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MINISTRY OF HIGHER EDUCATION, RESEARCH, SCIENCE AND TECHNOLOGY

DRAFT NATIONAL SCIENCE, TECHNOLOGY AND INNOVATION POLICY
(2015 – 2024)

*Harnessing Science, Technology and Innovation for A More Vibrant
and Sustainable Socio-economic Growth and Development*

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1 ABBREVIATIONS

ACE	Africa Coast to Europe
AENR	Agriculture, Environment and Natural Resources
ARIPO	Africa Regional Intellectual Property Organization
BMI	Body Mass Index
CIAM	Centre for Innovations against Malaria
DSTI	Directorate of Science, Technology and Innovation
ECOPOST	ECOWAS Policy on Science and Technology
ECOWAN	ECOWAS Wide Area Network
ECOWAS	Economic Community of West African States
ENWARCA	Educational Research Network for West and Central Africa
EPI	Expanded Programme on Immunization
FDI	Foreign Direct Investment
FTE	Full-Time Equivalent
GAMTEL	Gambia Telecommunications Company
GBoS	Gambia Bureau of Statistics
GDP	Gross Domestic Product
GEAP	Gambia Environment Action Plan
GIEPA	Gambia Investment and Export Promotion Agency
GERD	Gross Expenditure on R&D
GESDRI	Gambia Economic Social Development Research Institute
GPTC	Gambia Public Transport Corporation
GRI s	Government Research Institutions
HEI s	Higher Education Institutions
HIV-2	Human Immune-Deficiency Virus-2
ICT	Information and Communications Technology
ICT4D	ICT for Development
IHR	International Health Regulation
IPCC	Intergovernmental Panel on Climate Change
IPR	Intellectual Property Rights
ISESCO	Islamic Educational, Scientific and Cultural Organization
ISP	Internet Service Providers
ITC	International Trypanotolerance Centre
KEI	Knowledge Economy Index
KI	Knowledge Index
KIST	Kanilai Institute for Science and Technology
LBS	Lower Basic School
LGA	Local Government Area
M&E	Monitoring and Evaluation
MICS	Multiple Indicator Cluster Survey
MNC s	Multinational Cooperations
MoHERST	Ministry of Higher Education, Research, Science and Technology
MRC	Medical Research Council
MSME	Micro, Small and Medium Enterprises
MSTQ	Metrology, Standards, Testing and Quality
NaNA	National Nutrition Agency
NaRDC	National Research and Development Council

NARI	National Agricultural Research Institute
NaSTIC	National Science, Technology and Innovation Centres
NCAC	National Centre for Arts and Culture
NCD	Non- Communicable Diseases
NCSTI	National Council for Science, Technology and Innovation
NEMA	National Environment Management Act
NGO	Non- Governmental Organization
NICI	National Information and Communication Infrastructure
NEMC	National Environment Management Council
NSTIP	National Science, Technology and Innovation Policy
NTB	National Technology Board
PAGE	Programme for Accelerated Growth and Employment
PMF	Performance Management Framework
PPP	Purchasing Power Parity
PPPs	Public-Private Partnerships
PRSP II	Poverty Reduction Strategy Paper II
RDC	Research Development and Commercialization
RFM	Recurrent Funding Mechanism
SMEs	Small and Medium Enterprises
SOPs	Standard Operating Procedures
SSS	Senior Secondary School
STEM	Science, Technology, Engineering and Mathematics
STI	Science, Technology and Innovation
TB	Tuberculosis
TNCs	Trans national Cooperation's
TVET	Technical and Vocational Education and Training
UBS	Upper Basic School
UIS	UNESCO Institute of Statistics
UN	United Nations
UNECA	United Nations Economic Commission for Africa
UNESCO	United Nations Educational, Scientific and Cultural Organization
UTG	University of The Gambia
VTC	Vocational Training Centre
WARCIP	West African Regional Communication Infrastructure Programme
WB	World Bank
WHO	World Health Organization
WIPO	World Intellectual Property Organization

2 EXECUTIVE SUMMARY

The National Science, Technology and Innovation Policy (NSTIP) of The Gambia describes a ten-year (2015 – 2024) programme to move The Gambia into a more vibrant and sustainable socio-economic development-oriented nation by effectively utilizing Science, Technology and Innovation (STI) for improved quality of life for all Gambians. This policy consolidates the actions of Gambia Government in ensuring that STI features effectively in the country's overall development agenda. For this policy, Science, Technology and Innovation are conceived separately as three distinct but interrelated concepts:

- Science is the means of understanding the natural environment and systematic pursuit of knowledge;
- Technology is the application of scientific knowledge to control and exploit the environment for the development and improvement of the quality of life;
- Innovation is the process of creating or generating efficient and novel approaches, processes, services, ideas, technologies and/or products for development purposes or adding value to existing ones for improved performance.

The policy articulates the nation's common objectives and commitment to create synergy for the development and effective utilization of STI for the socio-economic transformation of The Gambia and its increased integration into the world economy. It is erected on two fundamental foundations, namely STI for Development and Policy for STI that will ensure that STI is mainstreamed into, embraced and implemented by all ministries, government agencies, private sectors and other relevant stakeholders. This policy embodies the need for harnessing STI in the context of a broader socio-economic transformation programme.

The two foundations expressed above embody nine strategic pillars that will provide the coordinating and supporting mechanisms to train, attract and retain a high-quality critical mass of scientists, engineers, researchers and innovators as well as develop and maintain an appropriate and efficient national STI ecosystem in the form of institutions, mandates, management, personnel, funding and deliverables.

An integral part of this policy deals with policies and strategies to enhance education and research for capacity building in STI and related domains through funding, provision of grants, transmission and diffusion of STI knowledge into active economic sectors, industry and communities for continued and sustained socio-economic growth and improved quality of life for all Gambians.

Each of the strategic pillars is elaborated in the form of policy statements, objectives and strategies. This is preceded by a general analysis of the situation of STI in the country, and incorporates pertinent issues and challenges in each of the sectors such as health, transport, education and training, agriculture and tourism.

The development and implementation of this policy is geared towards creating a more vibrant and sustainable socio-economic development consistent with Vision 2020 and Programme for Accelerated Growth and Employment (PAGE).

CHAPTER 1: INTRODUCTION

1.1 Background

The Gambia is located on the West of Africa, and extends inland for about 400 kilometres along the banks of the River Gambia, which divides the country into two parts, with widths varying from 24 to 28 kilometres. It covers an approximate land area of 11,000 square kilometres. The country has a culturally diverse society with a high degree of ethnic, racial, and religious tolerance.

The country has a population density of 135 people per sq.km¹ ranking number 74 out of 230 countries ranked from countries with highest to lowest population density. The country's dynamics of population vulnerability is demonstrated in its population statistics. The Gambia's projected population is estimated at 1.79 million with an annual growth rate of 2.74%².

According to the Population and Housing Census (2003), the population constitutes 50.2% female and 49.8% male. This population also demonstrates a youthful Gambia with about 44% of the population below 15 years of age, 24% between 10 and 19 years old, and 19% between 15 and 24. Only 3.4% of the population was 65 and over.

The crude birth rate is 38 per 1000 population while the total fertility rate is 4.8 births per woman³. The high fertility level has resulted in a youthful population structure. Data from the 2003 population household survey also revealed higher poverty rates for households with children aged 5 and under, young adults aged 20 to 24 and seniors aged 54 to 65 years. Data on populations per age group demonstrated that over 60 % of children and youth below age 20 were classified as poor, constituting 18.9% of the poor population. The population aged 60 and above has the highest poverty rate and constitutes 4.9% of the population.

The Gambia's Human Development Index (HDI) was valued at 0.420 in 2011, ranking at 168 out of 187 countries and territories, a marked improvement from 0.360 in 2000. The average annual growth rate for the country's ranking from 1980 to 2011 is 1.4%. The 2011 HDI of 0.420 is below the average of 0.456 for countries in the low human development group and below the average of 0.463 for countries in Sub-Saharan Africa. Average life expectancy has also decreased during the census period from 63.4 years in 2003 to 58.5 years in 2011⁴.

The Gambia has an overarching ambition of becoming a developed nation by the year 2020. A central challenge towards the attainment of the nation's Vision 2020 goal is that of

¹WHO Country Cooperation Strategy 2008—2013, WHO Regional Office for Africa, 2009: 02

²Gambia Bureau of Statistic (GBoS) 2011 estimates

³UNICEF State of the World's Children Report 2013

⁴UNDP Human Development Report, 2011

transforming the country into:

... a trading, export-oriented agricultural and manufacturing nation, thriving on free market policies and a vibrant private sector, sustained by a well-educated, trained, skilled, healthy, self-reliant and enterprising population and guaranteeing a well-balanced ecosystem and a decent standard of living for one and all...⁵.

This challenge underscores the important role of STI in our national development agenda. Realizing that STI is critical in propelling the socio-economic landscape of the nation, it is imperative that it be strengthened and mainstreamed into all sectors and at all levels of the national development agenda. STI should be pervasive and should touch the lives of every Gambian.

The commitment of The Gambia to harness, utilize and advance STI is reflected in the establishment of the Ministry of Higher Education, Research, Science and Technology (MoHERST) in 2007, University of The Gambia (UTG) in 1999, the formulation of PAGE 2012 – 2015 and the Presidential Declaration of 2012 as the Year of STI in The Gambia. The various programmes that will be implemented under the above initiatives include the enhancement of national capacities and capabilities in various sectors, which will accelerate the advancement of STI in the country.

Moving ahead in an era fraught with uncertainties and intense global competition, a “business as usual” approach will not work. Therefore, concerted efforts are required through a well-coordinated and participatory approach to deal with these uncertainties. In ensuring this, the NSTIP will be aligned as part of its short-term plan to help in achieving some key objectives of PAGE. Notably, the NSTIP will be based specifically on the first pillar of PAGE (Accelerating Economic Growth) through the strengthening of the country’s main economic sources; and generally, in the longer term, through the adoption of a wider innovative approach towards mainstreaming STI in all walks of life. This policy is aligned to Africa’s Science and Technology Consolidated Plan of Action (2005) and the ECOWAS Policy on Science and Technology (2012)⁶ so as to factor common regional and continental concerns as well as relevant international policies and programmes.

1.2 Conceptual Framework of National Science Technology Innovation Policy (NSTIP) Development

The development of The Gambia NSTIP was conducted in eight key stages and was informed by studies, international best practices, lessons learnt within The Gambia and from other countries, desk reviews, national and international policies as well as other instruments.

⁵The Gambia Incorporated Vision 2020

⁶ECOWAS Policy on Science and Technology (ECOPOST), 2012

1.2.1 Feasibility Study

In response to a request made to United Nations Educational Scientific and Cultural Organization (UNESCO) by The Gambia Government, a team of experienced scientists from UNESCO and Islamic Educational, Scientific and Cultural Organization (ISESCO) visited The Gambia in November 2012 to conduct a feasibility study of the country's potential in setting up a Science Park and Incubation Centres. This team recommended the formulation of an STI policy for the country that will facilitate the development of legislation, education programmes, networks and markets for technology-based products.

1.2.2 Case Studies

The national STI policies of other countries, such as Rwanda, Uganda, Thailand, Ghana, the Dominican Republic, Finland and Malaysia, were used as reference material to develop this policy. Study tours to Rwanda and Ghana were conducted to learn from their country experiences and expertise in the development of their STI systems with the main focus on: infrastructure and institutions, management, policy and programme priorities, STI capacity building, STI funding, coordination and sustainability.

In 2008, there were national consultations that led to the development of a Draft NSTIP. In addition, personnel of MoHERST and other stakeholders received training in STI policy formulation, both nationally and internationally.

1.2.3 Establishment of the National STI Core Team

A national STI Core Team was set up in January 2012 to lead the development process of an NSTIP for The Gambia. In order to develop a coherent and all-inclusive NSTIP for socio-economic and technological development of the country, the team held a retreat to discuss the status of STI in various sectors of the economy. Following this, various committees were set to facilitate the participation of stakeholders and to receive input from the public and private sectors. The product of the series of activities that ensued was the first draft NSTIP.

1.2.4 National Stakeholders' Consultative Meetings

Following the preparation of a draft NSTIP, national consultative meetings were conducted to provide all stakeholder groups with the opportunity to interact with the Draft NSTIP and review the policy chapters submitted by the committees for their suggestions and recommendations to be considered for incorporation into the policy document.

1.2.5 National STI Conference and Exhibition

A National Conference and Exhibition on STI was held in December 2012 to provide stakeholders with more opportunity to review the Draft NSTIP to ensure, among other things,

that national priorities and needs are well articulated.

1.2.6 National Reviews

In addition, the Draft NSTIP was shared with national stakeholders for more thorough review both before and after the National STI Conference.

1.2.7 International Review

The Draft NSTIP was shared with renowned international organizations such as the WB, UNESCO and OIC's Standing Committee on Scientific and Technological Cooperation (COMSTECH) for further review and to be aligned with international policy dimensions. The comments and suggestions received were incorporated into the Draft NSTIP, and this policy is aligned to Africa's Science and Technology Consolidated Plan of Action (2005) and the ECOWAS Policy on Science and Technology (2012) to factor common regional and continental concerns as well as relevant international policies and programmes.

1.3 Situational Analysis

The Gambia's goal to transform into a middle-income generating country requires a foresight that will bring together all the sectors under one comprehensive policy that will have an impact on the economy, population, health, education, environment and all the other sectors. This is achievable through the NSTIP presented in this document that will facilitate the harnessing of all potential capacities of STI to achieve national objectives for poverty reduction, competitiveness, sustainable environmental management and industrial growth.

Therefore, to achieve the country's goal to accelerate growth, create employment and reduce poverty, the Gambia Government has developed and is implementing PAGE as the nation's development strategy for the period 2012-2015. It replaces the Poverty Reduction Strategy Programme II (PRSPII) and is designed to address some of the important lessons learnt from the implementation of its investment programmes and also build on its achievements.

In this regard, it is noted that the Multidimensional Poverty Index (MPI) indicates that 32.4% of The Gambia's population live below the \$1.25/day poverty line⁷. According to the PAGE strategy document, 57% of the population live below the \$2/day poverty line. The index estimates the national poverty line at 61% in 2010. The percentage of the population considered multi-dimensionally poor is higher in the rural than in urban areas.

However, despite the recent global economic crisis, the Gambian economy has managed to sustain noteworthy growth with low inflation over the past few years. Real Gross Domestic Product (GDP) growth is reported, on the average, to be 6% for the past years which is attributed

⁷UNDP Human Development Report, 2011

primarily to the growth in agriculture and the services sectors.

As a result, strategies for the main productive sectors, namely Agriculture and Industry and related sectors, have been well articulated to address the nation's goals⁸. This is necessary because the agriculture sector is the largest and the main sector of the country's economy with the highest contribution to GDP of about 28- 30%⁹.

Agricultural activities in the country primarily focus on crop cultivation and animal rearing. The sector provides employment to about 75% of the population and its share of the country's total export is 70%, thus constituting a substantial part of The Gambia's foreign exchange earnings. Agriculture is also the principal means of income earning for rural households who fall below the poverty line. About 91% of those classified as extremely poor and 73% of those considered poor work in the agriculture sector. At the same time, the sector is regarded as the prime sector for investment to raise income, improve food security and reduce poverty. In spite of the unimpressive performance of this sector over the years, The Gambia enjoys comparative advantages for lowland rice, groundnuts, coarse grain and cotton, as well as for vegetable production. In addition, other sub-sectors contribute to the agricultural GDP, namely the livestock sub-sector (33%), groundnuts (23%), other crops (43%), fisheries (3%) and forestry (2%)¹⁰.

It is, therefore, imperative to provide farmers with adequate support, including the provision of relevant up-to-date technical information to build their capacity and add value to productivity. Consequently, extension services should give priority to appropriate modern technologies and farming techniques.

Closely associated to the agriculture and natural resources sector is the largely under-utilized River Gambia, which has a tremendous potential as a source of irrigation that can contribute to the modernization and diversification of agriculture, and consequently to the reduction of farmers' vulnerability to erratic climate conditions, thus contributing to poverty reduction. This is possible because most of the eastern part of The Gambia consists mainly of freshwater, although intrusion of salt water into these areas is a concern. Equally important is that the River Gambia has great possibilities to provide alternative, and perhaps more efficient, local transportation that can enhance the movement of people and goods within the country¹¹.

Therefore, the Agriculture and Natural Resources (ANR) and The Gambia National Agriculture Investment Programme (GNAIP) combined policy, institutional infrastructure and related measures are designed to address the multiplicity of issues and supply side constraints to enhance the growth of The Gambia's agriculture.

⁸Programme for Accelerated Growth and Employment (PAGE) 2012-2015

⁹Agriculture and Natural Resources (ANR) Policy 2009-2015

¹⁰Gambia National Agricultural Investment Plan 2011—2015

¹¹Programme for Accelerated Growth and Employment (PAGE) 2012-2015

The overall objective of ANR/GNAIP is to increase the contribution of the agriculture and related sub-sectors to the national economy. This is partly achievable by increasing productivity through commercialization and active private-sector participation predicated on a sound macroeconomic framework aimed at enhancing growth and employment creation. In addition, there are programmes to facilitate and strengthen the productive capacity of small and medium-scale farmers in order to promote large-scale farming and the development of agribusiness.

Other productive sectors also contribute to poverty reduction. The fisheries sector presently contributes 12% to the GDP¹². There is a growing concern over the observed declining state of fish resources and catches at the national level, which is attributed to increases in fishing capacity in the industrial sector and irresponsible fishing practices employed by fishing trawlers and foreign artisanal fishermen.

There are over 500 marine fish species in The Gambia's territorial waters which are usually classed as demersal and pelagic. The demersal fish are apparently being over-exploited. A more rigorous management to limit the fishing capacity (levels extracted) in the industrial sub-sector and enhance the artisanal fisheries sub-sector is, therefore, required to sustain and increase the fisheries sub-sector's contribution to the economy¹³.

Other areas where the application of STI has the potential to increase GDP include the petroleum sub-sector. Currently, this sub-sector entails two areas: the upstream that deals with the exploration, development and production aspects, and the downstream that is concerned with the refining, storage, marketing and transportation of petroleum products. In the upstream, more than 5000 km of 2-D seismic data and 3000 sqkm 3-D have been obtained. The results of these seismic surveys show potential prospects of petroleum resources in the country¹⁴.

Additionally, the country imports its petroleum products, which has put undue pressure on its budget. The affordability of liquefied petroleum gas (LPG) is one of the reasons nearly 90% of residents in the country cook with either charcoal or firewood¹⁵.

The Gambia has limited capacity to exploit the available energy resources. The mode of electricity generation and its associated cost requirement and the limited investment from the private sector have made it difficult to provide adequate and reliable electricity supply to support the ongoing socio-economic activities of the country¹⁶. The good news is that studies have shown that the country has high solar and wind-generated energy potentials and, therefore, one sure way

¹²Republic of The Gambia National Report to RIO+20 Summit 2012

¹³Programme for Accelerated Growth and Employment (PAGE) 2012-2015, 2011

¹⁴Programme for Accelerated Growth and Employment (PAGE) 2012-2015, 2011

¹⁵United Nations Development Assistant Framework, UNDAF 2012-2016, 2011

¹⁶Programme for Accelerated Growth and Employment (PAGE) 2012-2015

of addressing the high electricity tariffs is to harness the renewable energy potential of the country¹⁷. For that reason, an all-inclusive NSTIP will enhance the energy sector.

In the area of other equally important sectors, the government is working to improve conditions and create opportunities for their effective contribution to national development. In the case of the trade, industry and entrepreneurship sector, the 2011 Annual Report from the Ministry of Trade, Employment and Regional Integration (MoTIE) entitled Annual External Trade Statistics Review indicates that The Gambia's external trade for 2011 rose significantly relative to the 2010 values.

In nominal terms, the values increased from D9.71 billion in 2010 to D13.32 billion in 2011, representing an increase of 37.2%. Both the values of imports and exports increased significantly by 27.1% and 83.7% respectively. Because the country imports far more than it has the capacity to export, its trade balance again worsened by 11.4%, from D6.24 billion in 2010 to D6.96 billion in 2011. The share of exports as a percentage of total trade increased from 17.8% in 2010 to 23.9% in 2011 with domestic exports representing 29.5% of the total exports in 2011¹⁸.

The value of The Gambia's total imports increased significantly from D9.71 billion in 2010 to D10.14 billion in 2011, representing an increase of 27%. The country's trading partners remain the same. The European Union (EU), Economic Community of West African States (ECOWAS) and Asia continue to be the main source of The Gambia's imports. The share of imports from the ECOWAS region increased from 23% in 2010 to 28% in 2011 due to the increase in the value of imports of petroleum products and cement. Imports from the EU continue to be strong, accounting for 25% of the value of total imports in both 2010 and 2011. The share of imports from Asia and the Americas dropped slightly from 27% and 14% in 2010 to 23% and 12% in 2011 respectively.

The current entrepreneurship and innovation environment needs more support to develop entrepreneurs who could eventually create more businesses and more employment for Gambians. As of February, 2012, there were 13 commercial banks and more than 100 microfinance institutions. However, the types of financing provided are inadequate. This reality leaves a critical gap in the financial sector necessary for the promotion of entrepreneurship and innovation as well as the development of high-tech industries. Most of the businesses in The Gambia are micro and small enterprises, which are predominantly informal and engaged in traditional ventures such as retail trading or semi-skilled jobs. Most of these enterprises are in business to get their daily sustenance rather than to innovate and grow, hence their survivalist tendencies. In addition, there is an inadequate capacity to innovate in the area of industrial development, although innovation and the use of state-of-the-art technology in businesses, especially by micro, small and medium enterprises (MSMEs) in The Gambia, continue to develop.

¹⁷Public Utilities Regulatory Authority, Annual Report 2012

¹⁸ Annual External Trade Statistics Review, 2011, MoTIE

New tax reforms which are initiated and being implemented by the GRA are aimed at increasing efficiency in tax administration. These new reforms will, among other things, enhance the use of STI in tax administration. The efficiency measures will attract investors in STI-related activities.

The success of such STI-related activities is important to extend and raise the quality of life of Gambians. This is vital because in 2011, the country's infant mortality rate was 58/1000 live births, and the under 5 mortality rate was 101/1000¹⁹. The major causes of mortality in infants (0-12 months) include neonatal sepsis, premature deliveries, malaria, respiratory infections, diarrhoeal diseases and malnutrition. For child mortality, the main causes are malaria, pneumonia, malnutrition and diarrhoeal diseases. Malnutrition continues to be a major public health problem in The Gambia. The Maternal Mortality Ratio is estimated at 360/100,000 live births, the majority of which are due to sepsis, haemorrhage and eclampsia²⁰.

In addition, the health sector continues to be faced with numerous challenges. Tuberculosis (TB) remains a disease of public health importance in The Gambia, and in recent years, the case notifications of all forms of TB have markedly increased. For example, the total number of all forms of reported TB cases fluctuated from year to year with 2241 reported in 2012 compared to 2249 in 2011 and 1962 in 2010. However, there was a consistent increase of new cases per year with 1344 reported in 2010, 1375 in 2011 and 1429 in 2012²¹.

The health worker population ratio in 2012 is as follows: Doctor, 1:9899; Midwife, 1:4907; Nurse, 1:3066; Public Health, 1:16818; Laboratory Staff, 1:12285²².

In view of the challenges that beset the health sector, there are interventions aimed at reducing the disease burden in the form of disease surveillance, improved treatment regimens and the use of modern scientific research tools to improve the health condition of the population.

In the financial sector, the tourism industry, trade and transport sectors as well as energy and telecommunications sectors also contribute their quota to the GDP in spite of the numerous challenges that they face. Data on tourism's contribution to the GDP has varied from different sources. For example, in 2004, the World Tourism Organization (WTO) estimated that The Gambia tourism industry's contribution to the GDP was 13%, in contrast to the 16% calculated by the World Bank in 2005²³.

As a result of this, tourism, which contributes 12% to the GDP,²⁴ is one of the country's major sources of employment, providing, on the average, 16, 000 formal and informal jobs. The sector

¹⁹ UNICEF State of the World's Children Report 2013

²⁰UNICEF State of the World's Children Report 2013

²¹The MoHSW Report to Cabinet, March 2013

²² The MoHSW Report to Cabinet, March 2013

²³A Business Plan for the Development of Tourism 2010

²⁴Agriculture and Natural Resources (ANR) Policy 2009-2015

projects to put more emphasis on destination marketing and product development with the objective of increasing employment and revenue²⁵.

For many years, The Gambia as a tourism destination has relied mainly on the sun, sea and sand. Therefore, there is a need to diversify away from this form of tourism to include cultural and event tourism, eco-tourism, agricultural tourism and other forms of tourism. In this regard, there is also a need to strengthen capacity in terms of personnel and infrastructure for quality service delivery.

Mathematics and English are relevant in that they are prerequisites for undergraduate programmes, for example at the UTG, that would lead to the production of human capital in critical STI subjects such as medicine and allied health science, computer science, natural and physical sciences and agriculture. The types of jobs required for these areas are middle management and foundation requiring advanced degrees anticipated for the efficiency-driven stage of competitiveness or the production of future scientists and technologists.

However, the results in these areas are more favourably inclined to male than female participants in the 2010, 2011 and 2012 May/June West African Senior Secondary Certificate Examinations (WASSCE) results. There is a need for quality improvement in order to increase the percentage of passes in the critical STI related areas for an STI-driven economy by the end of the policy period. Table 1 is an illustration of those typical science subjects that are relevant to STI-related programmes in The Gambia's undergraduate degree programmes.

Table 1. *Examinees' Pass and Credit figures against the Entrants into the Examinations*

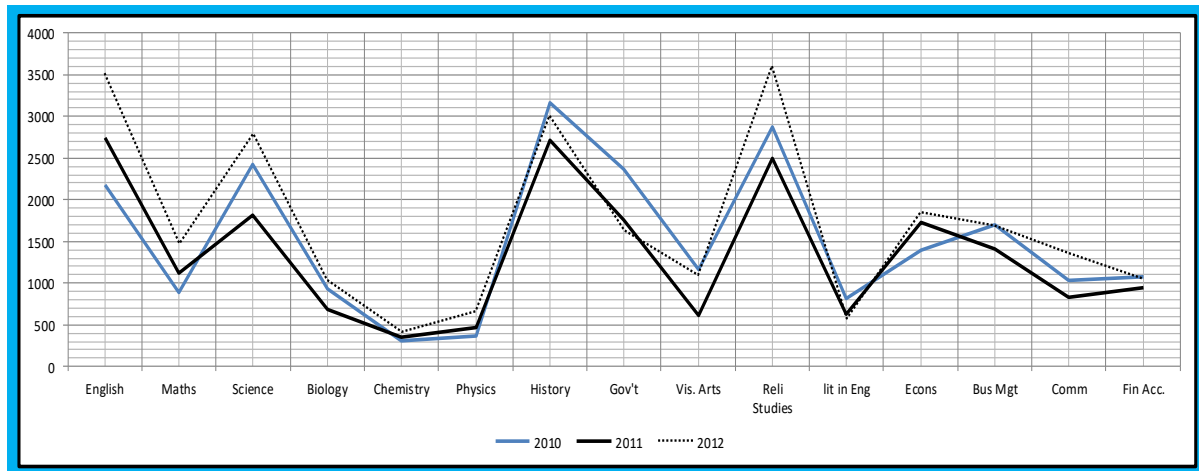
Indicators	Gender	Examination Year			
		2010	%	2011	%
Credits in Maths, English, Physics, Chemistry & Biology	Female	29	0.80%	25	0.70%
	Male	60	1.40%	61	1.41%
	Total	89	1.13%	86	1.09%
Credits in Maths & English	Female	63	1.73%	103	2.90%
	Male	117	2.74%	187	4.31%
	Total	180	2.28%	290	3.68%
Credit in Maths & Pass in English	Female	14	0.38%	21	0.59%
	Male	63	1.47%	61	1.41%
	Total	77	0.97%	82	1.04%
Pass in Maths and Credit in English	Female	97	2.67%	113	3.18%
	Male	88	2.06%	167	3.85%
	Total	185	2.34%	280	3.55%
Total Number of Examinees	Female	3638	45.99%	3548	45.00%
	Male	4272	54.01%	4336	55.00%
	Total	7910		7884	

Source: Adopted from data received from the West African Examinations Council, Banjul Branch

²⁵Programme for Accelerated Growth and Employment (PAGE) 2012-2015

Based on the figure below, it is observed that the performance of students in the May/June WASSCE results fluctuates. They continue to underperform in the science subjects like biology, chemistry and physics in the years under review (2010 to 2012).

Figure x. *Performance of Examinees in the Major Subject Areas*



Source: Adopted from data received from the West African Examinations Council, Banjul Branch

Other areas that have had an impact on the country's economy include the transport sector, i.e. road transport, maritime transport, river transport and air transport. The total road network in The Gambia is about 4,000 kilometres comprising 1,800 kilometres of 'primary' roads with about 50% of these being paved. Recently, there has been a major improvement in the road network, including the construction of new roads. The National Roads Authority (NRA) and the Road Fund were established by an Act of National Assembly (GRTSA ACT, 2003) to promote efficiency in road construction and maintenance.

In the maritime transport sub-sector, Government has taken significant steps in improving and modernizing the port and its related infrastructure to cater for the increasing volume of goods. The port has been expanded and rehabilitated in order to improve its container and cargo handling capabilities. However, it still lacks some essential equipment and services in its efforts to be a major hub in the sub-region. Other than seasonal groundnut transport and ferry crossing at crossing points, river transport is not fully utilized.

In the area of air transport, the airport facilities have been upgraded to suit international standards, although there is still more room for improvement in the area of utilizing available new technologies²⁶.

Despite the achievements registered in the transport sector, there are still numerous challenges facing the sector. There is a wide capacity gap within the sector and, as such research and development and the application of STI are limited.

²⁶Programme for Accelerated Growth and Employment (PAGE) 2012-2015, 2011, p71

In the past, some research institutions were established in the country. These include the National Agricultural Research Institute (NARI), the Centre for Innovation Against Malaria (CIAM), the Public Health Research and Development Centre, the Medical Research Council (MRC), the International Trypanotolerance Centre (ITC), the National Nutrition Agency (NaNA), the Educational Research Network for West and Central Africa (ERNWACA) The Gambia Chapter and the University of The Gambia (UTG).

Research and Development (R&D) in STI atmosphere in The Gambia is characterized by inadequate R&D infrastructure and facilities and inadequate capacity of researchers and research institutions to conduct research in STI. The UNESCO Institute of Statistics (UIS) 2012 country survey on research and experimental development conducted by MoHERST revealed that there are 60 researchers in the country and only 13.3% of them are female. Based on data collected from the MRC and NARI the expenditure on R&D in 2011 for these institutions was GMD 35,220,762²⁷, equivalent to US\$1,174,025.4.

Public private partnerships in the area of research are low. Consequently, there is a major challenge in obtaining credible, timely data for policy development and decision making. Therefore, there is a need to revitalize and support both the institutions that are inactive and those that are active in research, as well as develop close collaboration among the research institutions/organizations and foster partnerships between the private and public-sector organizations.

In this regard, the establishment of the proposed NaRDC will help promote R&D in STI and enhance the governing, monitoring, harmonization and coordination of research activities undertaken by research institutions in The Gambia.

Also, the country has developed a National Information and Communications Infrastructure (NICI) Policy²⁸ with plans and strategies, including the ICT4D Action Plan²⁹, through the support of the United Nations Economic Commission for Africa (UNECA).

A UNECA-supported study in 2007 showed that although it has not been possible to find disaggregated data on the impact of ICTs on the national economy; indications are that their impact is significant³⁰. This impact will probably be even higher in the future because the Gambia Government under the West Africa Regional Communications Infrastructure Programme (WARCIP) has sponsored the construction of a submarine cable landing station in its quest to provide high-capacity and reliable bandwidth by providing direct connectivity to the Information

²⁷Ministry of Higher Education, Research, Science and Technology UIS Survey on Research and Experimental Development 2012

²⁸Information and Communications Infrastructure (NICI) Policy, 2005

²⁹ICT4D Action Plan, 2008

³⁰Government of The Gambia/UNECA SCAN ICT Country Report: Status of ICT, Access, Usage and Exploitation in The Gambia, 2007

Superhighway. This is prudent because telecommunication is one of the sectors where private-sector participation has strengthened the infrastructure.

The Gambia's combined (fixed and mobile) telephone penetration level in 2012 was 105.7% compared to that of Africa where the fixed and mobile penetration rates are 1.4% and 59.8% respectively.

In consultation with the World Bank, the government is working on the modalities of financing the operation of the Africa Coast to Europe (ACE) project.

However, the major constraints in the ICT sector in the country include the insufficient specialized human resource and low ICT penetration in the rural areas. At the governmental level, 60% of all departments lacked permanent ICT personnel in 2006. The inadequate capacity and limited bandwidth has also slowed internet access. ACE project, funded by the World Bank, will widen the country's internet bandwidth³¹.

Another area in which the ICT sector has had a significant impact on the national economy is the labour market. The sector has created a large number of jobs and small businesses, some of which have grown to become bigger businesses. Examples of areas in which ICTs have created jobs are cyber cafes, Internet Service Providers (ISPs), mobile phone operations, airtime vendors, selling of mobile phones and their accessories and in the provision of services, such as advertising and marketing.

In 2006, the country overhauled its ICT sector to address the critical network infrastructure with the advent of the ECOWAS Wide Area Network (ECOWAN) and WARCIP.

These two projects are expected to improve capacity, the availability of data and connectivity within government institutions.

The challenges affecting the growth and development of ICTs in the country include:

- Inadequate funding and high interest rates charged by banks has become an investment detriment in the ICT sector especially among the young population who are more likely to create ICT-based businesses and innovation;
- There is also a human capacity gap in promoting the utilization and adoption of ICT in The Gambia's development process. In addition, there are inadequate ICT skills and knowledge to foster innovation and sustainability of the country's ICT gains;
- The state of the ICT infrastructure continues to be a challenge. ECOWAN is expected to be completed in 2015 and ACE was implemented in 2012. However, the constraints of a weak infrastructure remain;

³¹Programme for Accelerated Growth and Employment (PAGE) 2012-2015

- ICTs are crosscutting tools that facilitate and enhance government service delivery in the socio-economic fabric. However, it is a major challenge to rally other government sectors to integrate ICTs in their activities, in line with the NICI Policy and ICT4D initiative.

The above challenges, among others, need to be adequately resolved in order to maximize the contribution of ICT to STI development and, consequently, to national development.

With regard to the environment, adequate laws are in place, such as the National Environmental Management Act (NEMA), the Environmental Protection Act (prevention of dumping), and the National Disaster Management Act. These were enacted to facilitate the establishment of the National Environment Agency (NEA) as the lead agency for environment policy formulation and coordination of all environment-related activities.

In an attempt to address major environmental problems such as coastal erosion, deforestation and pollution, a 10-year environmental action plan, The Gambia Environmental Action Plan (GEAPI), was developed in 1992 to provide a policy framework for the management of The Gambia's environment. The Plan focused on capacity building, institutional strengthening and improved coordination of the different actions and strategies of government institutions, NGOs and the private sector.

Although some successes were registered, institutional capacity continues to be elusive. GEAP II was also implemented and it focused on further strengthening the environmental agencies. This is important because environmental issues are becoming more prominent. Africa is regarded as one of the most vulnerable continents with regard to climate effect, which can affect all dimensions of human life³².

The Government of The Gambia has demonstrated commitment in this area by mainstreaming climate change into government's development blueprint. This commitment includes the capacity-building programmes on climate-related issues at the grassroots level by the Ministry of Forestry and planned degree-level programmes at the UTG. These could go a long way towards enhancing sustainable economic growth.

On a similar note, it is widely recognized that economic growth is driven by knowledge and skills. Investment in research and granting inventors adequate rights to their products is vital. In this regard, The Gambia has promulgated Integrated Property Rights (IPR) laws to stimulate and ensure fair competition and to protect consumers by enabling them to make informed choices between various goods and services. These laws oversee the creation of intellectual property patents, copyrights, trademarks; the protection of intellectual property rights; and the legal pursuit of those who allegedly infringe on others' rights to their intellectual property.

³²The Intergovernmental Panel on Climate Change (IPCC), Climate Change Synthesis Report, 2007

The Gambia is also a member of African Regional Intellectual Property Organization (ARIPO) and has passed legislation to promote the protection of intellectual property rights to promote creativity and preserve copyright laws. There are several laws in The Gambia relating to intellectual property rights. These include the Industrial Property Act Cap: 95:03 and the Merchandise Marks Act Cap 95:05. In addition, there is the Banjul Protocol on Marks, which was adopted in 1993 and came into force in 1997 to establish a trademark filing system.

It is also encouraging that the country promotes both domestic and foreign investment in all sectors of the economy. This is supported by proper legislation such as The Gambia Investment and Export Promotion Agency (GIEPA) Act 2010 and The Gambia Industrial Property Act. The GIEPA Act 2010 provides for the offer of incentive packages to investors. A number of investment incentives are also provided under the GIEPA Act, which include special investment certificates, export processing zones and export promotion incentives.

Also, the investment climate in The Gambia is attractive to investors with regard to foreign exchange and political stability. The country's legal and institutional frameworks, with regard to combating money laundering and terrorism financing, has also been strengthened with the promulgation of the Anti-Money Laundering and Financing of Terrorism Act 2012. The introduction of the Act is part of measures to intensify efforts to combat the laundering of proceeds of crime in West Africa and strengthening cooperation among its members.

In addition to these laws, The Gambia is a member of many international bodies. It is also a signatory to international conventions on environments and intellectual property rights. These include the following Conventions: the Convention establishing the WIPO, December 2007 and the Kyoto Protocol to the UN Framework Convention on Climate Change.

In the area of youth and innovation, rural-urban drift has been pointed out as a challenge of economic and socio cultural values. Youths abandon the rural settlements for the urban areas in anticipation of getting better opportunities for a better life. With the increased enrolments in schools and a high penetration of ICT in the country, there is likelihood that emerging generations will be more likely to live in urban areas, more politically responsive, more educated and much more connected through the Internet with the rest of the world than their forebears.

A youthful population might be seen as a form of blessing provided proper plans are in place to harness their potentials. In this regard, there is a need for adequate preparation for the future in the areas of STI and skills acquisition.

The need to strengthen STI capacity and capabilities includes the various cadres of national security services to keep them at par with scientific and technological advances as well as serve to strengthen them in their delivery of national services.

The promotion of STI acculturation in society through advocacy, adoption and application of programmes and activities that promote knowledge and skills acquisition and assimilation will stimulate innovation among the citizenry and strengthen knowledge development through R&D. The Gambian population has not yet fully harnessed and utilized STI to transform their lives and environment. As such, there is a need for wider use and application of STI in their living conditions.

And therefore, the limited national STI infrastructure is a challenge. To meet the STI requirements of The Gambia's products and services, there is urgent need to establish an STI system that ensures the desired infrastructure for quality products and services.

Each of the issues raised in this section can influence the success of any policy and will require comprehensive STI intervention. Therefore, a robust STI policy and its effective governance will be required within the framework of prudent fiscal and monetary policies to help in the achievement of Vision 2020, the Millennium Development Goals and The Gambia's PAGE objectives.

1.4 Rationale for an STI Policy

In an increasingly competitive and globalized economy, STI is a key component and powerful instrument for sustained economic growth. The importance of STI has become more evident with the emergence of knowledge-based economies around the world. Indeed, countries that have witnessed impressive economic performance in recent years are those that have invested in STI and in creating an ecosystem that promotes a culture and environment that recognises its importance.

In The Gambia, although the implementation of various initiatives to boost the national development agenda has resulted in remarkable progress, the record of its socio-economic achievement indicates that there is room for improvement. The strengthening of the STI system will be useful in this regard. Therefore, the formulation of the NSTIP, that adopts an integrated and holistic approach, is timely to respond to these challenges.

Although the past approaches to economic growth have yielded some results, they are yet to achieve the desired effect on the development of the country's home-grown capabilities in STI. The Gambia needs to respond in an integrated and holistic fashion, underpinned by the foundations and strategic thrusts described in this policy in order to ensure that the country's transformation into a middle-income, self-reliant and income-generating nation becomes a reality. Towards this end, The Gambia should transform itself to be a key driver of STI.

1.5 Vision, Mission and Guiding Principles

1.5.1 Vision

The vision of the NSTIP is to create and enhance a scientifically cultured society that contributes to the realization of a knowledge-based economy to support and improve the quality of life.

1.5.2 Mission

To build and strengthen national capacity and competencies in STI that will enhance the attainment of economic development and national competitiveness.

1.5.3 Guiding Principles in STI Development

To provide direction in the nation's quest to achieve the full benefits of STI, the following guiding principles should be adhered to:

1.5.3.1 Commitment

It is necessary to ensure that there is full and unabridged national commitment to STI that translates into solid investments by both the public and private sectors and the widespread adoption of technologies for socio-economic development.

1.5.3.2 Concentration

It is important to ensure full and maximum utilization of the country's scarce resources in strategic priority areas. Efforts must be focused on those sectors where the nation's greatest strengths lie and where the opportunities for growth and leadership are highest.

1.5.3.3 Capacity

It is necessary to strengthen the nation's capacity and capability to effectively engage STI as a tool for wealth creation and social well-being through education, expansion and upgrading of the STI infrastructure.

1.5.3.4 Collaboration

The promotion of smart partnerships and synergies between civil society, research institutions, universities and industries will enhance the success of this policy.

1.5.3.5 Commercialization

It is necessary to enhance the nation's ability to commercialize national products, processes, services and outputs of research and innovations that meet market demands in a competitive way through the adoption of an aggressive export-oriented strategy.

1.5.3.6 Culture

It is essential to foster a culture that promotes creativity, innovation and entrepreneurship in STI through the creation of an environment that rewards market-driven ideas, supports science and innovation and inspires interest in STI indigenous technology careers.

1.5.3.7 Community Participation

The enhancement of community support, appreciation and active participation in STI development relevant to their daily lives and in accordance with acceptable national cultural norms, ethics and practices is essential.

1.5.4 Short, Medium and Long-term Objectives

1.5.4.1 Short-term Objectives

Within the first phase of the policy period, the short-term objectives are to:

- 1.5.4.1.1 Train personnel in the management, dissemination and implementation of the policy;
- 1.5.4.1.2 strengthen scientific research capacity to develop STI;
- 1.5.4.1.3 set up a comprehensive central database on STI to serve all sectors of the economy;
- 1.5.4.1.4 provide modern and appropriate ICT infrastructure;
- 1.5.4.1.5 strengthen data collection and analytical capacity;
- 1.5.4.1.6 set up a data bank with appropriate data management facilities and resources;
- 1.5.4.1.7 promote awareness and participation in STI to increase the number of students offering STI-related areas at all levels (both formal and non-formal) of the education system;
- 1.3.4.1.8 Set adequate standards to strengthen the delivery of quality STI.

1.5.4.2 Medium-term Objectives

Within the mid-phase of the policy period, the mid-term objectives are to:

- 1.5.4.2.1 Enhance collaboration nationally and internationally to foster STI knowledge transfer, adaption and diffusion;
- 1.5.4.2.2 Develop and strengthen capacity for STI by producing a trained and skilled population competent to transform the nation into a knowledge -based economy;
- 1.5.4.2.3 Further develop and strengthen research capacity and dissemination of scientific findings;
- 1.5.4.2.4 develop technological and indigenous knowledge through innovative links with industries, to add value to the country's products and services;
- 1.5.4.2.5 Establish the legal and regulatory framework that ensures effective use of STI for national development with adherence to set standards.

1.5.4.3 Long-term Objectives

Within the final phase of the policy period, the long-term objectives are to:

- 1.5.4.3.1 further strengthen scientific research as a means to spur innovation and entrepreneurship especially among the youth and women to enhance employability, among others;
- 1.5.4.3.2 strengthen the incorporation of indigenous technology and traditional medicine in the application of STI in the day-to-day living of the citizens;
- 1.5.4.3.3 transfer, adapt and assimilate appropriate technologies;
- 1.5.4.3.4 create and sustain a knowledge-based economy in which the citizens can effectively apply scientific and technological knowledge and skills in resolving socio-economic problems;
- 1.5.4.3.5 modernize agriculture and other national industries through STI to create quality products and services for sustained economic growth;
- 1.5.4.3.6 Use STI to modernize agriculture and create quality products and services for sustained economic growth.

CHAPTER 2: POLICY FOUNDATIONS AND PILLARS

2.1 Introduction

The National STI Policy is based on *two* fundamental foundations (STI for development and Policy for STI). These foundations are further consolidated by *nine* strategic pillars to provide direction in the implementation of the Policy for the improvement of the socio-economic well-being of all Gambians. The foundations are thus provided below:

2.2 STI for Development

Science, technology and innovation are essential tools to development which help nations achieve their national aspirations³³ as well as increase production, particularly in developing countries like The Gambia. The broader aim of this policy is to harness the potentials of STI in improving wealth creation and the quality of life of the citizenry through education and training, technology transfer, technology start-ups, entrepreneurship, macroeconomic and industrial activities. In this policy period, government will develop mechanisms to serve as a catalyst to speed up the processes for attaining national visions.

2.3 Policy for STI

To provide the coordinating and supporting mechanisms for the success of the policy, the country's STI capacity and capabilities should be enhanced through institutions, mandates, management, personnel, funding and deliverables. An integral part of this policy incorporates sectoral policies and strategies to enhance education and research for capacity building in STI and related domains through funding, the provision of grants, the transmission and diffusion of STI knowledge into active economic sectors, industry and communities. The policy also addresses the promotion of basic research into more local problems and the application of market-driven research to add value to exported products.

2.4 Strategic Pillars

The strategic pillars are, therefore, the key priority areas on which considerable attention should be provided. This will help lay the rudiments of a sound STI ecosystem that ensures that STI is mainstreamed as a powerful socio-economic instrument. It will also enhance the generation of knowledge, wealth creation and well-being of society as envisaged in The Gambia's development blueprints.

The strategic pillars consolidating the above foundations are as follows:

³³The Sussex Manifestos 1970

Strategic Pillar 1	Education and Training
Strategic Pillar 2	Elaboration of Indicators and Data Management
Strategic Pillar 3	Research and Development
Strategic Pillar 4	Information and Communication Technologies
Strategic Pillar 5	STI Infrastructure
Strategic Pillar 6	Legal and Regulatory Framework
Strategic Pillar 7	Science, Technology and Society
Strategic Pillar 8	STI Governance
Strategic Pillar 9	Funding and Sustainability

CHAPTER 3: SECTOR SPECIFIC PRIORITIES and PROGRAMMES

3.1 Education and Training (Human Capital Development of the Citizenry)

3.1.1 Introduction

A dynamic, scientifically competitive and innovative nation is founded on the availability of an adequate and appropriate critical mass of STI personnel. Without that, there will be a limited requisite base to create and transform ideas into innovative products, processes, services and solutions that improve the quality of life. In order to build and sustain a vibrant STI ecosystem and economy, the building of a critical mass of STI cadre must be accorded high priority.

Therefore, The Gambia should adopt a more holistic approach to enhance the programmes, mechanisms and overall outputs of its institutions at all levels of the education system. A successful development of the country's human capital for an effective innovative economy will have to devise measures to address three key issues. First, it needs to build a critical mass of well-trained STI personnel; second, this critical mass of STI personnel will have to be nurtured and retained; third appropriate mechanisms should be devised to optimize their efficiency.

3.1.2 Policy Statement

The Gambia Government will establish an STI education system that is responsive to the sustainable socio-economic and cultural development needs of the country.

3.1.3 Objectives

In order to strengthen STI education in The Gambia, the following objectives will be pursued within the policy period:

- 3.1.3.1 develop and improve the quality of innovation in science, technology, engineering and mathematics education across all the levels;
- 3.1.3.2 provide adequate and appropriately qualified and experienced personnel in all the areas of STI;
- 3.1.3.3 Make TVET services available and accessible to all, particularly the underrepresented groups with special needs.

3.1.4 Strategies

To develop, nurture and retain a critical mass of STI personnel, the Government of The Gambia will:

- 3.1.4.1 develop and improve the quality of science, technology, , engineering and mathematics (STEM) education across all the levels of education system through the increased participation of students and improved teacher quality and teaching methods;
- 3.1.4.2 restructure the existing STI education programmes so that they can respond to the needs and aspirations of the Gambian people;
- 3.1.4.3 review the existing STI education policies to ensure the development of higher-order cognitive, critical, analytical and entrepreneurial skills among students at all the educational levels through effective science, technology, engineering, and mathematics education that meets the changing needs of an innovative and knowledge-driven society;
- 3.1.4.4 develop an improved recruitment, training and retention system for high-quality and motivated STI teaching staff, especially in the pure sciences, engineering and mathematics, and also review the existing teaching and assessment methods (including TVET) by adopting best practices;
- 3.1.4.5 increase enrolment in STI programmes at all the levels of the education system;
- 3.1.4.6 provide adequate STI teaching and learning infrastructure in educational institutions and train appropriately qualified personnel in relevant STI fields;
- 3.1.4.7 increase and diversify graduate programmes in relevant STI fields in HEIs' to generate high quality-scientists, engineers and researchers;
- 3.1.4.8 facilitate industrial attachment to improve the quality of training of engineers and technicians;
- 3.1.4.9 create centres of excellence in STI education in all the regions of the country to conduct continuous professional development of STI teachers with specific emphasis on science and mathematics;
- 3.1.4.10 provide motivational schemes for STEM teachers and other STI professionals in the national education system;
- 3.1.4.11 strengthen the role of the media in promoting STI (particularly TVET) education;
- 3.1.4.12 promote and support research and development related to STI at all the levels of the education system;
- 3.1.4.13 develop and strengthen criteria and procedures for the accreditation, licensing and quality control of institutions, agencies and centres that offer formal and informal education and training;
- 3.1.4.14 provide linkages between the two streams of formal and non-formal TVET for an integrated system that allows learners to move from one stream to the other;

- 3.1.4.15 develop a comprehensive STI framework with the relevant socio-economic and cultural dimensions in harmony with human resource planning and development;
- 3.1.4.16 streamline entrepreneurship in both formal and informal education systems and create sustainable inter -and -intra public-private sector partnerships for enterprise development;
- 3.1.4.17 integrate technical and vocational education with agriculture, commerce, financial management and industry;
- 3.1.4.18 Provide and equip teaching and learning laboratories with modern facilities.

3.2 Medical and Public Health

3.2.1 Introduction

In The Gambia, health services delivery is diverse and comprises Government Health Services, private sector, NGOs/missions, traditional medicine practitioners, pharmacists and other outlets.

3.2.2 Policy Statement

Government will create and maintain a healthy population by mitigating diseases and all other factors that may influence the quality of life of the population to improve life expectancy.

3.2.3 Objectives

In order to strengthen the medical and health sector in The Gambia to enhance a healthy population, the following objectives will be pursued within the policy period:

- 3.2.3.1 To strengthen healthcare services and delivery;
- 3.2.3.2 To maintain a ready state of preparedness and a swift response to emergency out breaks of diseases with epidemic potentials;
- 3.2.3.3 To promote and strengthen research in all areas of healthcare;
- 3.2.3.4 To promote healthy lifestyles and reduce the burden of communicable and non-communicable diseases.

3.2.4 Strategies

To achieve the afore-mentioned objectives, the government will pursue the following strategies:

- 3.2.4.1 strengthen research capacity, dissemination and application of research findings;
- 3.2.4.2 improve quality, increase access and promote the rational use of healthcare services;

- 3.2.4.3 protect the health of the population through a sustained quality assurance programme;
- 3.2.4.4 encourage R&D in medicinal plants to promote the establishment of pharmaceutical industries and strengthen the capacity of traditional medical practitioners to augment the healthcare needs of the population;
- 3.2.4.5 strengthen the food quality surveillance system through the application of innovative techniques for improved food security and quality assurance working closely with the Food Security and Quality Assurance Authority;
- 3.2.4.6 strengthen disease surveillance and response capacity at all levels;
- 3.2.4.7 promote community awareness in disease prevention and control measures through the use of radio and TV programmes, community dialogue and other means of communication;
- 3.2.4.8 augment and strengthen the service delivery capacity of hospitals, health centres and clinics to provide the needed specialist care;
- 3.2.4.9 classify and subject all existing health delivery services to an accreditation process;
- 3.2.4.10 develop a plan to map out future developments to ensure relevance and sustainability in the health services;
- 3.2.4.11 strengthen the Health Management Information System (HMIS), strengthen cross-border surveillance and effectively implement the International Health Regulations (IHR);
- 3.2.4.12 strengthen sanitation through effective waste collection and management practices as well as disposal of hazardous materials;
- 3.2.4.13 implement all ethical guidelines for treatment and research in the health sector;
- 3.2.4.14 expand the provision of health technologies such as telemedicine at all the hospitals and major health centres;
- 3.2.4.15 Strengthen laboratory facilities and the human capacity to ensure quality health delivery systems.

3.3 The Economy

3.3.1 Introduction

The Gambia Government launched the Vision 2020 blueprint in 1996 as the long-term national development plan of the country with a aim of transforming The Gambia into a middle-income generating country by 2020.

The future outlook for the Vision is:

To transform The Gambia into a financial centre, a tourist paradise, a trading, export-oriented agricultural and manufacturing nation, thriving on free market policies and a vibrant private sector, sustained by a well-educated, trained,

skilled, healthy, self-reliant and enterprising population and guaranteeing a well-balanced ecosystem and a decent standard of living for one and all under a system of government based on the consent of the citizenry.

It is, therefore, important to note that for The Gambia to achieve its Vision 2020 objective of economic transformation, it needs to be guided by STI.

3.3.2 Policy Statement

Government, through the NSTI Policy, will drive the economy towards the attainment of Vision 2020 and PAGE to transform The Gambia into a knowledge-based and technology-led economy.

3.3.3 Objectives

Within this policy period, the government, in collaboration with private sector and non-state actors, will improve the economy in line with Vision 2020 and other government plans.

3.3.3.1 To improve economic growth and environment.

3.3.4 Strategies

To achieve the afore-mentioned objectives, the government will pursue the following strategies:

3.3.4.1 Create a supportive environment for more investments in STI;

3.3.4.2 Use STI to strengthen the main sources of economic growth by encouraging innovative investments in areas such as the AENR, banking, energy, finance and tourism;

3.3.4.3 Strengthen open trade policies and attract FDI to ensure technology transfer that spurs growth.

3.4 Trade and Industry, Innovation and Entrepreneurship

3.4.1 Introduction

The promotion of trade, industry, innovation and entrepreneurship is essential in transforming The Gambia as envisaged in Vision 2020 and PAGE. In the medium to long term, the extent of national development will mirror the progress made in creating an environment characterized by an entrepreneurship and innovation culture, entrepreneurship-friendly school curricula, entrepreneurship promotion programmes and incentives as well as the level of investments in infrastructure and research.

3.4.2 Policy Statement

Government in collaboration with the private sector will effectively use STI to create an enabling environment for the development and promotion of entrepreneurship and innovation culture to enhance The Gambia's competitiveness in regional and international markets.

3.4.3 Objectives

Within the policy period, the government will pursue the following objectives to improve trade, industry and entrepreneurship in The Gambia:

- 3.4.3.1 promote entrepreneurship and nurture the culture of innovation, foster industrial development and trade in order to reduce unemployment, improve productivity and enhance competitiveness;
- 3.4.3.2 create an enabling environment and mentoring system for establishing and operating a business and protecting intellectual property rights;
- 3.4.3.3 improve access to financial services on appropriate terms to facilitate industrial development;
- 3.4.3.4 increase The Gambia's export competitiveness, especially in regional and sub-regional markets;
- 3.4.3.5 Boost employment and economic competitiveness by increasing the number of start-up businesses.

3.4.4 Strategies

To achieve the afore-mentioned objectives, the government will pursue the following strategies:

- 3.4.4.1 expand and strengthen access to markets, such as trade fairs to promote trade, industry, innovation and entrepreneurship;
- 3.4.4.2 strengthen the organization of business plan competitions and youth entrepreneurship schemes to promote the culture of entrepreneurship and spur innovation among the youthful population;
- 3.4.4.3 support countrywide sensitizations on entrepreneurship and innovation through the print and electronic media and other means of communication;
- 3.4.4.4 develop a Business Information Database to facilitate linkages between domestic MSMEs and Transnational Corporations (TNCs) for skills and technology transfer;
- 3.4.4.5 promote investment in technology, its development and transfer to enhance local technological capabilities;
- 3.4.4.6 support the development of business parks through public-private partnership to serve as centres of excellence for commercial and modern technology;

- 3.4.4.7 develop industrial clusters for selected sectors based on comprehensive diagnostic studies;
- 3.4.4.8 develop a national strategy for the promotion of entrepreneurship and innovation to foster sustainable private sector-led growth;
- 3.4.4.9 strengthen the apprenticeship/industrial attachment programme for graduates of technical and vocational education and training;
- 3.4.4.10 provide and maintain industrial standards through a Quality Assurance System that permits the production of goods and services that are internationally competitive;
- 3.4.4.11 provide fiscal incentives as well as mentoring and business development service support to high-tech start-ups and high growth firms;
- 3.4.4.12 incorporate entrepreneurship and innovation in school curricula at all the levels of the education system;
- 3.4.4.13 facilitate technology transfer, adaption and diffusion through institutional and enterprise linkages as well as PPPs and non-state actors;
- 3.4.4.14 create and strengthen awareness on the importance of entrepreneurship and innovation in economic growth and development;
- 3.4.4.15 Create and strengthen the infrastructure for entrepreneurship, innovation, technology and knowledge transfer.

3.5 Energy

3.5.1 Introduction

To accelerate the socio-economic development process of the country, the energy sector needs to be accorded the necessary priorities to develop and promote the use of all forms of energy, including renewable energy and other related resources in the country.

3.5.2 Policy Statement

Government in partnership with the private sector and other stakeholders will provide adequate, reliable, affordable, efficient and sustainable energy supply to support the country's socio-economic growth and development.

3.5.3 Objectives

Within the policy period, the government will pursue the following policy objectives in order to strengthen the energy sector:

- 3.5.3.1 Increase investments for research and development, innovation, production and the use of alternative forms of energy;

- 3.5.3.2 strengthen the legal and regulatory framework to attract more investments in the sector;
- 3.5.3.3 Build capacity on the exploration, exploitation and management of petroleum resources in The Gambia; to facilitate the supply of adequate, reliable, affordable and sustainable energy nationwide.

3.5.4 Strategies

To achieve the afore-mentioned objectives, the government will pursue the following strategies:

- 3.5.4.1 build scientific research and technological capacity for the effective production and utilization of energy resources, such as renewable and non-renewable energy resources for a more reliable, sufficient and sustainable energy supply
- 3.5.4.2 facilitate the exploitation of solar energy for the commercial production of energy;
- 3.5.4.3 promote conducive environment to attract more investments and improve technological capacity in the energy sector through international cooperation, and public and private partnerships;
- 3.5.4.4 encourage more use of energy-efficient equipment;
- 3.5.4.5 develop a comprehensive needs base capacity-building training programme;
- 3.5.4.6 Improve and expand the energy infrastructure.

3.5 Agriculture, the Environment and Natural Resources

3.5.5 Introduction

The government will ensure the application of STI to facilitate the development of the AENR sector in support of national development.

3.5.6 Policy Statement

The government will ensure the application of STI to facilitate the development of the agriculture sector in support of national development.

3.5.7 Objectives

Within the policy period, the government and the relevant stakeholders will pursue the following policy objectives in order to strengthen the agriculture and natural resources sector:

- 3.5.7.1 set up a comprehensive database to cover all aspects of AENR;

- 3.5.7.2 increase the human resource capacity in agricultural research and transfer of technologies;
- 3.5.7.3 make innovative use of ICTs to inform, educate and sensitize farmers on modern agriculture practices, including information on market prices and weather conditions;
- 3.5.7.4 strengthen the development, application and transfer of agro-based technologies for food security, poverty reduction and diversification of the productive sectors;
- 3.5.7.5 promote the use of STI in the maintenance and enhancement of the quality and sustainability of the environment;
- 3.5.7.6 Factor and account the effects of the environment on agricultural productivity in all national development policies.

3.5.8 Strategies

For the attainment of the objectives cited above, the following strategies will be implemented:

- 3.5.8.1 develop research in areas such as soil and water management and conservation, rice genetics and management, animal health, pastures and forage, post-harvest management, soil microbiology, plant and zoological genetics, molecular biology and plant biotechnology;
- 3.5.8.2 increase the proportion of postgraduate and specialized trainings for personnel in the AENR sector;
- 3.5.8.3 strengthen the management capacity of personnel in agricultural research institutions;
- 3.5.8.4 promote the use of modern irrigation technologies and methods to better utilize the fresh waters of the River Gambia for an all-year-round agricultural production;
- 3.5.8.5 strengthen and, where necessary, establish modern storage facilities and preservative technologies for agricultural produce;
- 3.5.8.6 strengthen the collaboration between public/private institutions, research centres, and universities both at the national and international levels;
- 3.5.8.7 build specialized centres of agricultural research, specifically biotechnology, molecular biology, entomology and plant genetics to strengthen the agriculture sector;
- 3.5.8.8 establish agro-business innovation centres in all the regions of the country based on national and international standards;
- 3.5.8.9 strengthen support to the youth and women to engage in agricultural activities;
- 3.5.8.10 strengthen soil and water resources management on all croplands to improve and sustain the agriculture sector;

- 3.5.8.11 promote the use of STI to improve environmental conservation and management practices as well as plan and manage human settlements and spatial developments;
- 3.5.8.12 diversify artisanal fisheries to include harvesting under-exploited stocks;
- 3.5.8.13 use STI to map, explore and exploit The Gambia's agricultural resources;
- 3.5.8.14 provide a sustainable research and high performance computing facility to support agricultural research at all levels in order to enhance crop and livestock production;
- 3.5.8.15 invest in R&D to develop market information systems for agricultural products;
- 3.5.8.16 Strengthen the environmental impact assessment framework expertise to monitor and control the adverse effects of climate change;
- 3.5.8.17 Build new and strengthen existing agricultural research infrastructure (laboratories, offices, stores and others).

3.6 Transportation

3.6.1 Introduction

The transport sector in The Gambia has undergone a major transformation over the last few decades. Significant improvements have been registered in the land, air, maritime and river transport systems. This policy will use STI to boost all transport sub-sectors for the rapid and sustainable development of The Gambia.

3.6.2 Policy Statement

The Gambia Government will use STI to improve the transportation system and promote more efficient, sustainable and safe movement of people, goods and services.

3.6.3 Objectives

Within the policy period, Government will pursue the following policy objectives in order to strengthen the transport sector:

- 3.6.3.1 create information management systems for transport companies to improve on service delivery;
- 3.6.3.2 strengthen government's role in the transport industry through institutional capacity building and enhanced planning;
- 3.6.3.3 revive maritime and river transportation systems;
- 3.6.3.4 improve the primary and secondary road networks;
- 3.6.3.5 facilitate greater use of local resources;

- 3.6.3.6 introduce the use of new technologies in road design, construction and maintenance;
- 3.6.3.7 improve the safety, efficiency and quality of public and private transport;
- 3.6.3.8 Promote STI-related R&D in all transportation systems and infrastructure.

3.6.4 Strategies

For the attainment of the objectives cited above, the following strategies will be implemented:

- 3.6.4.1 Encourage private sector investment to enhance the development of the transport infrastructure using STI; use STI to establish efficient and reliable transport infrastructure and services;
- 3.6.4.2 Develop adequate scientific human resource for the transportation system;
- 3.6.4.3 Strengthen the capacity of relevant institutions to plan, prioritize, manage and implement the rehabilitation and maintenance of primary and secondary road networks to higher standards;
- 3.6.4.4 Use STI to modernize the existing technologies in accident investigation and mitigation;
- 3.6.4.5 Modernize and increase navigation equipment to ensure safety and security in the territorial sea and waterways.

3.7 National Security

3.7.1 Introduction

The Gambia's armed and security services have been effective in maintaining peace and order and ensuring that internal security is achieved at all times. In this regard, the use of STI will further enhance national security by keeping up with advances in the use of modern technologies.

3.7.2 Policy Statement

The Government of the Gambia in collaboration with the relevant stakeholders will strengthen the capacity and capability of all national security forces to effectively employ scientific and technological tools in their day-to-day operations in line with global trends.

3.7.3 Objectives

Within the policy period, Government will pursue the following policy objectives in order to strengthen the national security services in national security:

- 3.7.3.1 Improve communication between the scientific and technical (S&T) community and the security policymakers;

- 3.7.3.2 strengthen national security through adequate STI interventions such as communication infrastructure and harmonize national security information channels
- 3.7.3.3 increase the nation's participation in regional and global partnerships to enhance security;
- 3.7.3.4 strengthen the capacity and capability of the national security forces to deploy modern scientific and technological tools in their daily operations;
- 3.7.3.5 Strengthen national security through STI in surveillance technologies and techniques, security systems, security operations and intelligence.

3.7.4 Strategies

For the attainment of the objectives cited above, the following strategies will be implemented:

- 3.7.4.1 audit and harmonize the national security information infrastructure;
- 3.7.4.2 strengthen and expand the STI security infrastructure;
- 3.7.4.3 establish a national military and security sciences institute;
- 3.7.4.4 train and upgrade national security personnel in key STI disciplines, including forensics, microbiology, biochemistry, biophysics, computer programming and related fields at undergraduate and postgraduate levels;
- 3.7.4.5 Establish adequate R&D security infrastructure.

3.8 Sports and Recreation

3.8.1 Introduction

Sports and recreational activities have occupied centre stage in The Gambia in the recent past. A multitude of recreational facilities provide Gambians with the opportunity to fully develop their innate capabilities, while enriching their lives and improving their health and sense of well-being. It is generally accepted that recreation is essential to the physical, emotional, social and spiritual well-being of individuals in particular and society as a whole. To this end, it is envisaged that this policy will contribute to the improvement of the overall well-being of society through the development of sports in the country.

3.8.2 Policy Statement

The Gambia Government and its stakeholders will provide opportunities to access sports and recreational facilities to all Gambians, including the physically challenged and will develop the capacity of sports personnel at all levels.

3.8.3 Objectives

Within the policy period, Government will pursue the following policy objectives in order to strengthen the sports sector:

- 3.8.3.1 provide and facilitate the appropriate use and maintenance of requisite sports and recreational facilities, sports paraphernalia and services in all the sporting disciplines across the country;
- 3.8.3.2 facilitate the preservation of natural and cultural resources for current and future generations;
- 3.8.3.3 provide access to sporting and recreational facilities in all the regions in the country including for the physically challenged;
- 3.8.3.4 promote transparency and fair play in all sporting activities;
- 3.8.3.5 strengthen the enforcement of the anti-doping regulations in sports;
- 3.8.3.6 Provide sports education programmes at all the levels of the national education system.

3.8.4 Strategies

For the attainment of the objectives cited above, the following strategies will be implemented:

- 3.8.4.1 improve and expand the existing national recreation infrastructure in all the regions in the country;
- 3.8.4.2 promote the participation of the physically challenged at national and international levels;
- 3.8.4.3 promote research and development in physical health and therapy, nutrition, physical education and other disciplines to improve the quality of sporting activities and sports personnel;
- 3.8.4.4 Promote and expand the provision of sports-related education programmes in all the regions of the country.

3.9 Tourism and Hospitality

3.9.1 Introduction

This policy identifies the priority actions that need to be taken to improve on a sustainable tourism industry, as it is one of The Gambia's leading economic sectors, providing employment, foreign exchange, infrastructural development and international exposure.

The tourism sector is dynamic, and the environment is constantly evolving regardless of the business stage of development. There is a need to examine the environment in which tourism operates to identify key factors that may influence its development, marketing and management.

3.9.2 Policy Statement

The Gambia Government with its stakeholders will pursue a sustainable tourism development through the improved use of the environment, success in human resources, and the conservation of our culture and heritage in order to ensure a product of the highest quality whilst improving the life and economic development of the people of The Gambia.

3.9.3 Objectives

Within the policy period, Government will pursue the following policy objectives in order to strengthen the tourism sector:

- 3.9.3.1 provide a vibrant service-oriented, diversified and sustainable all-year-round tourism;
- 3.9.3.2 protect and conserve the environment;
- 3.9.3.3 expand and strengthen the tourism industry to stimulate economic growth;
- 3.9.3.4 promote and preserve the socio-cultural fabric of The Gambia;
- 3.9.3.5 improve the quality of services to meet regional and international standards;
- 3.9.3.6 develop and harness the potential of the country's domestic tourism;
- 3.9.3.7 Encourage and develop a sustainable eco-tourism.

3.9.4 Strategies

For the attainment of the objectives cited above, the following strategies will be implemented:

- 3.9.4.1 formulate and develop strong marketing strategies to sell The Gambia as a competitive tourist destination;
- 3.9.4.2 promote programmes and strategies for the development of the human capital in the tourism sector;
- 3.9.4.3 enhance private-sector participation in tourism infrastructure development, operation and maintenance;
- 3.9.4.4 create, maintain and improve tourist attraction centres and facilities across the country;
- 3.9.4.5 encourage investment in world-class standard accommodation to attract high-spending tourists;
- 3.9.4.6 establish and enhance the capacities of institutions and personnel in the tourism and hospitality industry;

- 3.9.4.7 Promote and develop eco-tourism with a view to improving service delivery in The Gambia's tourist industry.

3.10 Youth and Innovation

3.10.1 Introduction

A youthful population might be seen as a form of blessing, provided proper plans are in place that cater for their aspirations, educational and economic needs. The Gambia, like many of its African neighbours, cannot afford to ignore the ongoing and rapid rural-urban transitions. The NSTIP will endeavour to see to it that the youth continue to be featured prominently in the country's development agenda.

3.10.2 Policy Statement

Government and its stakeholders will use STI to empower the Gambian youth through various programmes and initiatives and reach out to them, respond to their expectations and ideas, nurture their skills and capabilities for their full participation in national development...

3.10.3 Objectives

Within the policy period, Government will pursue the following policy objectives in order to strengthen youth participation in national development:

- 3.10.3.1 increase access to, and support youth in, skills acquisition, technical, vocational education and training in both the formal and informal sectors of the economy;
- 3.10.3.2 strengthen youth organizations to actively participate in decision-making bodies in local government areas (LGAs) and at the national level;
- 3.10.3.3 Develop youth innovation in entrepreneurship and job creation throughout the country.

3.10.4 Strategies

For the attainment of the objectives cited above, the following strategies will be implemented:

- 3.10.4.1 adopt an all-inclusive approach to develop, initiate and execute STI programmes that will strengthen youth motivation and increased participation in STI;

- 3.10.4.2 review the national science education curriculum in light of placing more emphasis on the promotion of scientific and technological literacy of all citizens, particularly the youth;
- 3.10.4.3 provide support to technical and vocational institutions to increase the enrolment of youth in skills development programmes;
- 3.10.4.4 increase support to graduates of TVET institutions, especially female graduates, to be self-employed to create jobs;
- 3.10.4.5 diversify sports through the use of STI to increase the participation of the youth in various sports activities;
- 3.10.4.6 use STI to provide and strengthen support to the music and cultural industry;
- 3.10.4.7 Establish training institutes, theatres to increase youth participation in Fine and Performing Arts and other related activities.

CHAPTER 4: ELABORATION OF INDICATORS AND DATA MANAGEMENT

4.1 Introduction

Measuring the impact of STI policies and programmes is indispensable in national development. The national STI policy of The Gambia, like all other government policies, will need regular and adequate monitoring and evaluation for assessing the country's STI capacity gap and innovation capabilities to identify successes and constraints. It is also important to benchmark and compare the country's performance with that of the region.

At the macro level, a number of international organizations including the World Bank Competitive Indexes and the UNESCO Institute of Statistics are involved in benchmarking activities based on regular updated databases. Activities of this nature enable countries to position themselves with respect to their competitors and measure their performance and progress over time.

More elaborate indicators that monitor and assess STI ecosystems should complement the macro-benchmarking activities of these organizations. An effective way of doing this is to systematically document these indicators through the implementation of rigorous, regular surveys using limited well-defined samples.

4.2 Policy Statement

The Government of The Gambia will facilitate the establishment of an effective and efficient STI database and information systems for tracking and evaluation of The Gambia's national performance in STI.

4.3 Objectives

Within the policy period, Government will pursue the following policy objectives in order to strengthen data management to inform government decisions, policies and programmes regarding STI:

- 4.3.1 Develop capacities and capabilities to conduct surveys and baselines and effective audit of the STI ecosystem;
- 4.3.2 develop and elaborate sector-specific STI indicators based on international best practices;

- 4.3.3 track and evaluate the nation's successes and constraints in implementing STI programmes on a quarterly basis;
- 4.3.4 Develop and enhance a national STI performance scorecard.

4.4 Strategies

To establish a robust national STI information system for the effective monitoring and evaluation of The Gambia's STI performance, the Government of The Gambia will:

- 4.4.1 Strengthen national capacities for statistical analysis, utilizing standard analytical tools in STI evaluation processes;
- 4.4.2 Establish a National STI Information Centre (NASTIC) to lead the development of an effective national STI process and information system. This will, among others, increase the use of metrics, analysis and evaluation for benchmarking, policy development processes and decision-making as well as the impact of STI expenditures. The centre will undertake, among others, the following:
 - 4.4.3 conduct R&D activities, national innovation surveys, assessment of public STI knowledge and awareness, community innovation surveys, and produce comprehensive biennial reports to advise policy and decisions on STI;
 - 4.4.4 evaluate the country's STI performance and benchmark its innovations at the national, regional and international levels;
 - 4.4.5 facilitate The Gambia's participation in global STI policy evaluation and assessment programmes, including the World Bank's KEI, the UNCTAD Innovation Capability Index, the UNDP Technology Achievement Index;
 - 4.4.6 promote the use of geographic information systems for tracking purposes;
 - 4.4.7 conduct a quarterly assessment of the National STI Policy using standard approaches, including international peer reviews to stimulate mutual learning processes;
 - 4.4.8 initiate a national "technology foresight" programme as a systematic means of assessing scientific and technological developments, which could have a high impact and value on industrial competitiveness, wealth creation and the quality of life.

CHAPTER 5: RESEARCH AND DEVELOPMENT

5.1 Introduction

Research and development in STI plays a significant role in the socio-economic development and growth of a country. The successful application of the results of R&D in STI will help improve the Gambian economy. Research creates knowledge, which can help improve the performance of all the sectors.

5.2 Policy Statement

The Gambia Government and stakeholders will enhance the advancement of STI in all sectors covered in the STI policy through R&D and create the enabling environment to promote innovation, entrepreneurship, sustainable growth and development to sustain a better and decent standard of living for the citizenry.

5.3 Objectives

Within the policy period, Government will pursue the following policy objectives in order to strengthen research and development:

- 5.3.1 develop and maintain a database on R&D activities and findings for all the sectors and link the database to similar regional and international databases;
- 5.3.2 strengthen and develop the undergraduate programme at the institutions of higher learning in relevant subjects for STI development to create capacity for future R&D;
- 5.3.3 establish a National Research and Development Council (NaRDC) in The Gambia to promote, monitor, harmonize and coordinate research activities in the country;
- 5.3.4 increase STI-related R&D funding aimed at creating and enhancing advanced scientific, technological and innovative knowledge as well as skills in all the sectors and at all levels;
- 5.3.5 enhance the sustainable production of competitive quality products and economic growth, and maintain a balanced ecosystem using environmentally friendly technologies in line with national development goals through R&D and entrepreneurship;
- 5.3.6 Strengthen scientific and technical research for informed policy decisions.

5.4 Strategies

To position The Gambia to effectively utilize its research infrastructure for national development the government will employ the following strategies:

- 5.4.1 Establish a National Research, Development Council (NaRDC) consisting of relevant stakeholders with authority as the lead organization entrusted with the development and coordination of public-funded R&D schemes and programmes within two years. This will help guide national research efforts to be consistent with national priorities, and this body will specifically undertake, among others, the following;
- 5.4.1.1 generate, mobilize and serve as a one-stop centre for the coordination of all public R&D funding applications, evaluation and monitoring;
 - 5.4.1.2 identify priority areas and promote R&D in key sectors of the economy, including, energy, transport and health;
 - 5.4.1.3 promote a judicious balance in support of national priority areas of research, including the social sciences and humanities as well as support for the development of traditional industries and the exploitation of the country's natural resources;
 - 5.4.1.4 promote and develop basic developmental research to enable The Gambia to effectively exploit and advance new knowledge for the country's economic advantage and wealth creation;
 - 5.4.1.5 promote and support effective leadership in the management of research, development and commercialization of scientific, technological and innovative ideas;
 - 5.4.1.6 build the country's R&D infrastructure, which should provide the scientific community with the capacity to undertake competitive research activities;
 - 5.4.1.7 facilitate knowledge and technology transfer to domestic enterprises in order to stimulate industrial development through R&D;
 - 5.4.1.8 develop uniform standard operating procedures (SOPs) for streamlining R&D funding management;
 - 5.4.1.9 facilitate an effective form of cooperation and networking between the companies, universities and research institutes to develop innovative products, processes and services;
 - 5.4.1.10 strengthen ethical standards and regulatory mechanisms to monitor, evaluate and control food, drugs and other chemical products as well as in the conduct of research;
 - 5.4.1.11 enhance effective collaboration at the national, regional and international levels in STI-related research that impacts on society;
 - 5.4.1.12 facilitate knowledge and technology transfer to domestic enterprises in order to stimulate industrial development through R&D;
 - 5.4.1.13 provide a sustainable research and high performance computing space needed to support scientific research at all levels in order to enhance crop and livestock production, reduce environmental degradation, and improve

water and environmental sanitation as well as the economic standard of the people;

- 5.4.1.14 build capacities and capabilities for the management of R&D in basic and applied sciences, biotechnology, nuclear, atomic, nanotechnology and material sciences, space research e.t.c;
- 5.4.1.15 strengthen capacity through training (short and long-term) for staff in different sectors in R&D and entrepreneurship;
- 5.4.1.16 put in place mechanisms to ensure that regulations affecting R&D development are arrived at through adequate community, public-private initiatives and are enforced using appropriate conventional as well as other alternative methods of resolution;
- 5.4.1.17 strengthen entrepreneurship and innovation by mainstreaming them in schools, universities, fun labs, business incubation centres, science parks and TVET institutions' curricula;
- 5.4.1.18 create periodic interfaces between researchers and entrepreneurs to facilitate the commercialization of research outputs;
- 5.4.1.19 establish annual international events to network and facilitate linkages between domestic enterprises and multinational corporations (MNCs);
- 5.4.1.20 provide incentives for pro-poor agro-processing technology development and for entrepreneurs/MSMEs that commercialize technological ideas and research findings;
- 5.4.1.21 establish a research fund for impact-driven scientific research on key economic growth drivers;
- 5.4.1.22 promote scientific, technological and innovative education at all the levels of the education system;
- 5.4.1.23 promote research in conservation programmes, including bio-diversity, ecology, habitat and wildlife management;
- 5.4.1.24 establish centres of excellence for research in all STI sectors, science parks, incubators, industrial clusters and institutions of learning and create effective collaborative linkages between them ;
- 5.4.1.25 strengthen STI R&D capacity to monitor, predict and mitigate the adverse effects of climate change, agriculture, disaster management, renewable energy, health and hazardous chemicals;
- 5.4.1.26 develop an efficient integrated waste management system and pesticide application through research and development in recycling technology to minimize pollution;
- 5.4.1.27 Integrate the contributions of local communities, scientific societies, science academies, the private sector, public industries and service sectors to make requirements of the scientific, technical and vocational training relevant to the labour market.

CHAPTER 6: INFORMATION AND COMMUNICATION TECHNOLOGIES

6.1 Introduction

ICT's contribution to the national GDP demonstrates its rapid growth. This is manifested in the strong correlation between ICT applications and meaningful socio-economic development. The government intends to take advantage of ICT to boost economic development by focusing on telecommunications, information technology and communication. Despite the progress made, further developments are facing challenges which this policy intends to address:

6.2 Policy Statement

The National Information and Communication Infrastructure (NICI) plans will form the basis for government policy to address STI issues and development in all the sectors of the economy.

6.3 Objectives

Within the policy period, Government will pursue the following objectives and complement the NICI plans in order to strengthen ICT development:

- 6.3.1 integrate ICTs in all the sectors of the economy in order to promote efficient service delivery;
- 6.3.2 promote the adoption and adaptation of new technologies in ICT;
- 6.3.3 facilitate the use of ICT as a tool for training in the science and technical disciplines;
- 6.3.4 Enhance the use of ICT application for research and development in STI.

6.4 Strategies

For the attainment of the objectives cited above, the following strategies will be implemented:

- 6.4.1 promote and strengthen the infrastructure that will facilitate the development, affordability and accessibility of broadband connectivity;
- 6.4.2 promote efficient service delivery by conforming to national and international standards and norms;
- 6.4.3 ensure the affordability and accessibility of ICT-related materials;
- 6.4.4 intensify the use of ICTs as a learning tool, especially during the foundation level of education;
- 6.4.5 facilitate quality distance learning and the creation of knowledge hubs;
- 6.4.6 create and strengthen ICT training centres to support skills training and development;

- 6.4.7 promote the use of ICTs in all the sectors of the economy;
- 6.4.8 strengthen the use of ICTs to support research and development;
- 6.4.9 Promote and strengthen the development of research in ICTs.

CHAPTER 7: STI INFRASTRUCTURE

7.1 Introduction

The government offers a comprehensive vision that encompasses its state-of-the-art infrastructure providing the basis of the country's economic and social well-being.

The Ministry of Higher Education, Research, Science and Technology was established in 2007 to, among other things, steer the nation's STI agenda. The Gambia Government, in recognition of the important role STI plays in socio-economic transformation, sought to establish the Kanilai Institute of Science and Technology (KIST) and the Science Park of the University of The Gambia in Faraba Banta.

However, additional institutions and advisory mechanisms and solid STI infrastructure are required to enhance the national STI system.

7.2 Policy Statement

Government and other stakeholders will develop, strengthen and sustain proactive programmes to ensure the availability of the required STI infrastructure in order to achieve the development, growth and competitiveness envisaged in Vision 2020.

7.3 Policy Objectives

Within the policy period, Government will pursue the following objectives in order to strengthen STI development:

- 7.3.1 provide adequate training institutions, infrastructure and a legal and regulatory framework;
- 7.3.2 promote and strengthen the development and utilization of indigenous technologies for increased socio-economic output;
- 7.3.3 Enhance the application of ICT infrastructure in all regions.
- 7.3.4 Promote the adoption and adaptation of other technologies for increased socio-economic outputs.

7.4 Strategies

During the policy period, the Government of The Gambia and other stakeholders will ensure the implementation of the following strategies:

7.4.1 Metrology, Standardization, Testing and Quality Infrastructure

- 7.4.1.1 build and strengthen national capacities for Metrology, Standardization, Testing, Quality assurance (MSTQ), accreditation, certification and other regulatory institutions;
- 7.4.1.2 Foster and strengthen MSTQ-related cooperation regionally and internationally.

7.4.2 Fundamental Science Laboratories

- 7.4.2.1 Design, build and equip high-quality laboratory facilities for the physical and natural sciences, including computer sciences at all the levels of the education system in all the regions of the country;
- 7.4.2.2 Establish high-quality skills training centres in each region of the country;
- 7.4.2.3 Provide adequate equipment and sustainable supply of consumables at all the levels of education.

7.4.3 Intellectual Property Rights (IPR) Infrastructure

- 7.4.3.1 strengthen laws that promote IPR, research and investment in STI in The Gambia;
- 7.4.3.2 strengthen the National Intellectual Property Rights Office as the regulatory body for all intellectual property and copyright-related issues;
- 7.4.3.3 Strengthen the human capacity of the legal system in order to improve intellectual property rights and dispute settlements.
- 7.4.3.4 establish an IPR databank through the establishment of a Technology and Innovation Support Centre;
- 7.4.3.5 integrate intellectual property protection in all the relevant sectors of the economy;

7.4.4 ICT Infrastructure

- 7.4.4.1 strengthen the development of national and regional ICT infrastructure (e.g. ACE) and its interconnection over global networks for greater access to STI information;
- 7.4.4.2 ensure adequate broadband connectivity throughout the country;
- 7.4.4.3 develop indicators to monitor and evaluate the broadband quality of available networks to better assess the level of service delivery;
- 7.4.4.4 Improve, maintain and modernize infrastructure through public and private sector investments in transport, energy and information and communication technology.

7.4.5 Links between Centres of Excellence and Universities

- 7.4.5.1 establish and equip an international Centre of Excellence for STI;
- 7.4.5.2 Establish and equip specialized research laboratories in higher education through linkages with relevant institutions.
- 7.4.5.3 Promote collaboration between all the Centres of Excellence.

7.4.6 Indigenous Technologies

- 7.4.6.1 develop a framework that promotes the establishment of a “university-led” research institute for the advancement of indigenous technologies;
- 7.4.6.2 establish and develop a national indigenous technologies and knowledge information database;
- 7.4.6.3 establish documentation and dissemination units for innovation and practices related to indigenous technologies;
- 7.4.6.4 enhance the packaging of local produce, particularly food items and traditional medicine in order to add value to meet international standards;
- 7.4.6.5 establish and adequately fund indigenous research institutes to conduct practical and result-oriented activities;
- 7.4.6.6 encourage a hybrid of indigenous and imported technologies;
- 7.4.6.7 Collaborate with other countries to help strengthen the country’s infrastructure and human capital in STI for the development of indigenous technology.

CHAPTER 8: LEGAL AND REGULATORY FRAMEWORK

8.1 Introduction

The enhancement of a legal framework and institutional structures is required to ensure future investment in STI. The advent of an STI Policy will usher in the creation of new institutions and this will require laws for their modus operandi.

8.2 Policy Statements

- 8.2.1 *Government and stakeholders will ensure that the handling, manufacturing and disposal of hazardous chemical and waste are improved to protect lives and the environment;*
- 8.2.2 *Government will ensure that researchers and participants in a clinical trial are ethically protected;*
- 8.2.3 *Laws relating to research, technological development and innovation will be established.*
- 8.2.4 *The promotion of the simplification of the legal and regulatory environment regarding business establishment and operations will be encouraged*

8.3 Objectives

Within the policy period, Government will pursue the following policy objectives in order to strengthen STI development:

- 8.3.1 put in place a regulatory mechanism for proper waste disposal to protect human health and the environment from hazardous chemical and waste from STI activities;
- 8.3.2 establish a regulatory framework to protect research subjects in STI;
- 8.3.3 strengthen regulations to protect workers on the job;
- 8.3.4 improve international co-operation to enhance the STI legal system;
- 8.3.5 Review and renew laws and regulations relating to business development.

8.4 Strategies

The Gambia Government will ensure the implementation of the following strategies to achieve the set objectives:

- 8.4.1 improve the level of enforcement of the National Environment Management Act (NEMA) to protect human health and the environment;

- 8.4.2 enforce labour laws to protect scientists, researchers and industrial workers from exposure to hazardous materials;
- 8.4.3 promulgate and align laws that will strengthen The Gambia's research system to facilitate international cooperation;
- 8.4.4 strengthen the relevant government authorities such as the National Centre for Arts and Culture (NCAC) to stamp out the illegal practice of intellectual property rights;
- 8.4.5 incorporate IPR in the curriculum at the various levels of education to improve awareness;
- 8.4.6 enforce The Gambia Industrial Property Act to protect products;
- 8.4.7 Redesign the overall legal framework to align with international standards.

CHAPTER 9: SCIENCE, TECHNOLOGY, INNOVATION AND SOCIETY

9.1 Introduction

In The Gambia, efforts are being made to harness STI in order to improve the country's health conditions, environment with due considerations to climate change, gender disparities, agriculture and engineering initiatives, poverty alleviation, disaster risk reduction and management, transportation, as well as other areas of national development.

It is therefore, important to raise society's awareness of the need for the development of STI in all the sectors and its role in the overall national development. This will contribute effectively to the challenges that society encounters to improve and implement STI policy objectives in conformity with the country's ethical, social, cultural norms and values.

9.2 Policy Statement

The Gambia Government will promote STI acculturation in all gender categories of society through the adoption and application of knowledge acquisition and assimilation. Government will also improve the diffusion of STI knowledge to facilitate society's participation in innovative scientific and technical programmes that will improve the living conditions of its citizens.

9.3 Objectives

Within the policy period, Government will pursue the following policy objectives in order to strengthen science and technology development for society's benefit:

- 9.3.1 strengthen advocacy; improve awareness and participation in all STI-related policies, programmes and activities in all the categories of society;
- 9.3.2 harness and modernize indigenous technologies and other technologies in order to optimize their use in national development;
- 9.3.3 strengthen science literacy for all the categories of society;
- 9.3.4 Foster effective collaboration at the national and international levels in all STI-related activities.

9.4 Strategies

The Gambia Government will ensure the implementation of the following strategies:

- 9.4.1 establish an STI information management system to support policy decisions;

- 9.4.2 raise public awareness on STI through the use of exhibitions, simple demonstrations and symposia, the print and electronic media, traditional oral communicators, role plays, dramatization and focus group discussions by engaging the youth, women's groups, opinion leaders and educational/training institutions (e.g. science clubs, mothers' clubs, parent-teacher associations);
- 9.4.3 use STI to promote the appropriation of science by society through science literacy, popularization, open seminars, conferences, science weeks and open days;
- 9.4.4 establish and strengthen regulations and legal governance to ensure the protection and privacy of individuals and society;
- 9.4.5 promote gender perspectives in all STI systems and policies in order to factor in the interests and capacity of both men and women for the creation and utilization of scientific and technological knowledge;
- 9.4.6 Establish STI centres in all the regions as lead institutions in the popularization and elevation of STI knowledge, awareness and appreciation in society.

CHAPTER 10: STI GOVERNANCE

10.1 Introduction

A sound institutional and regulatory framework is central to an effective and well-functioning STI ecosystem. However, the major constraints in the STI sector in the country include the insufficient specialized human resources, especially in the area of STI governance. This human capacity gap hinders the promotion, utilization and adoption of STI in The Gambia's development process.

The Government's role is key to creating an environment under which STI flourishes through incentives and regulatory measures. An STI governance structure, which highlights the dynamic partnership between all the actors in economic and social development sectors, is essential to steer the national STI agenda and facilitate the effective implementation of the government's policies and programmes. The Gambia Government will facilitate and nurture the adoption of formidable structures that will enable STI to thrive in the country.

MoHERST is the sector ministry mandated to coordinate the implementation of the National STI Policy. This mandate will be delivered through the various relevant institutions that have critical stakes in STI. The Ministry will provide policy direction in consultation with the established structures contained in this policy.

10.2 Policy Statement

Government will establish a viable STI governance framework to facilitate an effective policy implementation, improved transparency, accountability, entrepreneurship, safe and appropriate use of STI by government, industry, society and all other stakeholders.

10.3

Objectives

Within the policy period, Government will pursue the following policy objectives in order to strengthen STI governance:

10.3.1 Create and support all the relevant elements of an STI governance structure;

10.3.2 Promote and establish linkages between the STI sub-sectors.

10.3.3 Ensure effective implementation of STI policies

10.4 Strategies

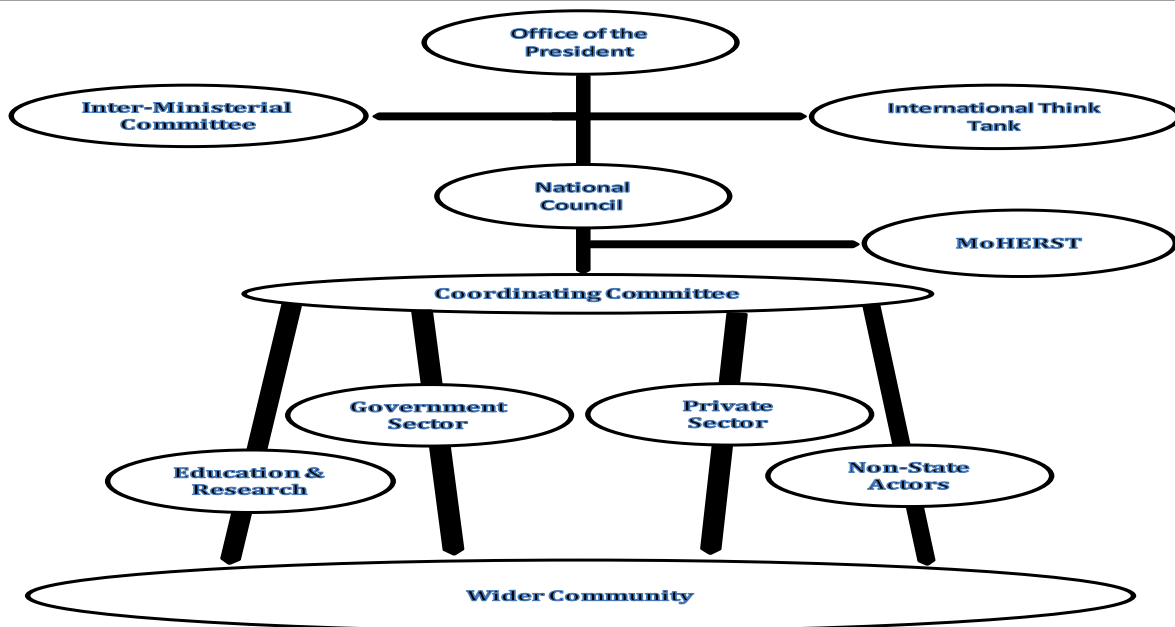
The Gambia Government and other stakeholders will ensure the implementation of the following strategies:

- 10.4.1 streamline the institutional framework for STI to enhance coordination and synergies in implementing STI activities and programmes;
- 10.4.2 enhance national and international partnerships and cooperation in STI;
- 10.4.3 ensure the establishment of a sound STI governance framework;
- 10.4.4 Strengthen the capacity of the Parliamentary STI Committee to effectively serve as an auditing arm of government in the implementation of STI policies and programmes.

10.5

S

TI Governance Framework



10.5.1 National Council for STI

The National Council for STI (NCSTI) will comprise members from government ministries and other sectors. It will, inter alia, carry out the following STI governance functions:

- 10.5.1.1 provide advice to the ministries on STI issues and implementation strategies to ensure that STI is responsive to the needs of the country;
- 10.5.1.2 provide for the harmonization and coordination of the country's STI policy so that its activities are comprehensive, complementary and reinforcing across all the sectors and ministries;
- 10.5.1.3 facilitate the monitoring and evaluation of the implementation of the STI policy to ensure that the activities initiated are relevant and beneficial to The Gambia;
- 10.5.1.4 convene council meetings every six months to review progress attained in the implementation of the National STI Policy for proper guidance to the sectors;
- 10.5.1.5 provide leadership and political support on the initiation and implementation, audit and review of all the major STI programmes;

- 10.5.1.6 facilitate the integration, collaboration and harmonization of the sectoral STI policies;
- 10.5.1.7 Support the mobilization of adequate funding for the sound implementation of national STI priorities and programmes.

10.5.2 Ministry of Higher Education, Research, Science and Technology

MoHERST will, among other things undertake the following:

- 10.5.2.1 coordinate, monitor and evaluate the implementation of the sector's policies and programmes related to STI;
- 10.5.2.2 develop foresight programmes and report on them;
- 10.5.2.3 plan and implement STI promotional activities and awareness initiatives through outreach programmes;
- 10.5.2.4 facilitate the establishment of STI agencies, councils and committees that will assist in the implementation of national STI policies and programmes;
- 10.5.2.5 establish, monitor and evaluate a national database management system in STI especially on research and development;
- 10.5.2.6 ensure that all MoHERST ICT requirements, services and facilities including hardware, software, networking, and cyber-security, are being managed and administered accurately, securely and timely according to the Ministry's needs;
- 10.5.2.7 strengthen the capacities and capabilities of industries through initiatives that will ensure competitiveness, increased productivity and economic growth;
- 10.5.2.8 strengthen the national innovation system and encourage the commercialization of R&D outcomes of public research institutions;
- 10.5.2.9 enhance cooperation in the fields of STI with other countries, international organizations and agencies;
- 10.5.2.10 collect and disseminate strategic STI information through a National STI Information Centre;
- 10.5.2.11 provide periodic technical reports to government on the status of STI in The Gambia;
- 10.5.2.12 Prepare annual budgets to support sectoral/institutional STI-related activities.

10.5.3 National Assembly Select Committee on STI

The National Assembly Select Committee on STI will, among other things, undertake the following:

- 10.5.3.1 Serve as an auditing arm and an oversight function of the government on STI;
- 10.5.3.2 Carry out a quarterly review and assessment of the impact of STI in the country;
- 10.5.3.3 Assist in the promotion and development of STI in the country.

CHAPTER 11: FUNDING AND SUSTAINABILITY

11.1 Introduction

The Gambia Government continues to demonstrate an increasing level of interest in improving the efficiency of the sectors in order to stimulate investment in STI programmes and activities for the socio-economic and cultural development of the country. It has been recognized that the successful implementation of the integration and popularization of STI into the country's socio-economic and cultural development agenda will largely depend on the availability of adequate funds to support all STI programmes and related activities.

11.2 Policy Statement

The Gambia Government will coordinate the effective participation and contribution of state and non-state actors in the sustainable funding of STI programmes for the socio-economic development of the country.

11.3 Objectives

Within the policy period, Government will pursue the following policy objectives in order to increase funding for the sustainable development of STI in The Gambia:

- 11.3.1 Increase annual STI budget allocations for the funding of STI programmes, research and development;
- 11.3.2 Source, mobilize and manage sustainable STI resources targeted at strategic national priorities;
- 11.3.3 Provide fiscal and other incentives as well as mentoring and business development services support to high-tech start-ups and high growth firms.

11.4 Strategies

The Gambia Government will ensure the implementation of the following strategies:

- 11.4.1 increase the budgetary allocation for STI activities;
- 11.4.2 mobilize the support of donor and other international agencies;
- 11.4.3 encourage the private sector with incentives to support STI activities at all levels;
- 11.4.4 support the commercialization of novel products or processes;
- 11.4.5 harness the resources needed from public, private and international donor partners for the mainstreaming and sustenance of STI in the Gambian economy;

- 11.4.6 encourage and promote effective and efficient leveraging of reliable and adequate public-private sector partnership in support of STI-related programmes and activities;
- 11.4.7 support the establishment of a system for regular review of the funding mechanisms of STI programmes;
- 11.4.8 review administrative and financial procedures for STI funding mechanisms and measures to promote the achievement of performance targets;
- 11.4.9 establish recurrent funding mechanisms to ensure the continuity of programmes and STI-related activities;
- 11.4.10 strengthen advocacy to highlight the benefits of STI;
- 11.4.11 develop a comprehensive performance management framework (PMF) linking programme outcomes to long-term impacts of the policy;
- 11.4.12 develop and execute an effective and efficient monitoring and evaluation (M&E) mechanism;
- 11.4.13 provide funding to ensure a periodic review of the implementation of the STI policy by all the relevant stakeholders;
- 11.4.14 strengthen the funding of the capacity-building programmes to ensure competitiveness, continuity and high-level performance in the STI sector;
- 11.4.15 create grants and other fiscal incentives to facilitate businesses to make breakthroughs in regional, sub-regional and international markets;
- 11.4.16 create incentives in the form of tax holidays, duty waivers and service support, among others, for research into innovative products and services as well as the commercialization of research results;
- 11.4.17 invest in the establishment of STI parks and incubation centres; encourage government to set up special funding for universities and research institutions for knowledge generation;
- 11.4.18 encourage public-private partnerships for the provision of funding/grants for design/improvement and prototype development;
- 11.4.19 provide funding for the repair and maintenance of research equipment, especially for scientists in applied research;
- 11.4.20 Provide incentives such as public purchasing, tax breaks or soft loans, to be made available for the diffusion or development of local technology.

CHAPTER 12: CONCLUSION

The NSTIP describes government's plan to develop and harness its scientific, technological and innovative competencies in advancing various social, cultural and economic sectors. It also addresses some of the constraints associated with this task including inadequate capacities in infrastructure, expertise, research facilities and funding.

The development of STI capacities and capabilities assumes increasing importance in today's rapidly changing and globalizing world where prosperity depends on the generation and more importantly, the application and dissemination of new knowledge, skills and, competencies.

In this regard, the Gambia Government recognizes the crucial role STI can play in socio-economic transformation. Thus, the need to develop and enhance the nation's STI system will be crucial in order to ensure that the citizens are no longer disadvantaged by the exponential pace in STI developments that they are witnessing today.

The NSTIP represents the government's commitment towards revitalizing the STI system so that the country can become competent and confident in mobilizing STI to achieve the goal of becoming a more equitable, prosperous, sustainable and inclusive society as enshrined in the Vision 2020 blueprint and PAGE.

12.1 Strengthening the NSTIP's Strategic Pillars

The NSTIP sets out a new and focused approach to mobilize STI to achieve the country's economic, social and environmental goals, which have been identified in Vision 2020 and PAGE. It positions The Gambia on the path of sustainable development by addressing existing challenges and building on its successes.

The approach to the NSTIP is built on rationality and a sense of urgency in the wake of current realities and future prospects and opportunities. A supply-push focus alone will not achieve the desired objectives and neither will obsession with demand-pull emphasis succeed. Both factors of STI development will be put into perspective. Increased efforts towards strengthening the linkages between these two dimensions are necessary and will be given high priority. The recommendations of NSTIP are built on the nine strategic pillars that are central to the success of The Gambia's long-term competency in STI, namely:

1. Education and Training
2. Elaboration of Indicators and Data Management
3. Research and Development
4. Information and Communication Technologies
5. STI Governance

6. Legal and Regulatory Framework
7. Science Technology and Society
8. STI Governance
9. Funding and Sustainability

These strategic pillars will provide the building blocks for a dynamic innovation-led economy in The Gambia. By reinforcing the strategic pillars, the country can enhance its expertise in STI so that it can improve the living conditions of all Gambians, enhance healthcare, provide a cleaner environment, more competitive industries, increased productivity of the agriculture sector, greater access to quality higher education, skills training for all and, above all, better living conditions for present and future generations.

12.2 Supporting the Nation's STI Agenda

Under the NSTIP, Government will adopt a proactive role in directing the nation's STI agenda. It will redouble efforts as reflected in the objectives of the nine strategic pillars of the NSTIP in a bid to ensure a collective effort towards adopting and elevating the country's competence in STI. This philosophy of building and adopting a high spirit of teamwork underpins the NSTIP to undertake the following:

- 12.2.1 introduce a legal framework to ensure commitment and the implementation of the NSTIP objectives and priorities;
- 12.2.2 intensify and diversify the development of the country's human capital at all levels through specific programmes and mechanisms as well as engagement with Gambians in the diaspora;
- 12.2.3 create, consolidate and streamline fiscal and financial incentives to fund the building of a critical mass of scientists, technologists, engineers, researchers and innovators and also promote increased access to knowledge, skills and technologies to ensure greater effectiveness and increased productivity;
- 12.2.4 create STI databanks and information management systems to better audit and diagnose the performance of the national STI ecosystem;
- 12.2.5 raise public awareness and appreciation of STI in socio-economic development;
- 12.2.6 increase Gross Expenditure on Research and Development (GERD) to intensify R&D to the level recommended in this policy;
- 12.2.7 revitalize and update the nation's R&D system in order to enable the country to generate and utilize knowledge, address national challenges and priorities and identify new opportunities;
- 12.2.8 establish a sound quality infrastructure to ensure the production of world-class products and services as well as to reduce non-tariff barriers to trade;

- 12.2.9 stimulate an enabling environment that promotes private investments in innovation as well as increased inflows of advanced technologies through FDIs and other investment channels;
- 12.2.10 promote increased demands for knowledge to foster greater collaboration between industry (particularly SMEs) and public sector research institutions, including educational institutions at all the levels;
- 12.2.11 prepare comprehensive guidelines and methodologies for auditing and documenting indigenous knowledge and technologies based on good practices from around the world;
- 12.2.12 intensify greater collaboration between custodians of traditional and indigenous knowledge with research institutions and industry in the development and promotion of indigenous technologies and products;
- 12.2.13 establish and strengthen STI governance structures and ensure increased collaboration of all the stakeholders to ensure the efficient and responsive coordination and implementation of NSTIP priorities;
- 12.2.14 Introduce a more accountable system to ensure responsibility for progress on the implementation of the NSTIP.

The government will support the above commitments with increased investments in STI through various fiscal and financial instruments to ensure success in the realization of its set goals. These investments are necessary to assure the nation's continued prosperity. They are also vital for ensuring a more inclusive and sustainable society that is confident in facing the challenges of the 21st century.

12.3 The NSTIP – A Framework for Socio-economic Prosperity

The NSTIP provides a robust and resilient framework that will guide the harnessing and utilization of STI to achieve the objectives of becoming a prosperous, sustainable and competent STI nation as envisaged in PAGE and Vision 2020. This policy document sets out the government's commitments towards enhancing the nation's competencies in STI that will ensure that, by 2022, the country has a functional and dynamic STI ecosystem in which:

- 12.3.1 the country increases investments in scientific, technological and innovative activities to become proficient in making efficient use of technologies and be able to catch up with the developed nations in selected STI knowledge and technologies;
- 12.3.2 the government is well prepared to manage the STI ecosystem through clearly defined priorities; efficient institutional framework; effective utilization of resources; a vibrant and motivated workforce; strong partnerships; and a transparent and accountable system of reporting;

- 12.3.3 the country will devise mechanisms to develop, attract and retain the best minds to conduct world-class research and support the economy and society;
- 12.3.4 national industries, both public and private-owned, will embrace STI as the key driver for increased competitiveness, supported by a conducive innovative environment that promotes research, innovation and new opportunities;
- 12.3.5 Gambian society is comfortable and competent in utilizing STI to improve the citizens' living conditions as well as harnessing traditional and indigenous knowledge for socio-economic advancement.

The measures set out in the NSTIP provide a solid basis for building a dynamic innovation-led economy in The Gambia. By effectively implementing the nine strategic pillars of the NSTIP, it is expected that the full potentials of science, technology and innovation can be harnessed to enhance the nation's innovative capacity in improving the quality of life of all Gambians.