REPUBLIC OF KENYA

SECTOR PLAN
FOR
SCIENCE, TECHNOLOGY AND INNOVATION

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KENYA VISION 2030

STATEMENT BY THE CABINET SECRETARY THE NATIONAL TREASURY AND PLANNING

Kenya's long term development blue-print, Kenya Vision 2030, is in its third implementation phase under the Third Medium Term Plan (MTP III) 2018-2022. A total of 28 MTP III Sector Plans have concurrently been prepared through 25 MTP Working Groups and three (3) Thematic Working Groups. The Plans provide in detail policies, programmes and projects to be implemented in each sector for the period 2018-2022. The Plans also incorporate policies, programmes and projects necessary for the effective implementation of the "Big Four" initiatives namely: manufacturing and agro-processing; food and nutrition security; universal health coverage and affordable housing. Ongoing flagship projects and other priority programmes and projects carried forward from the previous Medium Term Plans will also be implemented. The Sector Plans have also mainstreamed key priorities outlined in the Manifesto of the Jubilee Government.

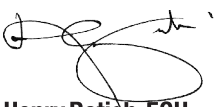
The MTP III and the Sector Plans have been prepared through a participatory and inclusive process involving representatives from the government, development partners, private sector, Civil Society, NGOs, organizations representing vulnerable groups, faith-based organizations and professional associations, among others and in line with the constitutional requirements.

The Sector Plans detail specific programmes and projects for implementation during the plan period, 2018-2022.The programmes and projects outlined in these plans will be implemented in close consultation and collaboration with county governments and in line with the Fourth Schedule of the Constitution. The Public Private Partnerships (PPPs) framework will be the vehicle through which the private sector will contribute to the implementation of programmes and projects highlighted in the plans.

The County Integrated Development Plans, County Spatial Plans and Ministries, Departments and Agencies (MDAs) Strategic Plans (2018-2022) will be aligned to the MTP III and the National Spatial Plan. Implementation of these plans will also be linked to the Results-Based Management Framework through Performance Contracts and Staff Performance Appraisal System.

A robust monitoring and evaluation framework will be put in place. In this regard, National Integrated Monitoring and Evaluation System (NIMES), County Integrated Monitoring and Evaluation System (CIMES) and the electronic Project Monitoring Information System (e-ProMIS) will be fully integrated with other governmental financial systems. This will ensure effective tracking of implementation of programmes and projects and also boost Public Investment Management.

In conclusion, I would like to appreciate the respective Cabinet Secretaries, Chief Administrative Secretaries, Principal Secretaries, staff in the MDAs and all those involved in the preparation of the Sector Plans for their valuable inputs. In addition, I commend staff from State Department for Planning led by Principal Secretary, Planning for the effective coordination of the MTP III preparation process.



Henry Rotich, EGH
Cabinet Secretary
The National Treasury and Planning

FOREWORD

The Third Medium Term Plan (MTP III, 2018-2022) succeeds the Second MTP (2013-2017). Like the previous MTPs, it has been guided by Kenya Vision 2030 – the country's long term development blue print – which seeks to transform Kenya into a newly-industrializing middle-income country by providing a high quality of life to all its citizens in a clean and secure environment by 2030. The MTP III has also been guided by the Constitution of Kenya and incorporates the priorities outlined in the Government Manifesto.

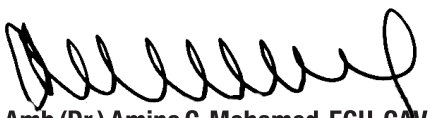
The Vision identifies Science, Technology and Innovation (ST&I) as an enabler of the Economic, Social and Political pillars. The ST&I Sector plan has thus been developed to support the Vision and the country's overall development priorities.

The ST&I Sector Plan focuses on generation, protection, management and application of ST&I as key requirements for the transformation of the country's economy one that is innovation-led and knowledge-based. The Plan aims at intensifying the application of ST&I to raise productivity and efficiency levels across all the sectors of the economy for the realisation of the projected economic growth and development.

The objective of the ST&I Sector Plan is to integrate ST&I into national production processes and create technology platforms that are essential for the generation of new knowledge and the development of innovative products, processes and services in a wide range of sectors. The programmes and projects in the Plan have been conceptualized to support the government strategic interventions under the four identified pillars of change: Manufacturing, Agro-processing, Housing and Health, popularly referred to as "The Big Four".

I wish to appreciate and commend all stakeholders who participated in the compilation of this plan and reiterate the government's commitment to providing an enabling policy, legal, regulatory and administrative framework for the successful implementation of this plan.

I call upon all stakeholders, including the private sector actors to support the actualization of the programmes and projects herein. The future can only get brighter.
God bless Kenya.



Amb (Dr.) Amina C. Mohamed, EGH, CAV
Cabinet Secretary
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PREFACE

Science, Technology and Innovation (ST&I) play a pivotal role in the industrialization, sustainable development and growth of nations. Investments and integration of ST&I into social, economic and governance policies will increase Kenya's global competitiveness, create employment and increase productivity. Intensified application of ST&I is essential in raising productivity and efficiency levels across the economic, social and political pillars. All these are key attributes to achieving the overarching Kenya Vision 2030 goals.

To achieve the goals of Vision 2030, the ST&I sector has identified flagship projects and priorities for the MTP III. This approach calls for adoption of various initiatives including: Public Private Partnerships (PPPs); linking industry with academia; value chain analysis; synergy as opposed to individual competition and initiatives for closed-cycle cluster approach for enhanced cooperation. The MTP III integrates ST&I into all sectors by ensuring that the sector players have access to the relevant technologies for the production of products, processes and services.

This Plan provides a multi-disciplinary, transformative and creative approach to spur economic growth, sustainable job creation and improve the quality of life for all Kenyans. Focus will be on programmes that will strengthen human capital development, infrastructure development, enhance the triple helix type '4' approach to Research, Development and Innovation. One of the critical programmes for MTP III is the finalization and publication of the ST&I policy to underpin the development of the sector and to provide a firm legal and regulatory framework for the governance of the sector.

Prof. Colleta A. Suda, PhD, FKNAS, CBS
Chief Administrative Secretary and Principal Secretary
State Department for University Education and Research
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ABBREVIATIONS & ACRONYMS

ADB	African Development Bank
BRICS	Brazil, Russia, India, China and South Africa
CBPP	Contagious Bovine Pleuropneumonia
CCPP	Contagious Caprine Pleuropneumonia
CDACC	Curriculum Development, Assessment and Certification Council
CUE	Commission for University Education
ECF	East Coast Fever
EAAPP	East African Agricultural Productivity Project
GDP	Gross Domestic Product
GNSS	Global Navigation Satellite System
GoK	Government of Kenya
HELB	Higher Education Loans Board
HEST	Higher Education Science and Technology
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
ICT	Information and Communication Technology
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KAIST	Kenya/Korea Advanced Institute of Science and Technology
KALRO	Kenya Agricultural and Livestock Research Organization
KAM	Kenya Association of Manufacturers
KEFRI	Kenya Forestry Research Institute
KEMFRI	Kenya Marine and Fisheries Research Institute
KEMRI	Kenya Medical Research Institute
KENIA	Kenya National Innovation Agency
KEPSA	Kenya Private Sector Alliance
KIOG	Kenya Institute of Oil and Gas
KIPI	Kenya Industrial Property Institute
KIRDI	Kenya Industrial Research and Development Institute
KNAS	Kenya National Academy of Sciences
KNBS	Kenya National Bureau of Statistics
KNQF	Kenya National Qualification Framework
KNSA	Kenya Space Agency
KUCCPS	Kenya Universities and Colleges Central Placement Service
LIWA	Linking Industry With Academia
MoE	Ministry of Education
MoLSP	Ministry of Labour and Social Protection

MoU	Memorandum of Understanding
MTEF	Medium Term Expenditure Framework
NACOSTI	National Commission for Science, Technology and Innovation
NBA	National Biosafety Authority
NCD	Non-Communicable Diseases
NPSRL	National Physical Science Research Laboratory
NPT	National Performance Trials
NRF	National Research Fund
PAUSTI	Pan African University Institute of Basic Sciences, Technology and Innovations
PSC	Public Service Commission
SAGA	Semi-Autonomous Government Agency
SCAC	State Corporations Advisory Committee
SDG	Sustainable Development Goal
SEKU	South Eastern Kenya University
SET	Science, Engineering and Technology
SKA	Square Kilometre Array
ST&I	Science, Technology and Innovation
STEM	Science, Technology, Engineering and Mathematics
STISA	Science, Technology and Innovation Strategy for Africa
TVET	Technical Vocational Education and Training
TVETA	Technical Vocational Education and Training Authority
UFB	Universities Funding Board
UoN	University of Nairobi
VTT	Vocational Technical Training

EXECUTIVE SUMMARY

The review of MTP II has demonstrated that most of the relevant institutions have been established and operationalized and legislation put in place. Where gaps exist, especially with regard to policy, these have been identified and proposals to address them have been made for implementation in MTP III. The achievements realized, challenges met and lessons learnt in the implementation of the MTP II have informed and shaped the identification of priority programmes and projects to be implemented during MTP III. The ST&I Sector Plan prioritizes areas that reflect the most important fields of knowledge and technology for which research excellence is important to improve Kenya's ability to address social and economic challenges.

To address the identified needs through knowledge creation, technology development, diffusion and commercialization, this plan identifies the following programmes for implementation during the MTP III period:

i. Nano-Sciences, Material Science, and New Production Technologies;

ii. Space Science Technologies Development;

iii. Energy Technologies Development;

iv. Science, Technology, Engineering and Mathematics (STEM);

v. Coordination of Technology, Innovation and Commercialization;

vi. County Technology and Innovation Delivery Services;

vii. Biotechnology and Biosciences;

viii. Natural Products;

ix. Policy, Legal and Institutional reforms;

The Sector Plan is organized as follows:
Chapter One presents the introduction with respect to Kenya's performance in ST&I; an overview of the MTP II and the focus of the MTP III for ST&I.

Chapter Two gives a situation analysis with focus on achievements realized during the implementation of the MTP II programmes and projects.

Chapter Three identifies challenges, emerging issues and lessons learnt during the implementation of MTP II.

Chapter Four presents the ST&I sector priorities and provide a brief description of programmes and projects to be implemented in MTP III.

Chapter Five highlights the policy, legal and institutional reforms to be undertaken for the effective governance of the ST&I Sector.

Chapter Six provides the implementation matrix that will be used to track progress of the MTP III programmes and projects. In addition, there are several annexures to the Plan, including the Monitoring and Evaluation Matrix.

1.0 INTRODUCTION

1.1 Overview

The third Medium Term Plan (MTP III, 2018-2022) of Vision 2030 succeeds the second MTP (2013-2017). Vision 2030 identified Science, Technology and Innovation (ST&I) as one of the enablers on which the Economic, Social and Political pillars are anchored. The Vision thus recognizes the role of Science, Technology and Innovation (ST&I) in raising productivity, efficiency levels, accelerating economic development and creating comparative advantage and competitiveness of the country. In recognition of this critical role of ST&I, the Kenya's Constitution makes specific provisions towards the development, protection and application of ST&I, including indigenous knowledge and technologies [Chapter Two, Articles 11(2)], 11(3) and, 69(1)(c)].

The Sector's role in ensuring that all sectors of the economy have access to the necessary technologies cannot be over emphasized. This is in line with the sector's theme "Accelerating the Transition to an Innovation-Led and Knowledge-Based Economy". During the MTP II, the sector set to: develop and implement an ST&I policy framework to support Vision 2030; strengthen scientific research; strengthen the technical capacity and capabilities of individuals and institutions at both national and devolved levels as well as raise the quality of teaching and learning of Science, Technology, Engineering and Mathematics (STEM) in schools, Technical, Vocational Education and Training (TVET) institutions and universities. These commitments were to facilitate the development of a highly skilled human resource base that will sustainably support and trigger innovation in priority areas.

Several achievements were realised over the plan period including legal, regulatory and institutional reforms to support the sector. Additionally, research funding grew from 0.48% to 0.79% of the GDP with a national target of 2% of GDP as per the ST&I Act, 2013.

There was also increased capacity for universities to offer STEM courses to meet the increased enrollment. In addition, increased spending on R&D by private companies and the existence of high caliber sector-based scientific research institutions. This led to Kenya's Global Competiveness Index improving from position 96 in 2012 to 91 in 2016 while the country's Innovation and Sophistication, Higher Education and Training, and Technological Readiness improved from 53, 103 and 89 in 2012 to 41, 97 and 88 in 2016, respectively. However, the sector did not fully achieve desired performance as envisaged in MTP II mainly due to inadequate funding and inadequate infrastructure and equipment.

Moving into the future, ST&I will continue to play a significant role in transforming Kenya into an innovation-led, knowledge-based economy that add value to the various products, services and processes. The MTP III will therefore focus on leveraging on the gains that the ST&I sector has made during the MTP II while taking into account international obligations and commitments such asSustainable Development Goals (SDGs) and the Africa Agenda 2063. The sector will work towards achieving SDG 9 on building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation. The sector specifically targets to encourage innovation and increase the ratio of Research and Development (R&D) workers per 1 million people from the current level of 231 to 400 researchers (in full-time equivalent) and enhance the public and private expenditure on R&D.

2.0 SITUATION ANALYSIS

This chapter presents the sector performance during the MTP II period. It also outlines the policies, legal frameworks and institutional reforms that were initiated, reviewed and implemented during the plan period. According to the World Economic Forum Global Competitiveness Reports, 2013-14 and 2017-18, Kenya's Global Competiveness Index improved from position 96 in 2012 to 91 in 2016. In terms of key index components, the country's Innovation and Sophistication, Higher Education and Training, and Technological Readiness improved from 53, 103 and 89 in 2012 to 41, 97 and 88 in 2016 (See Table 2.1). The favourable ranking is attributed to increased spending on R&D and the existence of high caliber scientific research institutions.

Table 2-1: Key Areas - Kenya's Global Competitiveness Index, 2016

Index Component	2012		2016	
	Rank	Score	Rank	Score
Global Competitiveness Index	96	3.8	91	4.0
Innovation and Sophistication	53	3.8	41	4.1
Higher Education and Training	103	3.5	97	3.8
Technological Readiness	89	3.4	88	3.7

Source: World Economic Forum, Global Competitiveness Reports, 2017-18 & 2013-2014

2.1 Achievements of MTP II Programmes and Projects

The achievements realized during the implementation of the MTP II programmes are as follows:

2.1.1 Nano-Sciences, Material Science and New Production Technologies Programme

The National Commission for Science and Technology (NACOSTI) developed the strategy for the establishment of the National Physical Science Research Laboratory for Engineering and New Production Technologies and designed the laboratory. Land allocation was made for the establishment of the lab at the Konza Technopolis.

2.1.2 Energy Technologies Programme

During the period, a secretariat was set up to oversee the activities towards the establishment of a nuclear energy facility. To build capacity for nuclear energy, several Kenyans are pursuing studies in nuclear Energy in South Korea, Slovakia, Russia, USA (Texas A&M) and China. Legal Frameworks for establishing both Kenya Institute of Oil and Gas (KIOG) and the Kenya Institute of Mining and Geology were put in place. However, Nuclear Energy Regulatory Framework was yet to be developed.

2.1.3 Science, Technology, Engineering and Mathematics (STEM)

Under STEM, the establishment of Kenya Advanced Institute of Science and Technology (KAIST) to provide specialized training in various engineering and science fields was underway. KAIST feasibility study was done and a memorandum of understanding amongst Ministry of Education, Konza Technopolis Development Authority and Export-Import Bank of the Republic of Korea was signed in May, 2016. The bank committed to avail a loan facility and the Government committed to contribute to the fund with a combined total amounting

to US $136,392. The Pan African University Institute of Basic Sciences, Technology and Innovations (PAUSTI) was established at JKUAT to undertake capacity building in STEM.

Three centres of excellence were established under the Southern and Eastern Africa Higher Education Centres of Excellence project at Edgerton, Moi and Jaramogi Oginga Odinga Universities. Egerton University is implementing a project in sustainable agriculture and agribusiness management, Moi University in phytochemicals, textile and renewable energy and Jaramogi Oginga Odinga University of Science and Technology for sustainable use of insects as food and feeds (insefoods).

Eight public universities were supplied with engineering and applied science teaching and research equipment. These include University of Nairobi, Dedan Kimathi University of Technology, Technical University of Mombasa, Meru University of Science and Technology, Technical University of Kenya, South Eastern Kenya University (SEKU), Multimedia University of Kenya and Masinde Muliro University of Science and Technology.

STEM was repackaged to promote experiential learning, innovation creativity and attraction to STEM related disciplines through well-coordinated programmes in education, R&D and Training in all aspects of ST&I. Students placed by Kenya Universities and Colleges Central Placement Service (KUCCPS) for STEM subjects increased from 30,411 in 2014 to 38,543 in 2016.

The proposed National Skills Inventory and Audit for ST&I was not conducted due to inadequate funds.

2.1.4 Coordination of Technology, Innovation and Commercialization Programme

The design for a National ST&I Statistics Observatory was developed for capturing, developing, sharing and storing National ST&I information. In addition, a scheme for awarding outstanding scientists was developed during the period under review. The National Research and Development survey and African Science Technology and Innovation Indicators Surveys (ASTII) were also undertaken.

2.1.5 County Technology and Innovations Delivery Services Programme

The Kenya National Innovation Agency (KENIA) was established and operationalized in 2016. The establishment of the Innovative Technology Transfer System was on course with an allocation of Kshs.312 million for the development of a 10-year master plan for science and technology parks. Regional Technical Offices were established under the State Department for Vocational and Technical Training (VTT). This was also implemented under the various sector - specific research institutes such as KALRO, KEMRI, KEFRI and KEMFRI that have specialized centres in different parts of country.

2.1.6 Biotechnology and Bioscience Programme

Review of the existing National Biotechnology policy of 2006 was on-going and a draft biosciences policy was undergoing stakeholder analysis. In addition, an agreement was signed in 2014 between the National Bio-safety Authority (NBA) and Egerton University for the establishment of state of the art modern biotechnology laboratory at the University.

A number of learning institutions undertook development of competent human resource for application of biotechnology research and product development by offering relevant post graduate programmes. These institutions include UoN, Kenyatta University, Egerton and JKUAT. The programmes are supported by Research

Institutes (KALRO, KEMRI, KEFRI) that provide scholarships to train officers. The Biotechnology research Institute was established at KALRO, while Biotechnology research programmes were offered at KEMRI and KEFRI and Biotechnology teaching programmes and specialized centres were established at UoN, Egerton University, JKUAT and Kenyatta University.

NACOSTI established a Bio Aware Programme and financed research activities in Biotechnology. NACOSTI, Universities, research institutes and NBA organized and participated in science weeks and conferences where issues of biotechnology were deliberated. Approval for field National Performance Trials was obtained for the Biotechnology products (Bt. Maize and Bt. Cotton).

2.1.7 Telecommunications, Electronics and Computer Technologies Programme

The Jomo Kenyatta University of Agriculture and Technology and Moi University commenced the assembly of computing devices for the digital learning programme in the Ministry of Education.

2.1.8 Natural Products Programme

Natural Products Policy and Bill were developed by the National Museums of Kenya to create an institutional set-up to serve as the primary custodian of the natural products industry.

2.1.9 Research and development Programme

In the field of medical research, Rapid test kits for HIV/AIDS and a protocol for the management of sand flies using pyrethrum powder were developed. In agricultural research field achievements include the development of four vaccines for control of Newcastle, ECF, CBPP and CCPP diseases; animal health diagnostic kits; medicated urea-molasses blocks for livestock; 15 fodder crop varieties; a technology for Total Mixed Ration for livestock from crop residues; improved indigenous chicken breeds and poultry feeds, 421 varieties of different crops. In addition, farmers were provided with 2,700 improved Sahiwal and Boran bulls and 1000 Boran X Friesian cross heifers and installed 12,000 drip irrigation kits. Lastly, Targeted fertilizer recommendations were developed to avoid blanket application of fertilizers and a book was launched showing the recommendations for different areas. During the MTP II period, KALRO tested 91,378 soil samples from across the country.

2.1.10 Human Capital Development

NACOSTI awarded 54 research sponsorship to PhD candidates in specialized areas in science and technology development at a cost of KSh78 million annually as a way of building capacity of human resources in the STI sector. NACOSTI funded 308 research proposals in 2013/2014. European Union funded research activities in Kenyan universities at KSh15 million in 2014/2015. Three Science and Technology Journals were published. The EU funded research activities in Kenyan universities at KSh15 million in 2014/2015.A total of 162 teaching staff were admitted into four universities for training at masters and PhD in engineering and applied Sciences through GOK/ADB Support to HEST Project. Nine MSc and seven PhD students were trained at KALRO under the East African Agricultural Productivity Project (EAAPP) funded by the World Bank.

The National Research Fund commenced its activities in 2016/2017 FY with an allocation of Ksh 3Billion from the GoK and further mobilized about Ksh384 Million from donors.

From this research kitty, Ksh 2Billion was allocated to various proposals as follows:

- Postgraduate studies: Ksh. 236 million;
- Multidisciplinary and multi-institutional research: Ksh. 888 million;

- Infrastructure support programmes: Ksh. 800 million;
- Research findings' disseminations: Ksh.27 million;
- Funding of Bilateral Collaborative matching grants: 58.7 million;
- Funding of Innovations: Ksh. 13.8million;

2.2 Policy, Legal and Institutional Reforms

The sector undertook various Policy, Legal and Institutional reforms to support implementation of programmes and projects. These include the development of the:

1) Biosciences draft Policy and Bill;
2) Atomic Energy Policy and Bill;
3) Nanotechnology draft policy and legal framework;
4) Kenya Space Science and Technology draft policy and bill;
5) Natural Products Draft Policy and Bill;
6) National Research and Development draft policy;
7) Kenya Agricultural and Livestock Research Act, 2013;
8) Science, Technology and Innovation Act, 2013;

The development of the Science, Technology and Innovation (ST&I) policy has progressed to the internal stakeholder engagement stage with inputs obtained from the key stakeholders.

The ST&I Act, 2013 was enacted during the MTP II planning period to provide a legal, regulatory and institutional framework for the governance of the sector. The Act establishes three critical institutions: The National Commission for Science, Technology and Innovation (NACOSTI), the National Research Fund (NRF) and the Kenya National Innovation Agency (KENIA) with clear mandates geared towards further development and effective coordination of the sector.

The University Education and Technical, Vocational Education and Training (TVET) institutions continue to contribute greatly to the generation of new knowledge, technologies and innovations for application in the national production systems following the enactment of the University Education Act, 2012 and the TVET Act, 2013.The following institutions were established: NRF, KENIA, NACOSTI, KALRO, UFB, TVETA, CDACC, KUCCPS, and Pan African University at JKUAT.

3.0 EMERGING ISSUES, CHALLENGES AND LESSONS LEARNT

This chapter highlights challenges, emerging issues and lessons learnt during the implementation of MTP II. They also form a basis for the proposed programmes and projects for the MTP III.

3.1 Emerging Issues

During the implementation of the programmes and projects set out in MTP II, the following emerging issues arose:

i. Rapid technological advancement in the area of digital technologies which shifted focus to the software development as an industry to tap the innovation potential of the Kenyan youth as well as need for increased resources for innovation incubation and commercialization of digital technology.
ii. Exploitation of space technology for National development which required the establishment of the National Space Agency and capacity building of Human Resource
iii. Harnessing of Natural Products for industrial production which requires huge investment in natural products research
iv. Incredible area of Synthetic Biology, Stem Cell research and regenerative medicine that is extending therapeutic possibilities for previously incurable diseases;
v. The need to develop new technologies and strategies for control of emerging pests and diseases for both crop and livestock;
vi. Development of relevant skills at TVET and University levels for full exploitation of the emerging priority sectors in the economy such as oil, gas, earth minerals and the blue economy.

3.2 Challenges

The sector experienced some challenges that impacted negatively on the achievement of its objectives which include:

i. The ST&I sector has operated without a formal, comprehensive and coherent national policy (Sessional Paper) despite the enactment of the ST&I Act in 2013. This has presented a major hindrance to the harmonious, efficient and coherent governance of the sector;
ii. Inadequate funding to undertake research, incubation and development due to non-alignment of the ST&I sector to the Medium-Term Expenditure Framework (MTEF);
iii. Poor state of infrastructure and equipment for research, higher education and training institutions, especially for physical sciences;
iv. Inadequate domestic industries to harness research outputs and turn them into goods and services thus stifling technology development in Kenya;
v. Weak ST&I culture among the population;
vi. Absence of a skills inventory;
vii. Mismatch between the skills possessed by the job seekers and those required by industry;
viii. Weak enforcement of local content requirement on projects execution thus hampering technology transfer;
ix. Threats emanating from climate change which affects research planning and productivity of various commodities;
x. Weak acquisition, adoption, adaptation and diffusion of technology thereby inhibiting the transition to a knowledge based economy;
xi. Weak mechanisms for implementation, monitoring, evaluation and review of ongoing projects and programmes;
xii. Inadequate entrenchment of ST&I from early childhood education system;

xiii. Limited employment opportunities for ST&I graduates leading to apathy and low enrolment in science based courses;
xiv. Limited capacity for training in specialized courses of medicine and engineering.
xv. Low uptake of the Public-Private Partnership as a financing mode.

3.3 Lessons Learnt

A review of the implementation of MTP II provides useful lessons on what the sector should focus on to realize and exploit the full potential of ST&I. The main lessons learnt are:

i. Political goodwill is vital for implementation of the MTP as the Sector Plan is aligned to the Governing Political Party Manifesto;
ii. The lack of a comprehensive ST&I policy (Sessional Paper) is a major cause of disharmony and incoherence in the governance of the sector;
iii. Globally, natural products industry contributes10% to GDP. Kenya could therefore benefit from the same by investing more in research, development and manufacturing of natural products;

4.0 PROGRAMMES AND PROJECTS FOR 2018-2022

This chapter outlines the programmes and projects that will be implemented during the MTP III (2018-2022). The identification of the programmes and projects is informed by the review of the sector performance, challenges, emerging issues and lessons learnt from the implementation of the MTP II. The programmes and projects have been proposed in view of their potential to:

i. Generate new knowledge through cutting edge research that support the Government's Strategic Interventions in the key areas of food security, manufacturing, agro-processing, health and housing;
ii. Spur economic growth, generate climate smart technologies to mitigate against the effects of climate change and enhance climate resilience;
iii. Accelerate the commercialization of research innovations by securing them through intellectual property rights and maximizing their delivery, uptake, sustainability and impact;
iv. Seamlessly align to the regional, continental and global development strategies, including the Sustainable Development Goals (SDGs), the Science, Technology and Innovation Strategy for Africa (STISA) 2024 and the African Development Agenda 2063;

Implementation of programmes and projects will require a multi-sectoral approach involving various Government departments and agencies responsible for coordination, research funding, capacity building, technology development, policy formulation, manufacturing and commercialization. Further, development partners and the private sector will supplement government efforts in financing through partnerships and collaborations. The following programmes will be implemented during the MTP III.

4.1 Flagship Projects and Programmes

4.1.1 Nano-Sciences, Material Science and New Production Technologies Programme

Kenya has inadequate expertise in basic physical sciences and engineering sciences including nanotechnology, which is a novel technology that allows the manipulation of properties of materials at the molecular or atomic level. This calls for intensified infrastructure development for basic physical sciences, engineering and Nano-Science to support high quality human capital development. The objective of this programme is to build state-of-the art infrastructure for high quality research and technology development.

Project 1: The National Physical Science Research Laboratory for Engineering and New Production Technologies

The objective of the project is to provide infrastructure and equipment for research that will deliver cutting edge physical science solutions for engineering, new production technologies and fabrication of research equipment and tools that need complex design outlay. The research units of The National Physical Science Research Laboratory (NPSRL) will provide consulting, engineering, fabrication and calibration services for both public institutions and private businesses. The Laboratory will incorporate research centres for the following highly specialized emerging sciences:

- *Electronics, Telecommunications and Computing:* The centre will undertake cutting edge research in the area of electronics, telecommunication and software computing sciences.

- *Nuclear Science for peaceful applications:* The centre will undertake advanced research and technology development for the peaceful applications of nuclear energy and safe disposal of nuclear waste.
- *Mining and Mineralogy:* The centre will undertake advanced research and technology development for sustainable exploration and exploitation of minerals.

Project 2: Centre for Nanotechnology Research
The Centre will be established as a research and technology development unit within the Industrial Research Complex that is being developed by the Kenya Industrial Research and Development Institute (KIRDI). It will focus on specialized research and technology development in nanoscience. Access to the center will be open to the broader nanotechnology practitioners in academia, industry and investment partners.

4.1.2 Space Science Technology Development Programme

Space Science Technology provides the space/ground segments of the technologies that support satellite telecommunications and Global Navigation Satellite System (GNSS). The development of the space enterprise presents opportunities for Kenya to exploit her ideal geographic location for equatorial launch of rockets. This unique location attracted the attention of the international community leading to the establishment of the San Marco Space Centre in Malindi by the Italian Government way back in 1964.

The objective of this programme will be to enhance the teaching, research and development of space science and subsequent use of space technology for peaceful purposes. This is envisaged to achieve sustainable provision and utilization of space-derived services for economic, social and scientific development. The programme will facilitate the following:

- Remote sensing for natural resource monitoring and management;
- Climate change and drought monitoring;
- Natural disaster prediction and mitigation;
- Rural and urban planning;
- Communications, navigation, positioning and timing;
- Telemedicine;
- E-learning;
- Space weather monitoring;
- National security surveillance;

Project 1: Centre for Microsatellite Technology Development
The centre will undertake advanced research in the area of satellite technology development, manufacturing, launch and operation. This will contribute to the development of a vibrant domestic space industry and create job opportunities for Kenyans.

Project 2: The Square Kilometre Array (SKA)
The SKA is a global project being implemented by nine African countries (Kenya, South Africa, Ghana, Mozambique, Madagascar, Mauritius, Botswana, Zambia and Namibia) and Australia. The objective is to build a large radio telescope with a node in Kenya. The project will entail the acquisition of the Longonot Earth Station from Telkom Kenya for conversion into a radio telescope to be used as a research facility for astrophysics, engineering, surveying, mathematics and information technology to generate "Big Data".

Project 3: Establishment of an Optical Astronomical Observatory
This observatory will undertake advanced research, training and outreach in basic space science with

relevance to astrophysics, mathematics, engineering and technology. Two sites have been identified at Mt. Kulal and Mt. Nyiro in Turkana/Samburu Counties for establishment of the observatory.

4.1.3 Energy Technologies Development Programme

The programme will facilitate the diversification of the country's non-renewable and renewable energy mix to meet the energy demands for industrialization and development. The application of ST&I will therefore ensure that the use of clean energy offers alternatives for the country's energy needs and address the challenges of clean energy technologies and increase energy efficiency in industry, buildings and manufacturing sectors.

Project 1: Renewable Energies Research Laboratory

The laboratory will be established to undertake advanced research and development in the areas of solar energy, wind energy and biofuels. It will provide data/information for effective decision making. Design, instrumentation and production of energy gadgets will also be undertaken in the laboratory.

Project 2: The Centre for Petroleum and Gas Exploration Research

The centre will undertake research and technology development in Oil and Gas Exploitation. It will focus on the value chain in the exploitation of fossil fuel reserves including socio-economic considerations.

4.1.4 Science, Technology, Engineering and Mathematics (STEM) Programme

The programme will enhance the capacity of education institutions to provide STEM education by facilitating the provision of modern equipment and qualified staff.

Project 1: Kenya Advanced Institute of Science and Technology

The project will build on the conceptual framework already developed for the establishment of the Institute at the Konza Technopolis through a partnership with the Korea Advanced Institute of Science and Technology (KAIST). The project will facilitate the human and infrastructure capacity building for the institute to provide advanced research services and graduate training.

Project 2: Establishment of Institute of Applied Sciences

The institute will be modelled along the German Universities of Applied Sciences where training in engineering and applied sciences will be hands-on and industry oriented. The Institute will be established in an already existing Kenyan university.

Project 3: Enhancement of the Centres of Excellence in Universities and Research Institutions

The main objective of the Project is to strengthen the capacity of selected Higher Education Institutions (Egerton University, Moi University and Jaramogi Oginga Odinga University of Science and Technology) to deliver quality post-graduate education and build collaborative research capacity in regional priority areas.

The Project will provide advanced laboratory equipment and access to e-learning resources to the centres of excellence already identified and establish new ones in other universities and research institutions. Further, the project will assess the status of laboratory equipment in universities and research institutions for purposes of refurbishment and human capacity building for their effective maintenance.

Project 4: National Skills Inventory and Audit for ST&I

The project will establish a database on the status of the national ST&I human resource capacity and skills in science, engineering and technology in relation to the job market needs. This will inform the development of a National Critical Skills Development Strategy. The project will also undertake a skills coding for ST&I and

strengthen linkages between industry and institutions of higher learning in areas of curriculum review, industry labour requirements, including incentives for attracting and keeping Science Engineering and Technology (SET) skills in industry.

Project 5: The African Science, Technology and Innovation Observatory
This project will facilitate the establishment of the Kenyan node of the African Science, Technology and Innovation Observatory for the collection, analysis and reporting on ST&I indicators. National Innovations and R&D surveys will be carried out to assist the country configure the national system of innovation.

4.1.5 Coordination of Technology and Innovation Commercialization Programme

This programme aims at ensuring effective innovation system to harness the potential offered by modern science and technology for social and economic advancement.

Project: The National Science, Technology and Innovation Parks
Science parks will be established to spur the formation of new ST&I-based businesses and serve as incubation centres for technology and innovations. This project will provide infrastructure for incubation and commercialization of innovations. Two sites for the establishment of the parks in the first phase have been identified at the Konza Technopolis and Dedan Kimathi University of Technology.

4.1.6 County Technology and Innovation Delivery Services Programme

The programme will deliver science, technology and innovation services to the counties. The programme will establish and empower county technology and innovations advisory and prospecting centres to coordinate technology transfer and adoption.

Project: The County Technology and Innovations Advisory and Prospecting Centres
This project will involve the establishment of centres in the counties to coordinate innovations and technology transfer and adoption at the county level in a partnership between the Kenya National Innovation Agency (KENIA) and institutions of Technical, Vocational Education and Training (TVET). The centres will also provide advisory services for the generation and protection of intellectual assets arising from the interplay between indigenous knowledge/technologies and modern science.

4.2 Other Programmes and Projects

4.2.1 Biotechnology and Biosciences Programme

The overall objective of this programme is to build Kenya's capacity to develop and safely apply Biotechnology and Biosciences in agriculture, health, mining, industry and environmental conservation. The Programme will also seek to address the low levels of public awareness on Biotechnology, which has hindered the development and up-take of the technology and build national capacities to tap on the great potential of synthetic biology and regenerative medicine.

Project 1: Public Awareness on Biotechnology
This project will build on the Bio-Aware initiative with an objective of developing specific platforms for public education and awareness creation on modern biotechnology. The project will review and re-launch the Bio-Aware (Biotechnology Awareness Creation Strategy) program and establish Biotechnology Information and Resource Centres (BRICs) at the county level to serve as focal points for provision of information, knowledge-sharing and public engagement.

Project 2: Centres of Excellence in Biotechnology Research
This project will identify Biotechnology Research Laboratories in research and higher learning institutions for infrastructure development and human capacity enhancement through the National Research Fund (NRF).

Project 3: Biotechnology Stewardship
This project will facilitate the safe application and adoption of Biotechnology through technology stewardship of the approved National Performance Trials (NPT) for the insect protected and water efficient *Bt. Maize* and *Bt. Cotton.* Key activities of the project will be: studies on Biotechnology adoption; farmer education; and performance evaluation of the two Biotech-crop varieties.

Project 4: Centre of Excellence for Stem Cells Research, Synthetic Biology and Regenerative Medicine
The centre will be established to undertake advanced stem cells research and regenerative medicine to address the need for new therapeutic and interventional approaches to Non-Communicable Diseases (NCD). The centre will provide a platform for engagement with leading global institutions for the development of national capacities, policies and institutional structures that are necessary to tap onto the great potential of synthetic biology and regenerative medicine.

4.2.2 Natural Products Programme

The programme will create an interface between indigenous knowledge and technologies on one hand and business innovation on the other hand. This will spur home-grown innovative culture and develop Kenyan unique products that meet international standards. The programme will support the development, acquisition, deployment and uptake of appropriate indigenous technologies to ensure optimal use of available natural resources in a sustainable manner.

Project 1: Manufacture of Pharmaceuticals through Public Private Partnership Initiative
This project will be implemented through a Public-Private Partnership between the Kenya Medical Research Institute (KEMRI) and local pharmaceutical industries in the manufacture of pharmaceutical products through appropriate technology transfer and acquisition.

Project 2: Development of Indigenous Technologies for the Manufacture of Niche Products
The project will identify, profile, document and secure indigenous technologies and home-grown innovations for application in the manufacture of niche products for local and global markets. This will be achieved through a partnership between the Kenya National Innovation Agency (KENIA), the Kenya Industrial Research Development Institute and institutions of Technical, Vocational Education and Training (TVET).

5.0 POLICY, LEGAL AND INSTITUTIONAL REFORMS

During the MTP III, the sector will prioritize the consolidation of various draft policies/strategies into a comprehensive ST&I policy, review relevant legal, regulatory frameworks and build capacities for institutions established by different laws to effectively execute their mandates.

5.1 Policy and Legal Reforms

The sector will undertake the review and consolidation of the following subsector-specific draft policies and legal frameworks (Bills) into an overarching ST&I policy to support their implementation as strategies for the development of the respective sub-sectors:

i. The National Biotechnology Development Policy;
ii. The Biosciences Policy and Bill;
iii. The Atomic Energy Policy and Bill;
iv. Kenya Institute of Nanotechnology legal framework and policy;
v. Kenya Space Science and Technology policy and bill;
vi. Natural Products Policy and Bill;
vii. National Intellectual Property Policy;
viii. National Innovation Policy;
ix. National Research and Development Agenda;
x. National Research in Health Policy; and
xi. Indigenous knowledge and Technology Policy.

5.2 Institutional Reforms

A number of ST&I institutions that have been established by various legislations are at their formative stages without the appropriate staff, institutional and infrastructure establishment, while others require to be restructured to effectively implement their respective mandates. The sector will prioritize the human and institutional capacity building for the ST&I institutions. These include:

i. The National Commission for Science, Technology and Innovation (NACOSTI);
ii. The Kenya National Innovation Agency (KENIA);
iii. The National Research Fund (NRF);
iv. The Kenya Space Agency (KNSA);
v. The Kenya National Academy of Sciences (KNAS);
vi. The Kenya Agricultural and Livestock Research Organization (KALRO);
vii. The National Biosafety Authority (NBA);
viii. The Technical Vocational Education and Training Authority (TVETA);
ix. The Commission for University Education (CUE);
x. The Higher Education Loans Board (HELB);
xi. The Universities Funding Board (UFB);
xii. The Curriculum Development, Assessment and Certification Council (CDACC);
xiii. The Kenya National Qualification Framework (KNQF);
xiv. The Kenya Universities and Colleges Central Placement Service (KUCCPS);

ANNEX I: IMPLEMENTATION MATRIX

Programmes/ Projects	Objectives	Expected Outputs/ Outcomes	Indicators/ Targets	Implementing Agency	Time Frame	Source of Funds	Indicative Budget (Kshs Million)					
							Total	2018/19	2019/20	2020/21	2021/22	2022/23
1. Nano-Sciences, Material Science and New Production Technologies Programme												
Goal: To build a state-of-the art infrastructure for high quality research and technology development in Nano- and Material Sciences												
The National Physical Science Research Laboratory (NPSRL) for Engineering and New Production Technologies	To establish a National Laboratory for advanced research in Physical Sciences	NPRSL established and Subject specific laboratories equipped	% completion of the NPSRL	MoE NACOSTI NRF KonzaTechnopolis Authority	5 years	GoK/ Development Partners	3,000	300	600	800	800	800
Centre for Nanotechnology Research (CNR)	To establish a center for advanced research in Nanotechnology	CNR established and equipped	% completion of the NRC	MoE NACOSTI NRF KIRDI	5 years	GoK/ Development Partners	700	100	100	100	200	200
2. Space Science Technology Development Programme												
Goal:To enhance teaching, research and development of space science technology for peaceful purposes												
Center for Microsatellite Technology Development	To establish a center for advanced research and satellite technology development	Center for Microsatellite Technology Development established	% completion of the center	MoE, NACOSTI NRF Universities	5 years	GoK/ Development partners	800	120	180	200	200	200
The Square Kilometer Array (SKA)	To establish a radio-telescope node for the generation of	The facility established as a radio-telescope	% completion of the square Kilometer Array (SKA)	MoE, NRF NACOSTI	5 years	GoK/ Development partners	800	120	180	200	200	200

Programmes/ Projects	Objectives	Expected Outputs/ Outcomes	Indicators/ Targets	Implementing Agency	Time Frame	Source of Funds	Indicative Budget (Kshs Million)					
							Total	2018/19	2019/20	2020/21	2021/22	2022/23
	new Knowledge and "Big Data"	observatory										
The optical Astronomical Observatory	To establishan Optical Astronomical telescope for outer space research	Observatory built and telescope installed.	% completion of the optical Astronomical Observatory	MoE, NACOSTI NRF Universities	5 years	GoK/ Development partners	650	50	100	100	200	200
3. Energy Technologies Development Programme												
Goal: To facilitateresearch into the country's non-renewable and renewable energy mix for industrialization and development												
Renewable Energies Research Laboratory	To equip a specialist laboratory for advanced research in renewable energies	Renewable Energies Laboratory constructed and equipped	% level of equipping the Laboratory	MoE, NACOSTI NRF KIRDI	5 years	GOK/ Development partners	430	50	80	100	100	100
The Centre for Petroleum and Gas Exploration Research	To establish a center for advanced research in Petroleum and Natural Gas exploitation	Petroleum and Natural Gas exploration Centre established	% level of completion of the Centre	MoE, NACOSTI NRF KIRDI	5 years	GoK/ Development Partners	700	50	100	150	200	200
4. Science, Technology, Engineering and Mathematics Education Programme												
Goal: To enhance the capacity of education and training institutions to provide high quality STEM education												
Kenya Advanced Institute of Science and Technology	To establish an institute for research and human capacity building in science and technology	Kenya Advanced Institute of Science and Technology established Human Resource capacity building in ST&I	% level of completion of the KAIST Number of Scientists/Technologists/Innovators trained	MoE, Universities	5 years	GoK/ Development Partners	4,500	500	1,000	1,000	1,000	1,000

Programmes/ Projects	Objectives	Expected Outputs/ Outcomes	Indicators/ Targets	Implementing Agency	Time Frame	Source of Funds	Indicative Budget (Kshs Million)					
							Total	2018/19	2019/20	2020/21	2021/22	2022/23
Establishment of Institute of Applied Sciences	To establish an institute for training in applied science foron-job skills development	Institution of Applied Sciences established	% level of completion of the institute	MoE, Universities	5 years	GoK/ Development Partners	500	50	50	150	150	150
Enhancement of the Centres of Excellence in Universities and Research Institutions	To equip centres of excellence in universities and research institutions	Centres of Excellence in Universities and Research Institutions enhanced	% level of equipping the centres of excellence	MoE, NACOSTI NRF Universities	5 years	GoK/ Development Partners	1500	200	300	300	300	400
National Skills Inventory and Audit for ST&I	To establish the status of the national ST&I human resource capacity and skills in STI	ST&I sector skills audit conducted	Number of reports on STI HR available, STI HR needed and STI HR skills gaps	MoE PSC MoL KNBS	3 years	GoK/ Development Partners	100	10	30	60	-	-
African Science, Technology and Innovation Observatory	To equip and populate the ST&I observatory database	Observatory equipped and database populated	% level of equipping the Observatory node and database population	MoE, KNBS KENIA NRF	5 years	GoK/ Development Partners	200	20	40	40	40	60
5. Coordination of Technology and Innovation Commercialization Programme												
Goal: To develop an effective innovation system and harness the potential offered by modern science for social and economic advancement												
The National Science, Technology and Innovation Parks	To provide innovation incubation infrastructure	Innovation infrastructure provided through targeted establishment of science and technology parks	% level of completion of Science and Technology parks	MoE KENIA NRF KIPPI KIRDI Universities	5 years	GoK/ Development partners	3,000	500	500	500	500	1,000

Programmes/ Projects	Objectives	Expected Outputs/ Outcomes	Indicators/ Targets	Implementing Agency	Time Frame	Source of Funds	Indicative Budget (Kshs Million)					
							Total	2018/19	2019/20	2020/21	2021/22	2022/23
	To mobilize funding for Research and Development	Grow the fund to a tune of 2% (approximately KES 124B) of the country's Gross Domestic Product.	% of GDP mobilized for research and development	MoE KENIA NRF	5 years	GoK/ Development partners	2,000	500	500	500	300	200
	To improve Global Competitiveness of Innovation and Sophistication, Higher Education and Training, and Technological Readiness	Improve the country's Innovation and Sophistication, Higher Education and Training, and Technological Readiness by one unit annually from 41, 97 and 88 in 2016	one unit improvement in the GCI Indicators annually	MoE KENIA NRF KIPPI KIRDI Universities	5 yeras	GoK/ Development partners	1,500	500	500	200	200	100
6. County Technology and Innovation Delivery Services Programme												
Goal:To Deliver science, technology and innovation advisory services to counties												
The County Technology and Innovations Advisory and Prospecting Centers	To establish centers for the development and Transfer of County Specific Technologies	Innovations and Technologies transfer centers established	Number of the County Technology and Innovations Centers established	MoE KENIA NRF	5 years	GoK/ Development partners	2000	100	400	500	500	500
7. Biotechnology and Biosciences Programme												
Goal: To build Kenya's capacity to develop and safely apply Biotechnology, and Biosciences including Synthetic Biology and Regenerative Medicine												
Public Awareness on Biotechnology	To establish platforms for the dissemination of biotechnology	Dissemination platforms established	Number of dissemination platforms established	NACOSTI NBA	5 years	GoK/ Development Partners	150	30	30	30	30	30

Programmes/ Projects	Objectives	Expected Outputs/ Outcomes	Indicators/ Targets	Implementing Agency	Time Frame	Source of Funds	Indicative Budget (Kshs Million)					
							Total	2018/19	2019/20	2020/21	2021/22	2022/23
	information											
Centers of Excellence in Biotechnology Research	To equip centers of excellence in Biotechnology Research	Biotechnology centers of excellence equipped	Number of Centers equipped	NACOSTI NRFKALRO KEMRI	5 years	GoK/ PPP/ Development Partners	1500	200	250	300	300	350
Biotechnology Stewardship	To facilitate safe application of biotechnology	Reports on the progress of biotechnology published a	Number of reports published	NACOSTI, NBA	5 years	GoK/ PPP/ Development Partners	200	40	40	40	40	40
Centre of Excellence in Stem Cell Research, Synthetic Biologyand Regenerative Medicine	To equip the center of excellence for advanced stem cells research and regenerative research	Center of Excellence in Stem Cell Research and Regenerative Medicineequipped	% level of equipping the center	NACOSTI NRF KEMRI	5 years	GoK/ PPP/ Development Partners	700	100	100	150	150	200
8. Natural Products Programme												
Goal: To enhance domestic innovative culture and develop Kenyan unique products that meet international standards												
Manufacture of Pharmaceuticals through Public-Private Partnership Initiative	To manufacture pharmaceuticals through appropriate technology transfer and acquisition regimes	Pharmaceuticals produced and marketed	Number of pharmaceuticals produced and marketed	NACOSTI KEMRI, KENIA, NRF KAM	5 years	GoK/ PPP/ Development partners	800	100	100	200	200	200
Development of Indigenous technologies for the manufacture of niche products	To manufacture niche products	Niche products produced and marketed	Number of Niche products produced and marketed;	KENIA, KIRDI, TVET Institutions	5 years	GoK/ Development partners	800	100	100	200	200	200

Programmes/ Projects	Objectives	Expected Outputs/ Outcomes	Indicators/ Targets	Implementing Agency	Time Frame	Source of Funds	Indicative Budget (Kshs Million)					
							Total	2018/19	2019/20	2020/21	2021/22	2022/23
9. Policy, Legal and Institutional Reforms												
Goal: To Consolidate the ST&I Policy, Legal and Institutional Framework for efficient governance and development of the Sector												
The ST&I Policy Framework Development	To publish the ST&I Policy	Policy document published	% completion of the policy development	MoE, NACOSTI,	4 years	GoK/ Development Partners	400	50	100	100	150	-
Review of the ST&I Legal Framework	To harmonize the ST&I Legal framework	Report of the recommendations for laws revision	% completion of the review document	MoE NACOSTI,	4years	GoK/ Development Partners	400	50	100	100	150	-
Capacity building for ST&I governance Institutions	To build the institutional capacity of ST&I governance institutions	Key institutions of ST&I governance capacitated	Number of institutions capacitated	MoENational TreasurySCAC	5 years	GoK/ Development Partners	1,200	200	300	400	400	400
GRAND TOTAL							**28,530**	**4,040**	**5,780**	**6,420**	**6,510**	**6,730**

ANNEX I: MONITORING AND EVALUATION MATRIX

Programmes/ Projects	Objectives	Expected Outputs/ Outcomes	Indicators	Implementing Agency	Time Frame	Sources of Funds	Yearly Targets					
							Total	2018 /19	2019/ 20	2020 /21	2021/ 22	2022 /23
Nano-Sciences, Material Science and New Production Technologies Programme												
The National Physical Science Research Laboratory (NPSRL) for Engineering and New Production Technologies	To establish a National Laboratory for advanced research in Physical Sciences	NPRSL established and Subject specific laboratories equipped	% completion of the NPSRL	MoE NACOSTI NRF KonzaTechnopolis Authority	5 years	GoK/Development Partners	6,000	10%	30%	50%	80%	100%
Centre for Nanotechnology Research (CNR)	To establish a center for advanced research in Nanotechnology	CNR established and equipped	% completion of the NRC	MoE NACOSTI NRF KIRDI	5 years	GoK/Development Partners	700	10%	30%	50%	80%	100%
Space Science and Technology Programme												
Center for Microsatellite Technology Development	To establish a center for advanced research and satellite technology development	Center for Microsatellite Technology Development established	% completion of the center	MoE, NACOSTI NRF Universities	5 years	GoK Development partners	1,500	10%	20%	40%	70%	100%
The Square Kilometer Array (SKA)	To establish a radio-telescope node for the generation of new Knowledge and “Big Data”	The facility established as a radio-telescope observatory	% completion of the square Kilometer Array (SKA)	MoE, NRF NACOSTI	5 years	GoK Development partners	800	10%	30%	50%	80%	100%
The optical Astronomical Observatory	To establishan Optical Astronomical telescope for outer space research	Observatory built and telescope installed.	% completion of the optical Astronomical Observatory	MoE, NACOSTI NRF Universities	5 years	GoK Development partners	1500	20%	40%	50%	80%	100%

Programmes/ Projects	Objectives	Expected Outputs/ Outcomes	Indicators	Implementing Agency	Time Frame	Sources of Funds	Yearly Targets					
							Total	2018 /19	2019/ 20	2020 /21	2021/ 22	2022 /23
Energy Technologies Development Programme												
Renewable Energies Research Laboratory	To equip a specialist laboratory for advanced research in renewable energies	Renewable Energies Laboratory constructed and equipped	% level of equipping the Laboratory	MoE, NACOSTI NRF KIRDI	5 years	GOK, Development partners	*600*	10%	30%	50%	80%	100%
The Centre for Petroleum and Gas Exploration Research	To establish a center for advanced research in Petroleum and Natural Gas exploitation	Petroleum and Natural Gas exploration Centre established	% level of completion of the Centre	MoE, NACOSTI NRF KIRDI	5 years	GoK, Development Partners	*1500*	30%	30%	70%	90%	100%
Science, Technology, Engineering and Mathematics Programme (STEM)												
Kenya Advanced Institute of Science and Technology	To establish an institute for research and human capacity building in science and technology	Kenya Advanced Institute of Science and Technology established	% level of completion of the KAIST	MoE, Universities	5 years	GOK DONOR	*13,000*	10%	35%	60%	80%	100%
		Human Resource capacity building in ST&I	Number of Scientists/Technologists/Innovators trained	MoE, Universities	5 years	GoK Development partners	1,000	-	-	-	-	1,000
Establishment of Institute of Applied Sciences	To establish an institute for training in applied science foron-job skills development	Institution of Applied Sciences established	% level of completion of the institute	MoE, Universities LIWA	5 years	GoK Development partners	450	10%	35%	60%	80%	100%
Enhancement of the Centres of Excellence in Universities and Research Institutions	To equip centres of excellence in universities and research institutions	Centres of Excellence in Universities and Research Institutions enhanced	% level of equipping the centres of excellence	MoE, NACOSTI NRF Universities	5 years	GoK Development partners	15000	10%	35%	60%	80%	100%
National Skills Inventory and Audit for ST&I	To establish the status of the national ST&I human resource capacity and	ST&I sector skills audit conducted	Number of reports on STI HR available, STI HR	MoE PSC MoL	5 years	GoK Development	*100*	-	1	-	1	-

Programmes/ Projects	Objectives	Expected Outputs/ Outcomes	Indicators	Implementing Agency	Time Frame	Sources of Funds	Yearly Targets					
							Total	2018/19	2019/20	2020/21	2021/22	2022/23
	skills in STI		needed and STI HR skills gaps	KNBS		partners						
African Science, Technology and Innovation Observatory	To equip and populate the ST&I observatory database	Observatory equipped and database populated	% level of equipping the ST&I Observatory node and database population	MoE, KNBS KENIA NRF	5 years	GoK/Development Partners	*150*	10%	30%	60%	80%	100%
Coordination of Technology and Innovation Commercialization Programme												
The National Science, Technology and Innovation Parks	To provide innovation incubation infrastructure	Innovation infrastructure provided through targeted establishment of science and technology parks	% level of completion of Science and Technology parks	MoE KENIA NRF KIPPI KIRDI Universities	5 years	GoK Development partners	*25000*	10%	30%	60%	80%	100%
	To mobilize funding for Research and Development	Grow the fund to a tune of 2% (approximately KES 124B) of the country's Gross Domestic Product.	% of GDP mobilized for research and development	MoE KENIA NRF	5 years	GoK/ Development partners	2,000	1%	1.2%	1.4%	1.8%	2%
	To improve Global Competitiveness of Innovation and Sophistication, Higher Education and Training, and Technological Readiness	Improve the country's Innovation and Sophistication, Higher Education and Training, and Technological Readiness by one unit annually from 41, 97 and 88 in 2016	one unit improvement in the GCI Indicators annually	MoE KENIA NRF KIPPI KIRDI Universities	5 yeras	GoK/ Development partners	1,500	40 96 87	39 95 86	38 94 85	37 93 84	36 92 83
County Technology and Innovations Delivery Services Programme												
The County Technology and Innovations Advisory and Prospecting Centers	To establish centers for the development and Transfer of County Specific Technologies	Innovations and Technologies transfer centers established	Number of The County Technology and Innovations Centers established	MoE KENIA NRF	5 years	GoK Development partners	20000	2	2	3	4	5

Programmes/ Projects	Objectives	Expected Outputs/ Outcomes	Indicators	Implementing Agency	Time Frame	Sources of Funds	Yearly Targets					
							Total	2018/19	2019/20	2020/21	2021/22	2022/23
Biotechnology and Biosciences Programme												
Public Awareness on Biotechnology	To establish platforms for the dissemination of biotechnology information	Dissemination platforms established	Number of dissemination platforms established	NACOSTI NBA	5 years	Gok Development Partners	10	1	1	1	1	1
Centers of Excellence in Biotechnology Research	To equip centers of excellence in Biotechnology Research	Biotechnology centers of excellence equipped	Number of Centers equipped	NACOSTI NRF KALRO KEMRI	5 years	GoK, PPP, Development Partners	1500	2	2	2	2	2
Biotechnology Stewardship	To facilitate safe application of biotechnology	Reports on the progress of biotechnology published	Number of reports published	NACOSTI NBA	5 years	GoK,PPP, Development Partners	500	-	1	-	1	-
Centre of Excellence in Stem Cell Research, Synthetic Biologyand Regenerative Medicine	To equip the center of excellence for advanced stem cells research and regenerative research	Center of Excellence in Stem Cell Research and Regenerative Medicineequipped	% level of equipping the center	NACOSTI NRF KEMRI	5 years	GoK, PPP, Development Partners	*700*	10%	30%	60%	80%	100%
Natural Products Programme												
Manufacture of Pharmaceuticals through Public-Private Partnership Initiative	To manufacture pharmaceuticals through appropriate technology transfer and acquisition regimes	Pharmaceuticals produced and marketed	Number of pharmaceuticals produced and marketed	KEMRI, KEPSA, KENIA, NRF, NACOSTI	5 years	GoK, PPP, Development partners	1,797	-	2	3	4	6
Development of Indigenous technologies for the manufacture of niche products	To manufacture niche products	Indigenous technologies developed	Number of Niche products produced and marketed;	KENIA, KIRDI, TVET Institutions	5 years	GoK, Development partners	1,500	-	4	6	8	8

Programmes/ Projects	Objectives	Expected Outputs/ Outcomes	Indicators	Implementing Agency	Time Frame	Sources of Funds	Yearly Targets					
							Total	2018/19	2019/20	2020/21	2021/22	2022/23
Policy, Legal and Institutional Reforms												
The ST&I Policy Framework Development	To publish the ST&I Policy	Policy document published	% completion of the policy development	MoE,NACOSTI	4 years	GoK, Partners	700	40%	50%	70%	100%	-
Review of the ST&I Legal Framework	To harmonize the ST&I Legal framework	Report of the recommendations for laws revision	% completion of the review document	MoE NACOSTI	4 years	GoK, Partners	150	30%	50%	60%	100%	-
Capacity building for ST&I governance Institutions	To build the institutional capacity of ST&I governance institutions	Key institutions of ST&I governance capacitated	Number of institutions capacitated	MoE, National Treasury SCAC	5 years	GoK, Partners	800	2	2	2	2	2

ANNEX II: THE SCIENCE, TECHNOLOGY AND INNOVATION SECTOR MTP III WORKING GROUP

1. Chair, PS State Department of University Education Ministry of Education
2. State Department for University (Higher) Education
3. State Department for Vocational and Technical Training
4. State Department for Investment and Industry
5. State Department for Planning and Statistics
6. The National Treasury
7. Ministry of Foreign Affairs
8. Development Partners
9. E-Government
10. State Department for ICT and Innovation
11. ICT Authority
12. Council of Governors
13. KonzaTechnopolis Development Authority
14. Kenya National Academy of Science
15. Google (Kenya Office)
16. United Nations Education Science and Cultural Organization
17. Engineers Board of Kenya
18. Kenya Private Sector Alliance
19. Kenya Association of Manufactures
20. Kenya Industrial of Research Development Institute
21. Kenya Intellectual Property Institute
22. Numerical Machines Complex
23. Public and Private Universities
24. Kenya Bureau of Standards
25. National Economic and Social
26. Vision 2030 Delivery Secretariat
27. Export Promotion Council
28. National Council of Science and Technology
29. All Public Research Institutions
30. Kenya Institute for Public Policy Research and Analysis
31. Youth Agenda

ANNEX III: THE SCIENCE, TECHNOLOGY AND INNOVATION SECTORMTP III DRAFTING TEAM

S. No.	NAME	ORGANIZATION	DESIGNATION
1	Prof. Paul Baki	Kenya National Academy of Science (KNAS) (Chairperson)	Assistant Treasurer
2	Dr. Roy B. Mugiira	National Commission for Science, Technology and Innovation (NACOSTI),	Director Technical Services
3	Eng. Stephen Manoa	Kenya Private Sector Alliance (KEPSA)	Innovator Technical Director
4	Dr. Festus Murithi	Kenya Agricultural and Livestock Research Organization (KALRO)	Director, Social Economist Policy Development
5	Archbishop Titus Zakayo Ingana	Ministry of Education	Deputy Director/Research
6	James K. Kiburi	Ministry of Education	Deputy Director, University Education
7	Ezra Magati	Ministry of Education	Senior Finance Officer
8	Evelyn Anupi	Ministry of Education	Deputy Chief Economist
9	Dr.GodeonKivengea	Kenya National Innovation Agency (KENIA)	Principal Research Officer
10	Rose Nyanga	Kenya National Innovation Agency (KENIA)	Principal Research Officer
Secretariat MOE/CPPMU			
11	Agnes Koori	Ministry of Education (Secretary)	Deputy Chief Economist
12	Rachael Musitia	Ministry of Education	Snr. Economist
13	Philip Kinara	Ministry of Education	Economist
14	Milka Odoyo	Ministry of Education	Senior Assistant Office Administrator
15	Janet Ayuma	Ministry of Education	Senior Supervisor