out in public research institutes and institutions of higher learning. The MTHE knows that international cooperation is a major factor in most programmes, contributing to funding as well as guiding research initiatives. However, strategies and priorities would be developed in a more systematic approach to making better use of the limited available resources.*

Strategies

- i. Develop capacities to effectively engage with international development partners;
- ii. Review existing collaboration agreements, memorandum of understanding for performance and identify militating factors to take more effective advantage of collaborations;
- iii. Domestication and operationalization of potential collaborations that hold great potentials to advance national development aspirations;
- iv. Identify new potential partners and new areas of collaborations with the existing partners for exploitation;
- v. Ensure the availability, adequacy and timely release of counterpart funding wherever required to sustain collaborations;
- vi. Develop national quality assurance and compliance system that guarantees the confidence of partners in their relationship with various national bodies;

- vii. Encourage active participation of Philanthropists and Diasporas in STI programmes to generate funds for research projects;
- viii. Design workable mechanisms to encourage Donors/Development Partners, Philanthropists and Diasporas to play a central role in STI advancement in the country;
- ix.** Establish and strengthen a donor liaison office to co-ordinate all funds received from donors and development partners for accountability and transparency; and
- x.** Develop bankable proposals in line with national development goals and engage development partners (donor organisations, international non-governmental organisations and diasporas) support for implementation.

CHAPTER 5 : STI ADMINISTRATION AND GOVERNANCE

5.1. POLICY INSTITUTIONS

For effectiveness and better impact, the new STI Policy institutions focused on the ministry responsible for science, technology, and innovation. The institutions will include public commissions and committees on Science, Technology, and Innovation. Few of such institutions are highlighted as follows:

5.2. APEX STI BODY: NATIONAL SCIENCE, TECHNOLOGY, AND INNOVATION COUNCIL (NSTIC)

An apex STI body shall be established to ensure strong advocacy for STI in the country, to provide STI advice to the Ministry and the Office of the President, and to ensure effective coordination and harmonisation of the nation's STI policy and programmes. The body would serve as a 'Think Tank' institution, meant to provide the brain power for the strategic STI policy implementation and monitoring. The body would provide oversight functions for the activities of the Ministry and provide it with added space to influence STI policies in all sectors of the economy.

The Apex STI body to be established as STI Commission (or Council) composed of representatives of Sierra Leone's STI institutions including the government, research institutes, universities, the private sector (both formal and informal), and other relevant institutions. The Commission would be chaired by a distinguished scientist, engineer or technologist to be appointed by the President. The Commission would be limited to no more than 15 members to ensure it is able to operate efficiently. The Commission is to be supported by a small cadre of technical staff with expertise in STI policy analysis, formulation, implementation, monitoring, and evaluation.

The apex STI body shall liaise with the MTHE, the Ministry responsible for STI to ensure that the following STI management functions are performed:

- i. Provide advice to the President and Ministry on STI policy formulation and program design/implementation so that they can best serve the specific needs of the country;
- ii. Provide STI advocacy, to ensure the voice of the country's STI community is represented in the country's programmes and policies at all levels;
- iii. Ensure coordination and harmonization of the country's STI policies, and activities are comprehensive, complementary, and reinforced across all sectors and ministries;
- iv. Provide monitoring and evaluation of the implementation of the STI policy, to ensure that the activities initiated are for the benefit of the Sierra Leonean people. In this regard, a body (or bodies) of experts will be set up under the STI Apex Body to monitor the implementation of STI policy plans and activities.

- v. Maintain a liaison office to work with the Parliamentary Committee responsible for Science, Technology, and Innovation so that the legislative arm of government is fully appraised of the need to prioritise STI Policy implementation and provide required supporting legislations

The MTHE is to be further restructured to ensure that it acquires the necessary capacity and capability to review, formulate and spearhead STI policy and strategy. In this regard, the National Science, Technology, and Innovation Council (NSTIC) would be reorganised into a Commission with a legal mandate to be fully involved in policy development, priorities identification, and resource mobilization for STI. The body is to be the main agent through which the Ministry responsible for Science and Technology will implement the strengthened STI performance management framework. A key component of this initiative is to ensure that there is alignment between the country's STI goals and the operational plans of the various Ministries and Agencies of government. This will be pursued through active Inter-agency Council whose main mandate is the development of Sectoral Technology Plans and the monitoring of their performance /evaluation. The Commission would have a Board comprising the public and private sectors to oversee its operations.

5.3. THE POLICY IMPLEMENTING INSTITUTIONS

Sectoral policy and implementing institutions would be reviewed to focus on key growing areas as identified in the policy and also, to ensure it operates within a national system while providing the necessary autonomy to accomplish its sectoral mandates. An office is to be set up within the Commission to spearhead the country's technology search and acquisition efforts in support of all sectors of the economy.

The nation's R&D efforts/activities shall continue to be performed essentially by public and private universities. In addition, concerted efforts would be made to encourage private firms including multi-nationals, to invest in R&D through a variety of measures and mechanisms. The country would strive to actively build international centers of excellence in national strategic STI priority areas to strengthen STI capacity and capability within the country.

5.4. REGULATORY INSTITUTIONS

A number of regulatory Agencies and mechanisms would be set up or strengthened to ensure that STI activities in the country are carried out within acceptable ethical and social values. In this regard, a Research Approval & Surveillance Council (RASC) would be set up under MTHE to ensure that research approvals are rapidly undertaken and that surveillance is adequately strengthened.

5.5. POLICY AND PROGRAMME INTERLINKAGES

To effectively develop, implement, and evaluate policies and programs related to science, technology, and innovation (STI), both domestic and international linkages

are necessary. International networks and collaborations would aid the adoption of global best practices and standards to enhance Sierra Leone's STI data comparability, as well as boost its ranking and performance in global benchmarks. Domestically, such linkages entail forming networks within and between departments and ministries (horizontally), as well as between the state and its constituent regions (vertically), to ensure effective policy and program implementation.

Inter-Sectoral Linkages: The existing policies would be interlinked across the sectors by creating systematic synergy between scientific and socio-economic ministries and departments. By doing so, shared ownership, equal responsibility, and complementarity would be created among various ministries, departments, funding bodies, and implementing agencies. Such interlinkages shall be institutionalised for long-term benefits.

5.6. INSTITUTIONAL ARRANGEMENTS

The Ministry of Technical and Higher Education (MTHE) is to coordinate the implementation of the STI plan in Sierra Leone. Several programmes and projects within the STI plan are to be implemented under the line Ministries, Departments and Agencies, the Academia, and the Private Sector. MTHE shall develop partnerships and networks among different stakeholders through the creation of Technical Working Groups to steer and oversee STI plans, programmes and projects. MTHE is to spearhead the establishment of Systems and Processes like the preparation of annual STI budget, STI plans, and programmes to enable the roll-out of the STI projects across all sectors of the economy.

5.7. LEGAL AND REGULATORY ARRANGEMENTS

The legal and regulatory arrangement for the policy within the articulated context of the Institutional Framework is essential for both investment and sustainability. Based on the Institutional Arrangements outlined in subsection 6.1, which includes Research Institutions, Academic Institutions (Universities, NCTVA accredited institutions/schools), relevant MDAs such as the Ministries of Health, Mining, Agriculture including SLARI, Education, Environment, Tourism, Water Resources, Transport and Aviation and Finance, DSTI, and Sierra Leone Standards Bureau all have their legal and regulatory frameworks embedded in the different Acts of Parliament.

The dawn of the STI Policy would usher in the creation of new institutions such as the National Science, Technology, and Innovation Council, which ordinarily would require new laws for their *modus operandi*. The Legal and Regulatory Framework which aligned the STI policy to SDGs and other international benchmarks would foster greater involvement of all the key stakeholders. Within the legal frameworks, the policy would ensure the following:

- Laws relating to research, technological development, and innovation would be established or reviewed accordingly;
- Government and stakeholders would ensure that the handling, manufacturing, and disposal of hazardous chemicals and waste are improved to protect lives and the environment;
- The government would ensure that researchers and participants in a clinical trial are ethically protected;
- Promotion of the simplification of the legal and regulatory environments regarding business establishment and operations are encouraged;
- Appropriate Regulatory Frameworks would be established to protect research focus/subjects in STI; and
- Improved international co-operation to enhance the STI legal system.

Strategies

The Government of Sierra Leone would ensure the implementation of the following strategies to achieve the objectives of the policy:

- Improve the level of enforcement of the National Disaster Management Agency Act, 2020 [No. 3 of 2020] an Act to provide for the establishment of the National Disaster Management Agency to manage disasters and similar emergencies throughout the country;
- Enforce labour laws to protect scientists, researchers, and industrial workers from exposure to hazardous materials;
- Promulgate and align laws that would strengthen Sierra Leone's research system to facilitate international cooperation;
- Incorporate Intellectual Property Rights (IPR) in the curriculum at the various levels of education to improve awareness;
- Review and reinforce The Education Act, 2004 [No. 2 of 2004] to reform the education system, including provision for pre-primary education, technical and vocational training, adult and non-formal education, and the role of universities; and to provide for other related matters;
- Reinforce the Human Rights Commission of Sierra Leone Act, 2004;
- The Legal Practitioners Act, 2000 [No. 15 of 2000] to consolidate and amend the law relating to the admission, enrolment, practice, and discipline of legal practitioners and to provide for matters incidental to or connected with the foregoing; and
- Redesign the overall legal framework to align with international standards.

CHAPTER 6 : MONITORING AND EVALUATION FRAMEWORK

6.1. PERFORMANCE MANAGEMENT FRAMEWORK

Effective, expeditious, and transparent performance management mechanisms are necessary in securing the success and impact of STI initiatives and programmes. To this end, the Government would:

- Ensure the development of a comprehensive performance management framework linking programme outcomes to the long-term impacts of the Policy.
- Develop, implement and strengthen science-based monitoring and reviewing mechanism.

6.2. SETTING TARGETS

Under the National Science, Technology, and Innovation Council, all Agencies and organs would have specific performance targets to ensure adequate coordination of efforts. It is also expected that the results of such efforts would bring positive outcomes to the Sierra Leonean people.

6.3. MONITORING

Objective: Monitoring and evaluation activities conducted in relation to the STI policy shall be:

- i. To ensure close alignment of implementation and policy objectives
- ii. To optimise the use of all resources committed to the policy
- iii. To provide inputs for redesign of policies, programs, resource allocation frameworks and mid-term policy review

To realise the policy objectives, the following activities would be undertaken:

- Designing the monitoring and evaluation indicators at all levels of implementation
- Carrying out continuous data collection, analysis, and periodic reporting to the Ministerial Management Steering Committee
- Carrying out random inspections and making objective observations
- Conducting specially designed surveys and rapid assessments to evaluate progress
- Carrying out participatory M&E
- Establishing Work Improvement Teams (WIT) in the respective implementing Agencies

- Facilitating independent assessment and reviews of the programmes under implementation in the implementing Agencies.

The implementing Agencies are expected to submit periodic review reports to the Inter Agency M&E steering committee. These reports would be reviewed regularly against the indicators to ensure steady and positive progress.

6.4. EVALUATION

The policy and its strategies would be evaluated during and after specified implementation period to ensure that it produces the intended results. The policy would also be subjected to independent evaluation, mid-term and post implementation to remove any element of bias.

Evaluation will examine the inputs, activities, outputs, outcomes and impacts regarding the STI Policy implementation. It will be conducted at regular intervals and will aim at understanding how the policy was implemented, determining barriers and facilitators of implementation; demonstrating the outcomes and impacts, and informing future policies. The performance of the policy and the implementation action plan would be reviewed periodically along the following dimensions:

- Speed and extent of implementation of programmes and projects identified;
- Increased proportion of technology-based growth in Sierra Leone's wealth creation efforts;
- Performance of businesses in terms of their utilisation of science, technology, and innovation;
- The extent of creation of new technology-based growth sectors;
- Increase in the number and value of local patents as well as their contribution to world's patents' pool;
- Increased innovative efforts of Sierra Leone's STI sector;
- Enhancement of Sierra Leone's STI potential;
- Increased STI human capital; and
- Increased contribution of STI to improvements in the quality of life of Sierra Leoneans

Government would make deliberate efforts to objectively assess Sierra Leone's STI policy performance along the dimensions highlighted above, using internationally acceptable, but locally relevant indicators.

6.5. POLICY PLANNING, MONITORING, AND EVALUATION DIRECTORATE

There shall be a National Monitoring and Evaluation Directorate (NaMED) responsible for putting mechanisms in place for continuous monitoring and timely evaluation of the policy and programmes implementation. These activities are critical to ensuring the policy objectives are getting translated into the expected outputs, outcomes, and impacts. Stakeholders' feedback and adaptation mechanisms would be incorporated to fine-tune the policy/program implementation strategies.

CHAPTER 7 : CONCLUSION

This policy is the outcome of a broad-based participatory process that involved key stakeholders from many backgrounds. The strategic objectives that the policy seek to achieve and actualise have been made and strategies to implement the objectives have also been articulated. It is the instrument that Sierra Leone would use to realise the deployment of STI in National Development Plans. Quite deliberately, it was not designed as a stand-alone policy but forms part and parcel of the country's core regimes. It is envisaged that it would enable the country to domesticate global, continental and regional strategies in Science, Technology, and Innovation (STI). Going forward, the policy should form the basis on which Sierra Leone will engage in international and bilateral co-operations and collaborations on STI.

Broadly, the policy serves as the foundation for the deployment of science, technology, and innovation in support of the Sierra Leone's developmental goals. The policy does not only envisage the processes and channels for the development of science and technology but also emphasised all-round societal development as the goal of science and technology engagement.

Finally, the policy would actively seek and engage with the international development partners, NGOs and Donor Agencies as well as Sierra Leoneans in Diaspora in all of its core objectives for the benefit of the people of Sierra Leone.

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