Revitalizing and Harnessing Science, Technology and Innovation in Kenya
# Table of Contents

TABLE OF CONTENTS.................................................................................................................. II

LIST OF ABBREVIATIONS........................................................................................................ IV

EXECUTIVE SUMMARY............................................................................................................... V

CHAPTER ONE - INTRODUCTION ERROR! BOOKMARK NOT DEFINED.

  BACKGROUND ERROR! BOOKMARK NOT DEFINED.
  GLOBAL TRENDS AND BEST PRACTICES Error! Bookmark not defined.
  NATIONAL CONTEXT
    Macro-economic Context Error! Bookmark not defined.
    Social context Error! Bookmark not defined.

THE ST&I POLICY AND KENYA VISION 2030 Error! Bookmark not defined.

NATIONAL PRIORITY SECTORS FOR ST&I POLICY INTERVENTIONS Error! Bookmark not defined.

LEVERAGING ST&I FOR NATIONAL DEVELOPMENT Error! Bookmark not defined.

JUSTIFICATION FOR ST&I POLICY Error! Bookmark not defined.

CHAPTER TWO - SITUATION ANALYSIS ERROR! BOOKMARK NOT DEFINED.

KENYA NATIONAL INNOVATION SYSTEM Error! Bookmark not defined.

  Demand for ST&I Error! Bookmark not defined.
  Education and Research System Error! Bookmark not defined.
  Business System Error! Bookmark not defined.
  Intermediary Organisations Error! Bookmark not defined.
  ST&I Infrastructure Error! Bookmark not defined.
  Framework Conditions Error! Bookmark not defined.
  Governance System Error! Bookmark not defined.

CHAPTER THREE - VISION, MISSION, PHILOSOPHY, GOAL AND OBJECTIVES Error! Bookmark not defined.

  VISION Error! Bookmark not defined.
  MISSION Error! Bookmark not defined.
  PHILOSOPHY AND GUIDING PRINCIPLES Error! Bookmark not defined.
    Philosophy Error! Bookmark not defined.
    Guiding Principles Error! Bookmark not defined.
  GOAL Error! Bookmark not defined.

  Weak Education and Research System Error! Bookmark not defined.
  Uncoordinated Intermediary Organisations Error! Bookmark not defined.
  ST&I Infrastructure Error! Bookmark not defined.
  Framework Conditions Error! Bookmark not defined.
  Weak ST&I Governance System Error! Bookmark not defined.

OBJECTIVES Error! Bookmark not defined.
CHAPTER FOUR – POLICIES AND STRATEGIES

CHAPTER FIVE - INSTITUTIONAL FRAMEWORK

ORGANISATIONAL STRUCTURE

Ministry in Charge of Science, Technology and Innovation

National Commission for Science Technology and Innovation

Kenya National Innovation Agency

National Research Fund

Research Institutes

Centres of Excellence

IMPLEMENTATION MATRIX
**LIST OF ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRICS</td>
<td>Brazil, Russia, India, China and South Africa</td>
</tr>
<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
</tr>
<tr>
<td>CoEP</td>
<td>Centres of Excellence Programme</td>
</tr>
<tr>
<td>ECDE</td>
<td>Early Childhood Development Education</td>
</tr>
<tr>
<td>ESQAC</td>
<td>Education Standards Quality Assurance Commission</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>ICTA</td>
<td>Information and Communication Technology Authority</td>
</tr>
<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
</tr>
<tr>
<td>IP</td>
<td>Intellectual Property</td>
</tr>
<tr>
<td>IPR</td>
<td>Intellectual Property Rights</td>
</tr>
<tr>
<td>KEBS</td>
<td>Kenya Bureau of Standards</td>
</tr>
<tr>
<td>KENIA</td>
<td>Kenya National Innovation Agency</td>
</tr>
<tr>
<td>KENAS</td>
<td>Kenya Accreditation Service</td>
</tr>
<tr>
<td>KES</td>
<td>Kenya Shillings</td>
</tr>
<tr>
<td>KICD</td>
<td>Kenya Institute of Curriculum Development</td>
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<tr>
<td>KIPI</td>
<td>Kenya Industrial Property Institute</td>
</tr>
<tr>
<td>KNBS</td>
<td>Kenya National Bureau of Statistics</td>
</tr>
<tr>
<td>KNIS</td>
<td>Kenya National Innovation System</td>
</tr>
<tr>
<td>MDAs</td>
<td>Ministries Departments and Agencies</td>
</tr>
<tr>
<td>MOEST</td>
<td>Ministry of Education, Science and Technology</td>
</tr>
<tr>
<td>NACOSTI</td>
<td>National Commission for Science, Technology and Innovation</td>
</tr>
<tr>
<td>NEMA</td>
<td>National Environmental Management Authority</td>
</tr>
<tr>
<td>NEPAD</td>
<td>New Partnership for Africa’s Development</td>
</tr>
<tr>
<td>NIC</td>
<td>Newly Industrialized Country</td>
</tr>
<tr>
<td>NIS</td>
<td>National Innovation System</td>
</tr>
<tr>
<td>NRENs</td>
<td>National Research Education Networks</td>
</tr>
<tr>
<td>NRF</td>
<td>National Research Fund</td>
</tr>
<tr>
<td>PPP</td>
<td>Public Private Partnerships</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>RST&amp;I</td>
<td>Research, Science, Technology and Innovation</td>
</tr>
<tr>
<td>SET</td>
<td>Science, Engineering and Technology</td>
</tr>
<tr>
<td>S&amp;T</td>
<td>Science and Technology</td>
</tr>
<tr>
<td>STEM</td>
<td>Science Technology Engineering and Mathematics</td>
</tr>
<tr>
<td>STP</td>
<td>Strategic Technology Platform</td>
</tr>
<tr>
<td>ST&amp;I</td>
<td>Science, Technology and Innovation</td>
</tr>
<tr>
<td>TVET</td>
<td>Technical and Vocational Education and Training</td>
</tr>
<tr>
<td>UE</td>
<td>University Education</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

Science, technology and innovation (ST&I) is identified as key foundation upon which the economic, social and political pillars of the Kenya Vision 2030 are anchored on. The Vision further proposes intensified application of ST&I to raise productivity and efficiency levels across the three pillars. The Vision also recognises the critical role played by research and development (R&D) in accelerating economic development in all the newly industrialising countries of the world. The ST&I policy has therefore been developed to support the Vision 2030 with a view of making Kenya to be a knowledge based economy and hence transform into a newly industrialising nation.

This ST&I policy aspires to re-align ST&I programmes to national goals and market needs; improve technical competencies and institutional capacity for ST&I and R&D institutions; build a robust national innovation system (NIS) that entrenches product oriented multi-disciplinary approach to R&D; strengthen governance and management of the ST&I sector and institutions to make them more efficient and effective; develop and implement a mechanism for sustainable financing of ST&I; and protect knowledge production by strengthening intellectual property and regulatory regimes at all levels.

Kenya’s ST&I sector has for a long time been experiencing myriads of challenges, which impede the constructive interaction among the stakeholders of the national innovation system. Among the key challenges are weak policy framework to facilitate effective integration of ST&I into the economy; “Silo Mentality” of ST&I stakeholders including government, private sector and academia; inadequate funding and support for ST&I sector; non-alignment of education and training curricula to industry needs; low levels of awareness on Intellectual Property Rights; inadequate ST&I data to quantify contribution of the ST&I sector to the national economy; weak advocacy for ST&I at high political and policy levels; low science culture among the population; and weak mechanisms for implementation, evaluation and review of ST&I initiatives.

This policy document outlines seven policy statements and various corresponding strategies to address challenges facing the current national innovation system. The policy statements emphasize the need to streamline the system to make it more effective and integrate it into the mainstream of national planning and development system. The policy statements refer to establishing institutional and regulatory framework to promote, coordinate, mobilize resources and manage ST&I; allocating resources, mobilizing and motivating stakeholders to participate in the R&D sub-sector funding to at least 2% of GDP annually; developing human resource capital in ST&I to meet the demands of the economy; developing education, training and research to implement and manage the changes and adapt to the technological transformation; developing ST&I infrastructure to support ST&I Programmes to realize the objectives and goals of industrialization; facilitating generation and management of Intellectual Property
Rights by scientists, researchers and innovators to facilitate the verification and acquisition of protection for indigenous resources and knowledge; promoting technology development, transfer and diffusion in priority research areas is important for the realization of full potential of ST&I in Kenya: promoting collaboration and partnership in ST&I to maximise benefits from national research projects and globalization; Promoting utilization and conservation of indigenous resources and traditional knowledge hence adding value to Kenya’s indigenous resources; enhance ST&I communication and advocacy will increase knowledge and understanding for adoption and utilization; and well-developed performance management framework linking programmes, outputs and outcomes within the ST&I sector is necessary for the success of ST&I initiatives.

The institutional framework to support and improve coordination and management of the ST&I sector is also provided. Through this policy document, the key coordination and management institutions, including the Ministry in charge of Science, Technology and Innovation; the National Commission for Science, Technology and Innovation (NACOSTI); the Kenya National Innovation Agency (KENIA); and the National Research Fund (NRF), will work with all stakeholders in the Government, private sector and academia in order to transform Kenya from a factor-driven economy into an innovation-driven economy.
CHAPTER ONE: INTRODUCTION


Science and technology are an integral part of Kenyan culture, which heavily influence our everyday lives. Thus, the Constitution of Kenya (2010)\(^1\), being the overarching legal framework, gives the constitutional recognition to science and technology. Consequently, article 11(2) on culture, the Constitution, emphasizes that the State \textbf{shall}:

\begin{enumerate}
  \item promote all forms of national and cultural expression through literature, the arts, traditional celebrations, science, communication, information, mass media, publications, libraries and other cultural heritage.
  \item recognize the role of science and indigenous technologies in the development of the nation; and
  \item promote the intellectual property rights of the people of Kenya.
\end{enumerate}

**Article 33 (1) (c)** on freedom of expression acknowledges academic freedom and \textbf{freedom of scientific research}.

The Fourth Schedule provides that Universities, tertiary educational institutions and other institutions of research shall be the function of the national government.

From the above provision of the Fourth Schedule, it is understood that the National government shall primarily be responsible for:

\begin{enumerate}
  \item Planning, establishing and funding Science, Technology and Innovation, University education; and Technical, Vocation Education and Training (TVET) institutions;
  \item Maintenance of quality standards, relevance and access to Science and Technology and higher education institutions;
  \item Coordinating research and innovations.
\end{enumerate}

This Policy appreciates the role of County Governments in its implementation.

1.2 National Context and Implications for Science Technology and innovation

1.2.1 Macro-economic Context

(Economic growth in Kenya has been relatively steady over the last five years. The gross domestic product (GDP) at current prices increased form KES 4.26 trillion in 2012 to

KES 7.15 trillion in 2016. Real GDP annual growth rate rose from 4.6 percent in 2012 to 5.8 percent in 2016 while GDP per capita was KES 157,681 in 2016 having risen from KES 104,821 in 2012. These indicators imply that the average wealth of individuals in Kenya increased steadily over the period 2012-2016.) Do e need to quote the source of this information. This situation has implications on the prospects of ST&I in Kenya. Increased wealth creation has increased potential for mobilizing resources to support R&D. Kenya has set the threshold for Government funding for R&D at 2% of GDP\(^2\) annually which translated to KES 143 billion . This policy aims to leverage on the prevailing economic conditions to mobilize resources for R&D.

Table 1.1: Trend in economic growth in Kenya 2012-2016

<table>
<thead>
<tr>
<th>Year</th>
<th>GDP current (KES millions)</th>
<th>GDP constant (2014 KES millions)</th>
<th>Real GDP Growth (percent)</th>
<th>GDP per capita current (KES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>4,261,151</td>
<td>4,812,924</td>
<td>4.6</td>
<td>104,821</td>
</tr>
<tr>
<td>2013</td>
<td>4,730,801</td>
<td>5,086,648</td>
<td>5.7</td>
<td>113,210</td>
</tr>
<tr>
<td>2014</td>
<td>5,357,672</td>
<td>5,357,672</td>
<td>5.3</td>
<td>124,710</td>
</tr>
<tr>
<td>2015</td>
<td>6,224,369</td>
<td>5,660,879</td>
<td>5.7</td>
<td>140,942</td>
</tr>
<tr>
<td>2016</td>
<td>7,158,695</td>
<td>5,989,210</td>
<td>5.8</td>
<td>157,681</td>
</tr>
</tbody>
</table>

Source: KNBS Various Years

According to the 2016 Economic Survey for Kenya the agriculture sector is the largest source of economic growth accounting to 15.2%. Other important contributors to growth are transport (9.7%), construction (8.2%), education (7.5%) and manufacturing (6.3%). The implementation of ST&I programmes is expected to enhance value addition to the different sectors and increase efficiency and production.

1.2.2 Social context

Kenya is experiencing demographic challenges stemming from high population growth rate, associated mostly with high fertility rates. At 2.7%, Kenya’s population growth rate is above the world average rate of 2.4% and above 2.1% replacement rate. Kenya’s population estimated at 45.4 million in 2016 is projected to reach 65 million by 2050 (quote the Sources of the information). Like most developing countries, Kenya has a large population of young people. The youth aged between 15 and 34 years represent about 35% of the total population. The country’s focus should be to harness the full potential of this youth for the benefit of socio-economic development. ST&I interventions will therefore be critical in ensuring that Kenya manages the present demographic transition, improves health and education profiles of the population, improves participation of the youth in decent labour and deals with the poverty status and ensure Kenyans have a decent life.

Over the last five years, poverty rate in Kenya has declined from 49.8% in 2012 to 42.0%. In the rural areas, where nearly 75% of the total population lives, poverty has persistently stagnated at an average of 55%.

In the education sector, Kenya has realized tremendous growth. Universities have increased from 1 in 1983 to 70 in 2015\(^3\) enabling an increasing share of the population to have access to knowledge and thus benefiting communities through increased range of higher education institution’s teaching and learning resources and research, despite the equity and quality concerns that still prevail as the key challenges facing the sector. The investments made in higher education are in expectation of benefits that can be reaped by the researchers as well as enriching the growth of the country’s economy.

\(^3\) (www.cue.or.ke),
This growth in the education sector provides a platform for harnessing knowledge and skills in science, technology and innovation for global competitiveness and revitalization of the technical education subsector and the youth polytechnics.

1.3 ST&I Policy and the National Development Agenda

The Vision 2030 is Kenya’s economic blue print that aims to transform Kenya into “a globally competitive and newly industrialized middle-income country, providing a high-quality standard of life to all its citizens” by the year 2030, with annual economic growth rate of 10%\(^4\). The blue print is being implemented in five-year Medium-Term Plans (MTPs) since 2008. Currently the government is implementing the third medium term for the period 2018-2022. ST&I has been identified as one of the key foundations required for the realization of the goals and objectives of the Vision.

The Second Medium Term Plan of Vision 2030, (MTP2, 2013-2017)\(^5\), whose focus was on achieving a transformative country; the Science, Technology and Innovation sector has an overarching theme, “Harnessing Science, Technology and Innovation for Regional and Global Competitiveness”. MTP2 recommended for intensifying the coordination of technology, innovation, research, development and commercialization as a flagship programme for sustained productivity growth. As a result, this policy framework has to be implemented along with the Science, Technology and Innovation Act 2013, (ST&I Act, 2013) that emphasize the need for a functional innovation system in which universities (and public research institutes) play a leading role in knowledge and technology generation through research and development. The policy will be implemented through the establishment of institutional framework, the increased allocation of public funding to research and development, provision of ST&I infrastructure, development of human resources through training, growth in the number of universities and research institutions.

The successive Medium-Term Plans of Vision 2030 have to continue integrating ST&I into priority sectors by ensuring that the players have access to the necessary technologies that will be relevant for the production of a diverse range of products, processes and services. The major outcomes of ST&I driven economy include; increased value addition to production, increase in high value as opposed to raw material exports and increased production efficiency. In addition, application of ST&I has a wide-ranging effect in the fields of medicine, natural resource management, tourism, agriculture and governance.

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1.4 Global, Regional and National Science, Technology and Innovation Trend

In Kenya, there are three missing links in ST&I. These are the need to establish a culture that respects knowledge and embed it in the various education curricula; the need to focus on active knowledge creation and acquisition and a deliberate and conscious effort to link knowledge creation to actual opportunities aimed at enhancing productivity and creating employment opportunities in existing and/or new sectors. Addressing these missing links is key to leveraging science, technology and innovation for national development.

The Sustainable Development Goals (SDGs) aim to enhance scientific research, upgrade the technological capabilities of industrial sectors, encouraging innovation and increasing the number of R&D workers per one million population and public and private R&D.

Consequently, there are some notable events that characterize current situation in ST&I globally that may qualify as best practice and hence influence the formulation of ST&I policy and strategy framework for Kenya, namely:

a) pronounced socio-economic success which are well-defined and articulate goals for ST&I sector aligned to national development plans;
b) dedicated Ministry of ST&I;
c) recognizing innovation as the driving force behind S&T and R&D;
d) multi-disciplinary and generally product-oriented research;
e) general shift from teaching to teaching and research universities.
f) establishment of new of universities to develop national capacities in key national priority areas;
g) strong indigenous industries and strong links between industry and researchers;
h) an environment that makes ST&I vibrant, including good facilities, well trained human resources, good access to information and knowledge resources and well-organized delivery institutions;
i) firm and sustainable financing mechanism for ST&I; and
j) well-coordinated ST&I sector.

At the continental level, Agenda 2063 for Africa envisages: (i) building and/or upgrading research infrastructures; (ii) enhancing professional and technical competencies; (iii) promoting entrepreneurship and innovation; and (iv) providing an enabling environment for ST&I through development of a comprehensive policy on ST&I. This Agenda is being implemented through its first ten-year strategy known as the Science, Technology and Innovation Strategy for Africa (STISA -2024). The Strategy is responding to the demand for ST&I to impact across critical sectors such as agriculture, energy, environment, health, infrastructure development, mining, security and water among others. The strategy is also firmly anchored on seven distinct priority areas that contribute to the achievement of the AU Vision. These priority areas are:
Eradication of Hunger andAchieving Food Security; Prevention and Control of Diseases; Communication (Physical and Intellectual Mobility); Protection of our Space; Live Together-Build the Society; and Wealth Creation. In addition, at continental level, the African Union Commission, NEPAD Agency and their partners should advocate and create awareness, mobilize necessary institutional, human and financial resources, track progress and monitor implementation.

At regional level, Regional Economic Communities (RECs), regional research institutions, networks and partners should leverage the strategy in designing and coordinating initiatives. For example, the East African Science and Technology Commission (EASTECO) has designed programmes and projects to ensure increased investments in development of ST&I. The identified priority areas in ST&I are promotion of ST&I knowledge and innovation through research, capacity building, commercialization and application of ST&I for socio-economic development.

At national level, AU member States should incorporate this strategy into their national policies, plans and practices. The Kenya Government has been implementing through the Kenya Vision MTPs. Through ST&I, the Vision envisages a modern economy, in which new knowledge plays a central role in wealth creation, social welfare and international competitiveness through:

i. An economic and institutional regime that provides incentives for the efficient use of the existing knowledge, the creation of new knowledge, and the flourishing of entrepreneurship.

ii. An educated and skilled population that can create, share and use knowledge well.

iii. A dynamic information and communication infrastructure that can facilitate processing, communication, dissemination.

The Government has committed to devote more resources to scientific research and strengthen the technical capacity and capabilities of individuals and institutions at both national and County levels. This will enable the development of a highly skilled human resource that will sustainably support and trigger innovation in priority areas, and raise the quality of teaching mathematics, science and technology in schools, polytechnics and universities. As a result, significant resources have been channelled towards the development of the sector policy, legal, regulatory and institutional framework in the last two medium term planning periods (MTP I: 2008-2012 and MTP II: 2013-2017). This trend will continue as the country unveils the third Medium Term Plan, MTP III (2018-2022). The MTP III therefore, will focus on leveraging on the gains that the ST&I sector has made during the Second MTP and addressing the coordination and governance challenges that have hindered progress in the development of the sector.

1.5 Rationale and Justification for the ST&I Policy

The need for a comprehensive National ST&I Policy arises from the understanding that natural resources are currently too scarce. Economic growth and global competitiveness
of most countries are transiting from material/labour-intensive to a knowledge-based economy. By comparing with Asian Tigers (Singapore, Taiwan, Hong Kong and South Korea), it is now accepted that investment in ST&I is a key driver to bridge knowledge divide and promote economic development, reduce poverty and realize global competitiveness. Success stories from SE Asia show that ST&I act as catalysts of development. ST&I are key to future financial stability and investing in them now translates into investing in the future.

ST&I Policy offer scientists, entrepreneurs, venture capitalists and others a supportive environment that encourages collaboration across disciplines and feedback across the different stages of innovation. The formulation of a ST&I Policy requires planning at a national level in order to create the right environment in which to integrate the supply of knowledge that derives from investment of national resources in education and ST&I, with demand. In the 21st Century, University should not only educate and expand knowledge, but should also commercialize it. The generated knowledge should be a driver of economic development needed to stimulate and promote Triple-helix in terms of constructive dialogue between academia (tertiary/university), private sector and government. An effective ST&I policy should offer unique opportunities for ‘cross-fertilization’ among the Triple-helix by leveraging public private partnerships.

Several challenges have emerged and need a harmonized approach in provision of sustainable development to attain vision 2030.

There is need therefore to:

- provide clear policy direction for effective implementation of establishment of programmes in priority areas for sustainable development in Kenya.
- raise public awareness on importance of ST&I sector to enhance partnerships and stakeholder involvement.

1.6 The Policy Development Process

Availability of ST&I policy is one of the essential prerequisites for the transformation of Kenya into a knowledge-based society. Development of innovative ideas generated from research and development into products, processes and services is highly dependent on a well-defined and supportive policy that effectively addresses citizen needs and aspirations. An effective policy addresses issues pertaining to research, inventions and innovations, commercialization of finished products and services, and legal frameworks. In each case, specific policy intervention measures have been proposed to address the challenges.

Most of the entities in charge of ST&I Policy making have operated in isolation from the rest of other policy agencies and therefore continue to have weak links to academic institutions and private sector. They are also not adequately linked to other international policy initiatives. Ignoring inter-sectoral linkages and policy mixes make the impact of ST&I less evaluated.
CHAPTER TWO: SITUATION ANALYSIS

2.0 Introduction

This chapter provides an overview of the progress made in Kenya in enhancing ST&I namely investments; governance and institutional framework. The situational analysis arises from comprehensive review of selected performance indicators for ST&I based on surveys, and other published reports.

2.1 Profile of ST&I indicators in Kenya

2.1.1 Global Ranking

Table 2.1a shows the World Economic Forum’s Global Competitiveness Index (GCI) for a period of five (5) years. It shows that the country improved significantly in innovation pillar and technological readiness over the last three years. However, the progress in higher education and training has been stagnant over the last two years. The drop in innovation pillar in 2017/18 Financial year is attributed by drop in Government procurement of advanced technology products (21st position), University-industry collaboration in R&D (32nd position) and company spending on R&D (36th position) (Table 2.1a).

Table 2.1a: Global Ranking in ST&I Pillars

<table>
<thead>
<tr>
<th>Global Ranking for a given year</th>
<th>2017/18</th>
<th>2016/17</th>
<th>2015/16</th>
<th>2014/15</th>
<th>2013/14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Countries Ranked by year</td>
<td>137</td>
<td>138</td>
<td>140</td>
<td>144</td>
<td>148</td>
</tr>
<tr>
<td>Innovation Pillar (Overall Ranking)</td>
<td>(37)</td>
<td>(36)</td>
<td>(41)</td>
<td>(38)</td>
<td>(46)</td>
</tr>
<tr>
<td>Capacity for innovation</td>
<td>38</td>
<td>36</td>
<td>42</td>
<td>33</td>
<td>34</td>
</tr>
<tr>
<td>Quality of scientific research institutions</td>
<td>45</td>
<td>49</td>
<td>44</td>
<td>42</td>
<td>51</td>
</tr>
<tr>
<td>Company spending on R&amp;D</td>
<td>36</td>
<td>31</td>
<td>33</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>University-industry collaboration in R&amp;D</td>
<td>32</td>
<td>26</td>
<td>37</td>
<td>37</td>
<td>38</td>
</tr>
<tr>
<td>Gov’т procurement of advanced tech. products</td>
<td>21</td>
<td>19</td>
<td>37</td>
<td>49</td>
<td>79</td>
</tr>
<tr>
<td>Availability of scientists and engineers</td>
<td>41</td>
<td>40</td>
<td>55</td>
<td>44</td>
<td>57</td>
</tr>
</tbody>
</table>
Higher education and Training (Overall Ranking) | PCT patent applications applications/million pop. | 90 | 93 | 90 | 95 | 96

| Quality of math and science education | 61 | 68 | 78 | 76 | 95
| Enrolment in Tertiary Education | 129 | 132 | 130 | 133 | 137
| Quality of Education System | 28 | 35 | 36 | 30 | 44

Technological readiness (Overall Ranking) | (88) | (89) | (94) | (87) | (89)

| Availability of latest technologies | 48 | 47 | 50 | 55 | 71
| Firm-level technology absorption | 36 | 35 | 54 | 56 | 66
| FDI and technology transfer | 41 | 48 | 56 | 59 | 66

2.1.2 The Researcher FTE by field of science

The Researcher FTE by field of science is shown in Table 2.2b, with engineering and technology, medical sciences and agricultural sciences contributing highest.

Table 2.2b: Researchers FTE by field of science (2010)

<table>
<thead>
<tr>
<th>RESEARCHERS FTE BY FIELD OF SCIENCE</th>
<th>TOTALL</th>
<th>BUSINES S</th>
<th>GOVERNME NT</th>
<th>HIGHEREDUCATION</th>
<th>PRIVATENON-PROFIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural sciences</td>
<td>418</td>
<td>56</td>
<td>64</td>
<td>261</td>
<td>38</td>
</tr>
<tr>
<td>Engineering and technology</td>
<td>1 343</td>
<td>190</td>
<td>258</td>
<td>861</td>
<td>34</td>
</tr>
<tr>
<td>Medical sciences</td>
<td>2 325</td>
<td>414</td>
<td>585</td>
<td>1 073</td>
<td>252</td>
</tr>
<tr>
<td>Agricultural sciences</td>
<td>4 301</td>
<td>337</td>
<td>840</td>
<td>2 889</td>
<td>236</td>
</tr>
<tr>
<td>Social sciences</td>
<td>569</td>
<td>39</td>
<td>97</td>
<td>342</td>
<td>91</td>
</tr>
<tr>
<td>Humanities</td>
<td>349</td>
<td>26</td>
<td>39</td>
<td>221</td>
<td>62</td>
</tr>
</tbody>
</table>

Source: Africa Innovation Outlook II (2014)
2.2 Gross domestic expenditure on research and experimental development

Gross domestic expenditure on research and experimental development (GERD) is an indicator widely used in assessing national scientific and technological strength, and provides information on how much a country invests in R&D. It is used in conjunction with the measures of gross domestic product (GDP) hence it illustrates R&D intensity as a percentage of GDP.

The African Science, Technology and Innovation Indicators Initiative (ASTII) survey of 2014 results show that R&D intensity in most of African countries is still far below the 1% which is the current target for AU member countries. The factors considered in the survey were: sources of funding for ST&I, type of research, R&D personnel, participation by women in R&D activities, sectoral distribution of R&D researchers, Percentage of R&D personnel with doctorates, full-time equivalent (FTE) and field of science. Table 2.2 shows the GERD by sector and sources of funding.

Table 2.2: Sources of GERD in Kenya

<table>
<thead>
<tr>
<th>GERD BY SECTOR AND SOURCES OF FUNDS</th>
<th>TOTAL</th>
<th>BUSINESS</th>
<th>GOVERNMENT</th>
<th>HIGHER EDUCATION</th>
<th>PRIVATE NON-PROFIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business sector</td>
<td>2 403.6</td>
<td>9 618 123</td>
<td>326</td>
<td>2 901.0</td>
<td></td>
</tr>
<tr>
<td>Direct government</td>
<td>4 366.0</td>
<td>2 213 028.0</td>
<td>2 020.0</td>
<td>105</td>
<td></td>
</tr>
<tr>
<td>General university funds</td>
<td>2 100.0</td>
<td>2 100.0</td>
<td>2 100.0</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Higher education</td>
<td>4 738.0</td>
<td>3 24 1 153.0</td>
<td>3 016.0</td>
<td>245</td>
<td></td>
</tr>
<tr>
<td>Private non-profit</td>
<td>878.6</td>
<td>158 95.6</td>
<td>213</td>
<td>412</td>
<td></td>
</tr>
<tr>
<td>Funds from abroad</td>
<td>11</td>
<td>843 6 721.0</td>
<td>2 051.0</td>
<td>2 125.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: African innovation outlook 2014

2.3 Funding for research and development

2.3.1 Government funding

Government funding is one of the major sources of funding research and development in Kenya. This funding is channelled through the Ministry of Education under the Research and Development Programme. The allocation of budget resources is done based on the Medium-Term Expenditure Framework through programme-based budgeting. This allocation is mainly appropriated for administrative expenses, capital development and funding research programmes. Figure 2.3 shows the trend in budget allocation from 2013/14 to 2016/17. The funding has increased from KES 894.6 Million in 2013/14 to KES 3.47 Billion in 2016/17. The rapid growth is due to the increased allocation towards the National Research Fund, a funding body established as per the
ST&I Act, 2013; and infrastructure development in the sector. Total funding includes monies from other sources in addition to Government Funds. The growth in funding shows positive trend towards attaining the set target for national research funding of 2% of GDP as stipulated in the ST&I Act, 2013.

2.3.2 Other sources of research funding other than GOK

The growth in funding shows positive trend towards attaining the set target for national research funding of 2% of GDP as stipulated in the ST&I Act, 2013.

![Figure 2.3: Budget Allocation for R&D (2013/14-2016/17)](source: The National Treasury)

2.4 The sources of economic growth

The sources of economic growth in 2016 is illustrated in Fig. 2.4 below, with agriculture, Forestry and fishing contributing heavily to the GDP followed by transport and storage with minimal contribution by professional, scientific and technical activities.
The National Innovation System (NIS)

An innovation system essentially refers to “a set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies and which provides the framework within which governments form and implement policies to influence the innovation process. As such it is a system of interconnected institutions to create, store and transfer the knowledge, skills and artefacts which define new technologies”\(^6\). An effective innovation system is required for a country to harness the potential offered by modern science and technology to its social and economic advantage. Within the National Innovation System framework, innovation is viewed as a collective process in which firms do not innovate in isolation but within a larger system involving other firms, universities, research centres, government agencies and other actors\(^7\) (Figure 2.5). The following are actors of the national innovation system:

(i) Governance
(ii) Education and research institution
(iii) Business/industry sector
(iv) Intermediate organisations (science parks, incubation centres and professional bodies)
(v) State -of-the- art ST&I infrastructure

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Kenya’s innovation system comprises of key stakeholders in Government, academia and private sector. The major components of the Kenya National Innovation System (KNIS) include: demand for ST&I, education and research system, business system, intermediate organizations, ST&I infrastructure, framework conditions as well as governance systems. The innovation system is illustrated in Figure 2.5.

2.5.1 Key Challenges within the Kenya National Innovation System

Kenya lacks a well-functioning innovation system that ensures enhanced competitiveness and links with the education and research system, the business system, the intermediate organizations, ST&I infrastructure and framework conditions in which they operate to interact dynamically and respond to national needs.

2.5.2 Demand for ST&I

Demand for ST&I is highly correlated to the structure of the economy. The pressure of competition drives private firms to demand better skills and knowledge from the education and research system. This results in “technology deepening” and expansion across sectors due to increased interaction of the actors within the NIS. Lessons from South Korea, Malaysia, Taiwan, Brazil and Chile indicate that in the absence of local demand for ST&I, technological deepening has to be supported by aggressive government interventions that included targeted public procurement, creation of specialised public ST&I Institutes, and preferential arrangements to steer firms to targeted technology sectors.

2.5.3 Education and Research System

Education and research are the key determinants of the ability to create a knowledge-based economy. A well-coordinated National Research Agenda that is aligned to national development goals is crucial for socio-economic development of a country. The actors in the education and research system are composed of educational institutions namely; universities, research institutes and centres, TVET institutions and schools. A pool of relevant and adequate skills must be available for absorption into the economy. Technologically successful countries such as Taiwan and Chile have been supported by an adequate pool of high technical skills. Education and research system must be proactive in addressing the needs of industry to ensure effective synergy. The

knowledge-intensive nature of science and technology requires highly qualified and skilled human resources.

Research in Kenya is fragmented and not well coordinated, and this is attributed to lack of a comprehensive National Research Agenda. Consequently, research priorities are set at the sub-sectoral level. There is limited multi-disciplinary, inter-institutional, product oriented and market driven research due to silo-mindset among the actors in education and research system. The absence of a National Research Agenda has inhibited the integration of Science Technology and Innovation into the national

Figure 2.5: Major Components of the Kenya National Innovation System
Source: Adopted from Arnold and Bell, 2001 (with modifications)
development programmes. This has constrained the evaluation of the contribution of ST&I to economic growth of the country as envisaged in Vision 2030.

Over the years, the supply of much needed relevant human resource for knowledge-based economy has become acute, with employment of technically qualified personnel remaining low by international standards. Kenya’s investment in high-level technical human resource and research is still low. The rapidly growing economy has already started showing the skills constraints with shortages in critical cadres. There is also low translation of skills into technologically productive competencies within industry resulting in reduced technological deepening. An added dimension to this is the emerging age-gap between the senior and junior scientists, engineers and technologists, thus impacting on succession planning.

The curriculum in ECDE and primary school level does not foster creativity in science and mathematics resulting in low participation in STEM subjects at secondary and tertiary levels of education. The education and training curricula is not adequately aligned to industry needs. In addition, there is general shortage of science equipment and modern facilities in learning institutions. There is also a shortfall in qualified and trained science teachers for imparting quality science education in schools. The systematic problem of the academia is the fact that universities hardly encourage their professors to do research; the crowded teaching programmes notwithstanding. The emphasis is on teaching, which is the criterion for career progression. Reforming the academic-promotion system would be useful in spurring research. In addition, there is limited inter-institutional collaborations and partnerships to facilitate sharing of education and research resources.

2.5.4 Business System

The business system is critical to the process of acquiring and utilising ST&I for national development, since most innovative activities take place within business industry. Actors within the business system must therefore be predisposed to acquire and exploit technology. These actors include start-up companies; micro, small and medium enterprises (MSMEs); and large and multinational companies.

The Kenyan business system has not fully integrated innovation to enhance competitiveness. As a result, key sectors such as manufacturing have not been able to grow and become competitive. Kenya’s industrial structure displays insufficient linkages between the various categories of firms, especially the MSMEs, where most innovations take place. In addition, most local firms have not been able to develop technological competencies to acquire and apply knowledge from foreign firms while most start-up companies die before maturity.
The local business system is not adequately innovative in addressing national and county specific challenges. The system therefore does not offer opportunities for technological learning to enable the economy to build technological capabilities.

Technological learning within the business system is not formally structured and appropriately managed to ensure technological capability building. Training activities are not inbuilt in contracts with industry to facilitate deeper technological competencies and related managerial capabilities.

2.5.5 Intermediary Organisations

Intermediary organizations are developers and transmitters of knowledge between the business system on one hand and the education and research system on the other. They transmit feedback to the education and research system on the priorities of the business system. They also have strong familiarity with the processes of new knowledge generation and offer expertise in governing interactive learning. The Kenyan intermediary organisations include various professional associations, Kenya National Academy of Science and various special interest groups.

Most of the stakeholders constituting the intermediary organizations are weak in developing and transmitting knowledge between the business system and the education and research system. Additionally, the ST&I activities of intermediate organisations are not aligned to national priorities. Conflict in the legal and policy frameworks that govern Intermediary organizations hinder the multi-disciplinary synergy for development and transmission of knowledge between the business system and education and research system.

2.5.6 ST&I Infrastructure

Infrastructure is the key foundation upon which ST&I activities are operationalized. This encompasses a wide array of critical issues including finance, intellectual property rights and information, standards and norms and, innovation and business support system issues. These institutions require periodic reviews for their legitimacy, authority and capacity to ensure continued relevance and effectiveness.

2.5.7 Finance

Though there is some improvement, the Government has not prioritised budgetary allocation for research and development leading to the research agenda being influenced by development partners. There is also a lack of guiding framework for
coordination of sector specific funding leading to weak coordination of resource mobilization efforts among and between the various players. Further, private sector participation in funding of research and development is still very low.

2.5.8 IPR and Information

There is little awareness and appreciation of Intellectual Property Rights among practitioners, stakeholders and policy makers and the existing Policy is not flexible to accommodate ever emerging issues in Science Technology and Innovation. Documentation and preservation of indigenous resources and traditional knowledge is inadequate and fragmented. The existing Intellectual Property Rights regime does not adequately facilitate the verification and protection of indigenous knowledge and resources. The level of uptake and commercialization of intellectually protected products and services is low. Thus, there is need raise awareness on IPR to avoid exploitation of our biodiversity and indigenous knowledge.

The generation, storage and dissemination of ST&I data and information is not coherent and interactive to inform policy decisions for the growth of the sector. In addition, information on ST&I is neither mapped nor interlinked. The existing system for ST&I information management is not automated. There is lack of promotion centres at national and county levels to create interest and a culture of science and technology.

The country lacks a tracking system for the establishment of status of ST&I indices to benchmark the national system of innovation for global competitiveness and inform relevant policy interventions.

2.5.9 Standards and Norms

The ST&I sector is regulated under various regulatory frameworks which have established various institutions mandated to carry out the relevant functions. Some of the key institutions include NACOSTI, NEMA, KEPHIS, and KEBS among others. The governing interactions between innovation actors (i.e., laws, regulations, standards and norms) significantly affect the context for emerging technologies and industries. These institutions play an enabling role by promoting certainty and stability in social interactions and economic transactions at critical stages in the emergence of a new technology or industry.

The National Commission for Science Technology and Innovation is the institution with the overall mandate to regulate and assure quality in the ST&I sector in the country.
The Commission is obligated to develop and enforce codes, guidelines and regulations in accordance with the ST&I Act, 2013 for the purposes of governance, management and maintenance of standards and quality in research systems.

There are inadequacies in capacities to assure quality standards and accreditation of ST&I Institutions and programmes in accordance to national and international requirements. These inadequacies include; human, financial technological and general infrastructure. There is a shortage of qualified and competent human resource to effectively undertake quality assurance and accreditation functions. The budgetary allocations are inadequate to facilitate the execution of the regulatory mandate. The operational efficiency of the regulatory bodies is highly hampered by low level of technological uptake and automation of the standards and accreditation processes.

The ST&I sector lacks a coherent and focused policy framework that has resulted in weak coordination in regulation, quality assurance and accreditation of research and technology.

2.5.10 Innovation & Business Support

There exist diverse efforts among the actors in the ST&I sector to support creation of more effective products, processes, technologies, services or ideas that get accepted by market and society. These efforts include development of innovation hubs, business incubation centres, science parks and special economic zones for purposes of converting ideas, research, or prototypes into viable products and services. Technology incubation supports entrepreneurs and start-up technology enterprises in the development, assimilation, absorption and utilization of the requisite technology to accelerate their successful development. Commercialization is necessary step for business success of innovations from start-up ventures or public and private research efforts.

Operational linkages among the academia, industry and government are weak resulting in a poor environment for growth of innovations and low rate of commercialization of research outputs. In addition, the operational structures and financial support to facilitate the necessary linkages among the actors are weak. Awareness of the commercialization processes of innovations is low among the general population leading to slow business and enterprise development. The infrastructure to support innovation, incubation and commercialization is not well developed thereby hindering the growth of knowledge-based business start-ups.
2.5.11 Framework Conditions

Framework conditions are the legal, regulatory and facilitative environments necessary in shaping the performance of national innovation systems. They put in place measures to strengthen capacity and capability in terms of institutions, mandates, personnel, funding and linkages. They also put in place measures of governance to ensure effective consultation, coordination and harmonization among actors. These framework conditions provide for measures to ensure participation and commitment of both public and private sector. In addition, the framework conditions provide for an effective mechanism for international collaborations, and community participation and support for ST&I. Consequently, this provides an appropriate environment for KNIS implementation and further enhances entrepreneurial and innovative culture nationally.

Article 11 of the Constitution recognises the role of ST&I and indigenous technologies in the development of the nation and the promotion of intellectual property rights of the people of Kenya. Further to this, the ST&I Act 2013 oblige NACOSTI to promote increased awareness, knowledge and information of research system. There exist different for a for advocacy and awareness for ST&I, which include annual science week, exhibitions and fairs, mentorship programme for secondary schools, and science and engineering congress.

The science culture among the Kenyan populace is low which is attributed to limited information on the role of ST&I in daily life. The existing advocacy and awareness programmes are not well structured and coordinated. In addition, the resources for advocacy and awareness programmes are limited. At high political and policy levels, the awareness for ST&I is low resulting to lack of ST&I champions.

A robust financial environment is critical for research and development, and innovation. Financing of ST&I sector is fragmented, institution based and inadequate. Various ST&I sub-sectors have their unique financing structures that are entrenched in their respective legal and policy frameworks. These structures have established institutions that independently source for and manage financial resources within their sub-sectors.

The government has instituted fiscal and taxation measures to support innovation that include tax rebates on research equipment and infrastructure developments. There are incentives to researchers and scientists through the Kenya Science Technology and Innovation (KESTI) awards. The government provides competitive research grants to individuals and institutions through the National Research Fund.
There is lack of a comprehensive and coordinated financing framework to support the ST&I sector leading to inefficient mobilization and utilization of resources in the sector. In addition, this has hampered decisions in the financing of national research priority areas.

There are inadequate incentive mechanisms to support research and development which include tax related incentives and subsidies.

### 2.5.12 Governance System

The governance system for ST&I consists of different institutions to coordinate and oversee implementation of an effective KNIS. The key institutions include, the Ministry in charge of Science, Technology and Innovation, the National Commission for Science, Technology and Innovation (NACOSTI), the Kenya National Innovation Agency (KENIA) and the National Research Fund (NRF).

This Ministry is responsible for policy, planning and coordination of funding of the ST&I sector. It also coordinates the implementation of flagship programmes across all sector Ministries, Departments and Agencies (MDAs) with respect to science, technology and innovation.

The National Commission for Science, Technology and Innovation is established under the ST&I Act, 2013 as a body corporate. The mandate of the Commission is to regulate and assure quality in the ST&I sector and advise Government on matters of science, technology and innovation. Research institutes are hosted by the respective sector ministries. NACOSTI works with the sector ministries to restructure and rationalize the research institutes to promote product-oriented multi-disciplinary research. County Governments, in liaison with NACOSTI, may establish specialized research institutes or innovation centres of excellence to carry out mandates that have been prioritized by this level of Government.

The Kenya National Innovation Agency is established by ST&I Act 2013 as a body corporate. The mandate of the Agency is to develop and manage the Kenya National Innovation System. The Kenya National Innovation Agency will have branches in counties to carry out her functions.

The National Research Fund is established by the ST&I Act, 2013 as body corporate and managed by a Board of Trustees. The mandate of the Trustees is to mobilize and manage financial resources for the KNIS to create knowledge, innovation and development in all fields of science, technology and innovation.
The governance system is not functioning optimally due to inadequacies in human, financial and infrastructural capacities. The existence of numerous regulatory frameworks in the ST&I sector has affected the effectiveness of the current governance system. These institutions have not fully integrated the industrial sector as captured in socio-economic development plans of the Government and aligned to national priority needs. There is, therefore, need to streamline the system to make it more effective and integrate the ST&I system into the mainstream planning and development system.

2.5.13 Monitoring and Evaluation

Monitoring and evaluation is critical for the purposes of tracking the progress and achievement of the objectives of the ST&I sector. M&E assists in developing measurable indicators to determine the level of achievement of set targets. The M&E process links programme outcomes to long term impacts of the policy and measure’s its contribution to the national development agenda. Various sub-sectors collect and analyze ST&I data which is relevant to their specific mandates for purposes of monitoring and evaluation. The Ministry responsible for S&T collects and analyses ST&I data through Africa Science Technology & Innovation Indicators (ASTII) initiative. NACOSTI conducts monitoring and evaluation of ST&I programmes within the sector.
CHAPTER THREE: VISION, MISSION, PHILOSOPHY, GOAL, GENERAL OBJECTIVES, KEY ISSUES AND STRATEGIC OBJECTIVES

3.1 Vision

The Vision for Science, Technology and Innovation is:

To be a middle income nation that is driven by science, technology and innovation for national prosperity and global competitiveness.

3.2 Mission

The Mission of the Science, Technology and Innovation is:

To mainstream application of science, technology and innovation into all sectors of the economy through generation, acquisition, dissemination and utilisation of available capacities and capabilities in order to achieve the objectives of Vision 2030.

3.3 Philosophy and Guiding Principles

Philosophy

The ST&I policy reforms articulated in this policy are anchored on a firm philosophy and principles for the sector. ST&I is premised on the philosophy “research for social and economic transformation and development”. ST&I cut across all sectors and should be used to drive social, economic and political development. It is therefore the perfect means to transforming production processes to ensure global competitiveness. Well planned programmes and projects that lead to entrenching ST&I in all national production systems are prerequisite. Education and training systems (primary, secondary and tertiary) must also entrench creative and critical thinking to enhance learning and application of knowledge.

Guiding Principles

The effective implementation of the ST&I Policy will be guided by the following principles:
i. **Relevance**: ST&I policy shall aim at helping to achieve the country’s Vision 2030.

ii. **Quality**: The policy shall put emphasis on novelty and originality as key determinants of ST&I excellence.

iii. **Cost-effectiveness**: There shall be use of the most cost-effective means to achieve the desired results.

iv. **Multi-disciplinarism and synergism**: In order to make ST&I development and application holistic, the multi-disciplinary and cross-sectoral approach to problem-solving shall be adopted.

v. **Collaborations and Partnerships**: There shall be conscious efforts for collaboration and interaction with all local and foreign ST&I stakeholders.

vi. **Environmental protection and conservation**: All ST&I institutions shall make efforts to protect and conserve the environment.

vii. **Empowerment and participation**: Promote the empowerment and participation of women, youth, marginalized communities and disadvantaged persons in all ST&I activities.

viii. **Equity and non-discrimination**: Ensure there is equity and non-discrimination in appointing the leadership team and in recruitment, promotions and human resource management of public ST&I institutions; and apply the two thirds gender rule in all elective or appointive bodies.

ix. **Ethical leadership**: Ensure that the leadership team of ST&I institutions complies with the ethical leadership principles as specified in Article. 73(2) of the Constitution.

x. **Reward recognition and Sanction**: The ST&I institutions shall develop and implement a robust system for identifying, evaluating, recognising, protecting intellectual property rights and rewarding excellence in ST&I activities while at the same time sanctioning non-performance.
xi. **Good governance:** Ensure that the leadership team of ST&I institutions complies with the values and principles in the management and administration of institutions as provided in Article 232(1) of the Constitution as well as the principles governing the management of finances as specified in Article 201 of the Constitution.

3.4 **Goal**

The goal of this policy is to facilitate the transformation of the national economy from a factor-based into a knowledge-based economy.

3.5 **General Objectives**

The general objectives of this policy are to:

i. Strengthen governance and management of the ST&I sector and institutions to make them more efficient, effective and accountable for performance.

ii. Guide the identification of sector priorities and determine the strategic technology platforms required to address those priorities.

iii. Rationalize and re-structure ST&I institutions to make them more effective in addressing national priority needs in order to build a robust national innovation system.

iv. Strengthen the existing Intellectual Property Rights (IPR) regime to maximise incentives for the generation, protection and utilization of intellectual property.

v. Provide an integrated approach to planning for sustainable generation, utilization and management ST&I in the country.

vi. Enhance the quality and capacity of the human resource in the ST&I sector to support productivity and relevance for development.

vii. Re-align STEM programmes to national goals and market needs.

viii. Strengthen the ST&I infrastructure to enhance access to technologies.

ix. Promote and enhance collaboration, partnerships and participation among institutions in the ST&I sector.

x. Identify and develop key industries, which including ICT that will help the country attain middle income country status.
xi. Identify priorities in Indigenous Resources and Traditional Knowledge and determine the strategic technology platforms required to address the identified priorities.

xii. Promote a strong culture of ST&I in the country.

xiii. Develop mechanisms for sustainable financial resource mobilization from government, private sector and development partners for ST&I and ensure effective utilization.

xiv. Provide mechanisms for regular effective, transparent and science-based monitoring and reviewing of ST&I initiatives.

3.6 Key Strategic Policy Issues

This section addresses Strategic Policy issues emanating from the situational analysis of the National Sectoral Priorities (Chapter Two). The Policy Issues highlight areas meant to create an enabling environment for the growth of ST&I. Eleven policy issues have been identified and are discussed below:

**Strategic Policy Issue 1:** Legal and Institutional Framework

**Strategic Policy Issue 2:** Funding for ST&I

**Strategic Policy Issue 3:** Human Resource Development

**Strategic Policy Issue 4:** Education, Training and Research

**Strategic Policy Issue 5:** ST&I Infrastructure

**Strategic Policy Issue 6:** Generation and Management of Intellectual Property Rights

**Strategic Policy Issue 7:** Technology Development, Transfer and Diffusion

**Strategic Policy Issue 8:** Collaborations and Partnerships

**Strategic Policy Issue 9:** Indigenous Resources and Traditional Knowledge (IRTK)

**Strategic Policy Issue 10:** Performance Management Framework

**Strategic Policy Issue 11:** ST&I Communication and Advocacy
STRATEGIC POLICY ISSUE 1: LEGAL AND INSTITUTIONAL FRAMEWORK

It is through governance systems that scientific and technological developments can be addressed and the benefits of ST&I optimised. A coordinated governance structure is required to create a coherent and focused legal, institutional and regulatory framework to support the development of effective and sustainable ST&I. The structures are also expected to promote the empowerment and full participation of women, youth disadvantaged persons and persons with disabilities in all ST&I programmes and activities. The integration of ST&I into all sectors of the economy and encouragement of targeted research and innovation in key growth sectors have had some challenges. Some of the specific governance issues that have been identified in relation to this include:

**Conflicting and Fragmented Regulatory Framework**

The ST&I sector is regulated under various regulatory frameworks which have established various institutions mandated to carry out the relevant functions. Some of the key institutions include NACOSTI, NEMA, KEPHIS, and KEBS among others. The governing interactions between innovation actors (i.e. laws, regulations, standards and norms) significantly affect the context for emerging technologies and industries. These institutions play an enabling role by promoting certainty and stability in social interactions and economic transactions at critical stages in the emergence of a new technology or industry. The ST&I sector lacks a coherent and focused policy framework that has resulted in weak coordination in regulation, quality assurance and accreditation of research and technology.

**Strategic Objective:** To strengthen and harmonize the legal, institutional and regulatory framework for development and utilization of ST&I.

STRATEGIC POLICY ISSUE 2: FUNDING FOR ST&I

Funding for ST&I and related activities is a basic requirement if ST&I is to make an impact across all sectors of the economy. Kenya has had the problem of inadequate funding that is not effectively coordinated in the face of competing demands for the national budget. Innovative resource mobilization mechanisms are critical to successful
implementation of the policy objectives. Securing of adequate funding streams for the various science, technology and innovation components to facilitate implementation of the policy objectives and achievement of the intended outcomes need to be addressed. There is need for incentive mechanisms such as tax incentives and subsidies to support ST&I. Some of the specific funding issues that have been identified include:

**Inadequate Financial Resources**
The Government has not prioritised budgetary allocation for ST&I leading to the research agenda being influenced by development partners, hence driving their agenda. There is also a lack of guiding framework for coordination of sector specific funding leading to weak coordination of resource mobilization efforts among and between the various players. Further, institutional and private sector participation in funding of research and development is low due to lack of clear incentive mechanisms.

**Strategic Objective:** To secure adequate funding for ST&I sector.

**Weak Financial Resource Mobilization Framework**
A robust financial environment is critical for ST&I. Financing of ST&I sector is fragmented, institution based and inadequate. Various ST&I sub-sectors have their unique financing structures that are entrenched in their respective legal and policy frameworks. The structures have established institutions that independently source for and manage financial resources within their sub-sectors. There is lack of a comprehensive and coordinated financing framework to support the ST&I sector leading to inefficient mobilization and utilization of resources. In addition, this has hampered decisions in the financing of national research priority areas.

**Strategic Objective:** To promote the development of a robust national framework for mobilization and management of ST&I resources.

**STRATEGIC POLICY ISSUE 3: HUMAN RESOURCE DEVELOPMENT**
Quality human resource is an important determinant of sustainable growth and development. The need to progressively increase the rate of generation of a high quality skilled human resource with a special focus on developing and upgrading innovation competencies within employment is also increasing. The process requires an enabling environment for building a critical mass of human resource, to harness and effectively participate in the generation and application of ST&I for value addition and efficient creation of new products and services. Some of the specific human resource development issues that have been identified include:

**Inadequate Human Resource for ST&I**

Over the years, the supply of human resource has become critical in certain ST&I areas, while employment of technically qualified personnel remains low by international standards. Kenya’s investment in high-level technical human resource and research is low. An added dimension to this is the emerging age-gap between the senior and junior scientists, engineers and technologists.

**Strategic Objective:** To build a critical mass of human resource capacity in ST&I priority areas.

**STRATEGIC POLICY ISSUE 4: EDUCATION, TRAINING AND RESEARCH**

Education and training institutions influences the ability to develop quality human resources within employment and affects the pool of skills emanating from the system. To ensure that adequate and relevant skills are available, ST&I related disciplines need to be integrated at all levels of education and training. Research is also essential for purposes of generating new knowledge and for putting into perspectives on the already developed knowledge to suit the Kenyan needs. The rapid changes in the ST&I sector will require human capacity to implement and manage the changes and adapt to the technological transformations. This requires a shift in terms of human resource requirements in certain cadres. Some of the specific education, training and research issues that have been identified include:

**Unresponsive Education Curriculum**
The curriculum in ECDE and primary school level does not foster talent development and creativity in science and mathematics resulting in low involvement in STEM at secondary and tertiary levels. The education and training curricula is not adequately aligned to industry needs. In addition, there is general shortage of science equipment and modern facilities in learning institutions. The universities curricular do not encourage the professors to do research; the crowded teaching programmes notwithstanding. The emphasis is on teaching, which is the criterion for career progression. Therefore, reforming the curricula and academic-promotion system would be useful in spurring research. There is shortage of qualified and trained science teachers and researchers for imparting quality science education in schools and research. There is limited inter-institutional collaborations and partnerships to facilitate sharing of education and research resources.

**Strategic Objective:** To develop and review education curriculum to respond to the needs of ST&I sector.

**Human Resource Skills Mismatch with the Industry Requirements**

There is a human resource skills gap between generation of knowledge in tertiary institutions and other levels of Institutions and its application in the industrial sectors across the country. Generally, there is also low translation of skills into technologically productive competencies within industry resulting in reduced technological intensification. As a result, the rapidly growing economy is already showing the skills constraints with shortages in critical cadres.

**Strategic Objective:** Provide support for practical interaction between ST&I training and the industry for enhanced technological learning that focuses on industry and market needs.

**Inadequate National Research Agenda**
The fact that research in Kenya is fragmented and not well coordinated is attributed to an ineffective National Research Agenda. Consequently, research priorities are set at the sub-sectoral level due to silo-mentality among the actors in the ST&I sector leading to limited multi-disciplinary, inter-institutional, product oriented and market driven research. The absence of an effective National Research Agenda has inhibited the integration of Science Technology and Innovation into the national development programmes. This has constrained the contribution of ST&I to economic growth of the country as envisaged in the Vision 2030.

**Strategic Objective:** To develop a national research agenda that will promote the advancement and use of ST&I in all productive sectors of the economy.

**STRATEGIC POLICY ISSUE 5: ST&I INFRASTRUCTURE**

The development of appropriate ST&I infrastructure is key to the realization of the objectives and goals of industrialization. Adequate infra-structure and equipment are prerequisite if the country’s research system is to keep pace with modern trends in research and research methodologies. Lack of supportive facilities like modern laboratories, workshops, computers and other technologies that are necessary for authentic integration of ST&I into globalization will always affect the quality and standards of research. The ICT infrastructure ensures speedy, secure and cost effective access to information and hence, the need to create an enabling environment for the strengthening and supporting ST&I physical infrastructure. Some of the specific ST&I Infrastructure issues that have been identified include:

**Inadequate ST&I Infrastructure**

Currently the country is faced with inadequate ST&I facilities, slow modernization, poor country wide distribution networks and accessibility. Although the Government has committed that the expenditure on R&D should be at least 2% of the GDP for ST&I sector, the current funding is approximately 0.98%. This is not adequate for ST&I infrastructure development. Addressing the current infrastructure funding gap may
require active public private partnerships (PPPs) through appropriate incentives that are currently low and inefficient.

**Strategic Objective 1:** To strengthen supportive physical infrastructure, including strategic facilities and their maintenance through renewal, upgrading and creation.

**Low ICT Integration in ST&I Sector**

ICT is a key enabler for ST&I sector. Knowledge Management Information System (KMIS) which plays a key role in ST&I data systems cannot work effectively without efficient ICT networks. The elaborate use of ICT is however limited especially in rural areas due to inadequate network connections. More local and foreign investment in ICT may be necessary to provide for utilization of digital technology in the ST&I sector.

**Strategic Objective:** Establish efficient ICT infrastructure and promote its use.

**STRATEGIC POLICY ISSUE 6: GENERATION AND MANAGEMENT OF INTELLECTUAL PROPERTY RIGHTS**

Due to the globalization processes currently on going, it is essential that existing Intellectual Property Rights (IPR) regimes are judiciously enforced to provide impetus for the generation, protection and utilization of intellectual property by all categories of relevant stakeholders. This is mainly important in cases where the collective knowledge of societies normally used for common good is likely to be converted to proprietary knowledge for commercial profit. Some of the specific IPR issues that have been identified include:

**Weak IPR regime**

There is little awareness and appreciation of Intellectual Property Rights among practitioners, stakeholders and policy makers and the existing Policy is not flexible to accommodate ever emerging issues in Science Technology and Innovation. The level of uptake and commercialization of intellectually protected products and services is also low.
**Strategic Objective:** To prudently enforce the existing Intellectual Property Rights (IPR) regime to maximise the generation, protection and utilization of intellectual property.

**STRATEGIC POLICY ISSUE 7: TECHNOLOGY DEVELOPMENT, TRANSFER AND DIFFUSION**

Technology Development, Transfer and Diffusion is important for the realization of full potential of ST&I in Kenya and depends on appropriate identification, acquisition, transfer, diffusion and application of emerging and relevant technology from collaborating partners and development of locally initiated technology. This requires support, search, acquisition, development and application of modern and traditional knowledge and the utilization of the ensuing technologies in the formal and informal sectors of the economy. There exist diverse efforts among the actors in the ST&I sector to support creation of more effective products, processes, technologies, services or ideas that get accepted by market and society. These efforts include development of innovation hubs, business incubation centres, science parks and special economic zones for purposes of converting ideas, research, or prototypes into viable products and services. Some of the specific technology development, transfer and diffusion issues that have been identified include:

**Low innovation uptake by Micro, Small and Medium Enterprises**

The Kenyan business system has not fully integrated innovation to enhance competitiveness. As a result, key sectors such as manufacturing have not been able to grow and become competitive. Kenya’s industrial structure displays insufficient linkages between the various categories of firms, especially the Micro, Small and Medium Enterprises (MSMEs), where most innovations take place. In addition, most local firms have challenges and should be supported to develop technological competencies to acquire and apply knowledge from foreign firms. Most local start-up companies die before maturity especially due to inadequate innovativeness that is required in addressing specific business system needs and challenges.
**Strategic Objective:** To support search, acquisition, development and application of modern and traditional knowledge and relevant technologies for the formal and informal sectors of the economy.

**Weak Technology Transfer**
Technological learning within the business system is not formally structured and appropriately managed to ensure technological capability building. Training activities are not inbuilt in contracts with industry to facilitate deeper technological competencies and related managerial capabilities. The systems that are tasked with providing support for technology incubation to ensure growth for entrepreneurs through development, assimilation, absorption and utilization of the requisite technology within the public sector remains weak and uncoordinated. This is occurring despite the fact that commercialization is a necessary step for business success of innovations from start-up ventures or public and private research efforts.

**Strategic Objective:** To provide support for increased technology transfer to micro, small and medium enterprises.

**STRATEGIC POLICY ISSUE 8: COLLABORATIONS AND PARTNERSHIPS**
The current development patterns are driven by knowledge sharing through collaborations and partnerships. National and international collaborations and partnerships in ST&I is an important requirement to maximise benefits from national research projects and globalization. Collaborative and multi-disciplinary interactions play a major role in the ST&I sector especially in scientific research where knowledge generation, utilization and sharing is a major component. Close and productive interaction between scientists, private sector and public institutions in the field of ST&I is vital in harnessing the existing potentials that enhance technology development and knowledge sharing. Some of the specific collaboration and partnership issues that have been identified include:
Weak Government, Industry and Academia Linkages
Operational linkages among the academia, industry and government are weak resulting in a poor environment for growth of ST&I and low rate of commercialization of research outputs. In addition, the operational structures and financial support to facilitate the necessary linkages among the actors are weak. Awareness of the commercialization processes in ST&I is low among the general population leading to slow business and enterprise development. The infrastructure to support innovation, incubation and commercialization is not well developed thereby hindering the growth of knowledge based business start-ups.

Strategic Objective: To promote strategic regional and international linkages, collaboration and partnerships in ST&I for national development.

Uncoordinated Intermediary Organisations
Most of the stakeholders constituting the intermediary organizations are weak in developing and transmitting knowledge between the business system and the education and research system. Additionally, the ST&I activities of intermediate organisations are not aligned to national priorities because of their private nature.

Strategic Objective: To strengthen the supportive capacity of intermediary organizations.

STRATEGIC POLICY ISSUE 9: INDIGENOUS RESOURCES AND TRADITIONAL KNOWLEDGE (IRTK)
Kenya has rich indigenous resources and traditional knowledge available in the formal and informal sectors for exploitation. However, biodiversity has been declining around steadily overtime. This reduction is caused primarily by human impacts, particularly the destruction of plant and animal habitats. In addition, human practices are responsible for the loss of genetic diversity within and among these species hence affecting the existing indigenous resources and traditional knowledge. Some of the specific IRTK issues that have been identified include:
Inadequate Documentation and Preservation of IRTK

Indigenous resources and traditional knowledge is being eroded at a higher rate than it is being passed on to the next generation partly due to the changing life styles and partly due to the influence of Western culture. It is therefore necessary to develop technologies that add value to Kenya’s indigenous resources hence, the urgent need for proper documentation. Documentation and preservation of indigenous resources and traditional knowledge is inadequate and fragmented. The existing intellectual property rights regime does not adequately facilitate the verification and protection of indigenous knowledge and resources.

Strategic Objective: To exploit the full potential of the existing IRTK by using ST&I to generate, protect, preserve, evaluate, update, add value to, and utilize them for national development.

Low Biodiversity and Conservation of Heritage

Biodiversity is often used as a measure of the health of ecosystem. Biodiversity has been declining in Kenya and around the world due human impacts, particularly the destruction of plant and animal habitats. In addition, human practices are responsible for the loss of genetic diversity within and among these species. Rapid human population growth and the subsequent forest degradation threaten biodiversity and may cause habitat fragmentation or in extreme cases, species extinction. Bio-piracy and poaching are also challenges facing biodiversity in Kenya.

Strategic Objective: To explore alternative technologies including ICT to conserve and manage Kenya’s natural resources while harnessing maximum benefits from environment and natural resources sustainably.

STRATEGIC POLICY ISSUE 10: PERFORMANCE MANAGEMENT FRAMEWORK

Regular and effective, transparent and research-based monitoring and reviewing mechanisms are necessary for the success of ST&I initiatives. Currently a well-developed comprehensive performance management framework linking programmes,
outputs and outcomes within the ST&I sector is not working as expected. Some of the specific performance management framework issues that have been identified include:

**Low Institutional Capacity to Assure Quality and Standards**
There are inadequacies in capacities to assure quality standards and accreditation of ST&I Institutions and programmes in accordance to national and international requirements. These inadequacies include; human, financial technological and general infrastructure. There is a shortage of qualified and competent human resource to effectively undertake quality assurance and accreditation functions. The budgetary allocations are inadequate to facilitate the execution of the regulatory mandate. The operational efficiency of the regulatory bodies is highly hampered by low level of technological uptake and automation of the standards and accreditation processes.

**Strategic Objective:** To strengthen capacity for quality assurance and standards at the national and institutional levels.

**Inadequate Monitoring and Evaluation Framework**
The country lacks an integrated data and information management system for collecting, collating, storing and sharing ST&I data to inform policy. This has led to inadequate ST&I data for inclusion in the national statistics system. Consequently, the contribution and impact of the ST&I sector to the national economy is not quantified due to weak monitoring, evaluation and reporting mechanisms to highlight achievements in ST&I. Inadequate financial and human resource capacity has hampered monitoring and evaluation in the sector.

**Strategic Objective:** To develop a comprehensive performance management framework linking programme outcomes to long term impacts of this ST&I Policy.

**STRATEGIC POLICY ISSUE 11: ST&I COMMUNICATION AND ADVOCACY**
There is a growing need to enhance public awareness on the importance of ST&I and its implication to everyday life, covering the ethical, moral, legal, social and economic aspects. Initiatives should be put in place to promote public acceptance of and support for national ST&I activities. The improved awareness on, support for and stakeholders’ ownership of the development and application of ST&I for national development will elevate the profile and build its competitiveness. Some of the specific public communication and advocacy issues that have been identified include:

**A Weak ST&I Information System**
The generation, storage and dissemination of ST&I data and information is not coherent and interactive to inform policy decisions for the growth of the sector. In addition, information on ST&I is neither mapped nor interlinked. The existing system for ST&I information management is not adequately automated. There is inadequate coordination of National and County Government levels to create interest and a culture of science and technology. The country lacks a tracking system for the establishment of status of ST&I indices to benchmark the national system of innovation for global competitiveness and inform relevant policy interventions.

**Strategic Objective:** To promote communication between the scientific community and consumers of ST&I products and services and those supportive of the development and application of ST&I.

**Low ST&I Awareness and Advocacy**
The science culture among the Kenyan populace is low which is attributed to limited information on the role of ST&I in daily life. The existing advocacy and awareness programmes are not well structured and coordinated. In addition, the resources for advocacy and awareness programmes are limited. At the high political and policy levels, awareness for ST&I is low resulting to lack of ST&I champions.

**Strategic Objective:** To promote public awareness, acceptance and support for national ST&I activities.
CHAPTER FOUR - POLICIES AND STRATEGIES

4.1 The policy identifies that, due to a variety of reasons, science and technology planning and management structure is not functioning optimally. The effect of this is that there is a wide gap in the expectations and the aspirations of the National Innovation System.

4.2 The policies fall within the strategic issues mentioned in Chapter Three and will be used to address challenges by: finalizing and operationalizing an integrative policy framework to facilitate effective integration of ST&I into the economy; effective implementation of a coordinated national research agenda; enhancement of a cross-cutting/all-inclusive innovation system; strengthening of linkages and coordination among government, private sector and researchers; alignment of education and training curricula to industry needs; promoting commercialization rate of innovations; simplifying IP process and enhancing awareness among innovators; developing a database on experts and innovations; and provision of adequate funding and support for innovations.

4.3 The following policy statements emphasize the need to streamline the National Innovation System to make it more effective and integrate it into the mainstream of national planning and development system.

Strategic Policy Issue: Legal and Institutional Framework

Strategic Policy Objective: To strengthen and harmonize the legal, institutional and regulatory framework for development and utilization of ST&I.


In order to implement the policy, the Government will adopt the following strategies:

a) Review, harmonize and consolidate the existing legal and regulatory framework.

b) Mainstream ST&I in all sector of the economy at both national and county government levels.

c) Re-engineer institutions to provide a governance framework that support autonomy, coordination, gender equity and partnership-based application of ST&I.

d) Review staffing and leadership of ST&I institutions with a view to promoting progressive gender parity in national ST&I initiatives.
Strategic Policy Issue 2: Funding For ST&I

Strategic Objective: To secure adequate funding for ST&I sector.

Policy 2: The Government will allocate resources (2% GDP annually), mobilize and engage stakeholders to participate in R&D sub-sector funding.

In order to implement the policy, the Government will adopt the following strategies:

a) Allocate 2% of GDP annually to ST&I sector.
b) Develop a framework for resource mobilization for ST&I.
c) Enhance national, regional and international collaborations to increase investments in ST&I.
d) Develop an incentive framework for Private sector participation in R&D funding.
e) Harmonize policies, planning and budgeting of the sector.

Strategic Policy Issue 3: Human Resource Development

Strategic Objective: To build a critical mass of human resource capacity in ST&I priority areas.

Policy 3: The Government will develop human resource capital in ST&I to meet the demands of the economy.

In order to implement the policy, the Government will adopt the following strategies:

a) Undertake ST&I skills inventory and mapping technologies to ensure focus in prioritized areas.
b) Mainstream women, youth and persons living with disabilities in ST&I programmes.
c) Provide incentives to attract and retain talented Kenyans in ST&I locally and from the diaspora.
d) Establish incubation and innovation centres to promote entrepreneurial development.
e) Promote and strengthen Research Chair programme in prioritized ST&I areas.
f) Provide mechanisms to allow industry to contribute to curriculum development in institutions of higher learning and training.
g) Promote ST&I brain gain and brain circulation.
h) Develop a dynamic career path for researchers in public research institutes and institutions of higher learning.
**Strategic Policy Issue 4: Education, Training and Research**

**Strategic Objective:** To develop a national research agenda that will promote the advancement and use of ST&I in all productive sectors of the economy.

**Policy 4: The Government will ensure quality Education, Training and Research for knowledge based economy**

In order to implement the policy, the Government will adopt the following strategies:

a) To develop and review education curriculum to respond to the needs of ST&I.

b) To develop a national research agenda that will promote the advancement and use of ST&I in all productive sectors of the economy.

c) Develop a framework for enhancing creativity and learning by discovery.

d) Establish centres of excellence that promote innovation and creativity.

e) Develop well coordinated programmes in Education, Training and Research and Development and Training in all aspects of technology management.

f) Nurture Kenyans from the youngest possible age to pursue careers in ST&I.

g) Sensitize teachers, parents, students, and all stakeholders on ST & I and its benefits.

h) Expose Kenyans to ST&I experiences at the earliest possible age.

i) Develop mechanisms for recognizing, tapping and nurturing ST&I talent.

j) To cultivate and sustain interest in Mathematics, science and technology at Early Childhood, Primary and Secondary Education level.

k) Develop entrepreneurship skills for technology-based enterprises.

l) Provide for reforms in vocational training in national priority areas to produce craftsmen, artisans and technicians who are relevant to the needs of modern industry.

m) Increase public investment for universities, government laboratories and research institutes to enable access to facilities, and equipment needed for research for focusing on identified national strategic priority areas.

n) Provide enhanced research grants to Kenya’s most outstanding researchers in national strategic priority areas through the proposed Kenya National Research Foundation.

o) Encourage through incentives, in-house R&D by commercial enterprises.

p) Strengthen research management systems.

**Strategic Policy Issue 5: ST&I Infrastructure**

**Strategic Objective:** To develop a national research agenda that will promote the advancement and use of ST&I in all productive sectors of the economy.
Policy 5: The Government will develop ST&I infrastructure to support Programmes in identified priority areas.

To implement the policy, the Government will adopt the following strategies:

a) Establish the status of ST&I infrastructure in the identified priority areas.
b) Provide adequate ST&I infrastructure in the identified priority areas.
c) Provide adequately equipped science laboratories in learning institutions.
d) Develop programmes with industry to strengthen indigenous technological capabilities through partnership with universities and public research institutions.

Strategic Policy Issue 6: Generation and Management of Intellectual Property Rights

Strategic Objective: To prudently enforce the existing Intellectual Property Rights (IPR) regime to maximise the generation, protection and utilization of intellectual property.

Policy 6: The Government will facilitate acquisition of Intellectual Property Rights (IPRs) by scientists, researchers and innovators.

In order to implement the policy, the Government will adopt the following strategies:

a) Sensitise stakeholders on the importance of Intellectual Property Rights;
b) Develop and implement a National Intellectual Property Rights Policy;
c) Review Intellectual Property Rights regime to facilitate the verification and acquisition of protection for indigenous resources and knowledge;
d) Strengthen management of intellectual property rights (IPRs) including patent and other services by reviewing existing legislation to allow the securitization of intellectual property where IPRs can be used as a collateral for loans.

Strategic Policy Issue 7: Technology Development, Transfer and Diffusion

Strategic Objective: To provide support for increased technology transfer to micro, small and medium enterprises

Policy 7: The Government will promote development, transfer and diffusion of ideas and knowledge into products and processes

In order to transform ideas and knowledge into products and processes, the Government will adopt the following strategies:
a) Establish business development unit within ministry responsible for science and technology to facilitate commercialization and technology transfer.

b) Enhance quality standards and accreditation of testing and calibration laboratories according to international requirements to enable Kenyan industry compete globally.

c) Enhance the transfer of innovations and inventions emanating from Research and Development.

d) Establish Government supported business incubators and science technology parks.

**Strategic Policy Issue 8: Collaborations and Partnerships**

**Strategic Objective:** To strengthen the supportive capacity of intermediary organizations.

**Policy 8: The Government will promote collaborations and partnerships in existing and emerging issues in ST&I**

To implement the policy, the Government will adopt the following strategies:

a) Develop and strengthen systems and institutions to facilitate collaboration and multi-disciplinary scientific research

b) Establish, implement, monitor and review agreements within research institutions, universities and engineering institutions.

c) Create opportunities for linkages between private and public Institutions.

d) Establish a supportive network of interconnected public and private institutions focused on nurturing, developing and diffusing required ST&I skills, knowledge and attitudes.

e) Promote productive interaction between communities, research institutions and knowledge intermediaries in ST&I.

f) Target programmes that address regional and international linkages, collaboration and partnerships in ST&I.

g) Establish mechanisms for networking between policy makers and ST&I experts.

h) Create and strengthen science diplomacy.

**Strategic Policy Issue 9: Indigenous Resources and Traditional Knowledge (IRTK)**
**Strategic Objective:** To explore alternative technologies including ICT to conserve and manage Kenya’s natural resources while harnessing maximum benefits from environment and natural resources sustainably.

**Policy 9: The Government will fully exploit its Indigenous Resources and Traditional Knowledge for national development**

To implement the policy, the Government will adopt the following strategies:

a) Evaluate and update the extensive indigenous resources and traditional knowledge.

b) Integrate IRTK into national development.

c) Promote utilization and conservation of indigenous resources and traditional knowledge.

d) Promote value addition on indigenous resources and traditional knowledge.

e) Promote ST&I innovations and inventions that are Kenyan in origin and character.

f) Enhance role of social science in ST&I.

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**Strategic Policy Issue 10: Performance Management Framework**

**Strategic Objective:** To develop a comprehensive performance management framework linking programme outcomes to long term impacts of this ST&I Policy.

**Policy 10: The Government develop a comprehensive performance management framework linking programme outcomes and impacts**

To implement the policy, the Government will adopt the following strategies:

a) Develop and implement an effective and efficient Web-based monitoring and review mechanism.

b) Exploit the on-going initiatives on ministerial re-organization to have the PMF well defined and funded.

c) Periodic review of the implementation of the ST&I policy with key stakeholders.

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**Strategic Policy Issue 11: ST&I Communication and Advocacy**

**Strategic Objective:** To promote public awareness, acceptance and support for national ST&I activities.

**Policy 11: The Government will elevate the profile of and promote public awareness of ST&I for national development**
To implement the policy, the Government will adopt the following strategies:

a) Develop and implement ST&I communication Policy.
b) Enhance visibility of ST&I.
c) Support and encourage the development of indicators for ST&I.
d) Promote and encourage a national integrated advocacy programme for ST&I.
e) Fast track one ST&I driven development programme to serve as an example and motivator.
f) Encourage public dialogue involving researchers, the different users and beneficiaries on ST&I matters of interest.
g) Benchmark the impact of activities aimed at raising public awareness of science, technology and innovation through effective comparative studies.
h) Support and encourage effective communications print and electronic media.
i) Develop mechanisms for communicating ST&I results to increase knowledge and understanding for adoption and utilization.
j) Promote online approach to ST&I information exchanges.
CHAPTER FIVE - INSTITUTIONAL FRAMEWORK

5.1 Organisational Structure

Kenya’s drive to be a middle-income country by 2030 will be based on development of a robust knowledge-based economy. Lessons learnt from most newly industrialized countries (NIC) indicate that this transformation has been built around a dedicated Ministry responsible for science, technology and innovation across all sectors. In line with the benchmarked countries, Kenya should establish a Ministry responsible for Science, Technology and Innovation. This Ministry will be responsible for policy, planning and coordination of funding of the ST&I sector. It will also coordinate the implementation of flagship programmes across all sector Ministries, Departments and Agencies (MDAs) with respect to science, technology and innovation.

5.2 Ministry in Charge of Science, Technology and Innovation

Science, technology and innovation is critical to the realization of Vision 2030 and is cross-sectoral. The coordination function will therefore fall under a dedicated Ministry in charge of ST&I which will be responsible for policy for science, technology and innovation.

The main functions of the Ministry are to:

a) Formulate, review and coordinate national research, science, technology and innovation policies and legislations to promote RST&I;

b) Coordinate the implementation and evaluation of the national RST&I Policy;

c) Promote strategic regional and international linkages, collaboration, and cooperation in RST&I;

d) Coordinate various private and public agencies involved in RST&I;

e) Manage the Government’s RST&I investments;

f) Undertake technical audit to ensure that RST&I investments yield products beneficial to the economy;

g) Collaborate with other Government organizations where RST&I is involved within their work; and

h) Coordinate the interaction among knowledge institutions, business community and industry.

The Ministry has the National Commission for Science, Technology and Innovation (NACOSTI); the Kenya National Innovation Agency (KENIA); and the National Research Fund (NRF) as the institutional frameworks for the governance of the national innovation system. The key functions of these agencies are as follows:
5.3 National Commission for Science Technology and Innovation

The National Commission for Science, Technology and Innovation (NACOSTI) was established under the ST&I Act, 2013 as a body corporate. The mandate of the Commission is to regulate and assure quality in the ST&I sector and advise Government on matters of science, technology and innovation. NACOSTI will have ST&I offices in the counties to carry out her mandate. The specific functions of the Commission are:

a) Develop, in consultation with stakeholders, the priorities in scientific, technological and innovation activities in Kenya in relation to the economic and social policies of the Government, and the country's international commitments;

b) Lead inter-agency efforts to implement sound policies and budgets, working in collaboration with the county governments, and organizations involved in science and technology and innovation within Kenya and outside Kenya;

c) Advise the national and county governments on the science, technology and innovation policy, including general planning and assessment of the necessary financial resources;

d) Liaise with the National Innovation Agency and the National Research Fund to ensure funding and implementation of prioritized research programmes;

e) Ensure co-ordination and co-operation between the various agencies involved in science, technology and innovation;

f) Accredit research institutes and approve all scientific research in Kenya;

g) Assure relevance and quality of science, technology and innovation programmes in research institutes;

h) Advise on science education and innovation at both basic and advanced levels;

i) In consultation with the National Research Fund Trustees, sponsor national scientific and academic conferences it considers appropriate;

j) Advise the Government on policies and any issue relating to scientific research systems;

k) Promote increased awareness, knowledge and information on research system;

l) Coordinate, monitor and evaluate, as appropriate, activities relating to scientific research and technology development;

m) Promote and encourage private sector involvement in scientific research and innovation and development;

n) Annually, review the progress in scientific research systems and submit a report of its findings and recommendations to the Cabinet Secretary;

o) Promote the adoption and application of scientific and technological knowledge and information necessary in attaining national development goals;
p) Develop and enforce codes, guidelines and regulations in accordance with the policy determined under this Act for the governance, management and maintenance of standards and quality in research systems; and

q) Undertake, or cause to be undertaken, regular inspections, monitoring and evaluation of research institutions to ensure compliance with set standards and guidelines.

5.4 Kenya National Innovation Agency

The key functions of KENIA are:

a) Institutionalize linkages between universities, research institutions, the private sector, the Government, and other actors in that System;

b) Cause the creation of science and innovation parks, institutes or schools or designate existing institutions as centres of excellence in priority sectors;

c) Develop and continuously benchmark national innovation standards based on international best practices;

d) Scout for and nurture innovative ideas from individuals, training institutions, the private sector and similar institutions;

e) Establish and regularly update a database on innovation in collaboration with other relevant institutions;

f) Monitor, forecast and maintain a database of the latest and future global technology;

g) Increase awareness of intellectual property rights among innovators;

h) Ensure the inclusion of science, technology and innovation in the country's programs and policies at all levels;

i) Establish and maintain a Presidential or other award system for novel innovations, subject to prescribed conditions;

j) Implement the national innovation and commercialization policy;

k) Disseminate scientific knowledge or technology through any medium;

l) Recommend provision of financial and any other assistance to any person, for the purpose of enabling that person develop a technological innovation;

m) Acquire rights or interests in or to any technological innovation supported by the Agency from any person or assign any person any rights in or to such technological innovation;

n) Create synergies among different technological innovations, incubations initiatives for diffusion of technology in Kenya;

o) Develop the national capacity and infrastructure to protect and exploit intellectual property derived from research or financed by the Agency;
p) Facilitate the application for grant or revocation of patents and institution of legal action for infringement of any intellectual property rights;
q) Recommend the provision of financial and any other assistance to any person for the purpose of encouraging the person to develop any technological innovation;
r) Identify strategic fields of innovation;
s) Provide incubators for innovative ideas;

5.5 National Research Fund

The functions of the Board of Trustees are:

a) Mobilize resources for the Kenya National Innovation System from the Government, the private sector, venture capital, development partners and other sources;
b) Prudently manage and invest the funds so mobilized
c) support the development of human resources through grants to persons in research institutions or universities pursuing postgraduate programs in prioritized areas of science, technology and innovation with priority being given to marginalized indigent communities;
d) Support the development of research capacities in the national priority areas of science, technology and innovation;
e) Allocate funds for research and promote multi-disciplinary collaboration among universities and research institutions, including the innovation delivery agencies;
f) Evaluate the needs, status and results of research financed through the Fund
g) Provide financial support for the development of research facilities by universities, research institutions and other bodies identified by the NACOSTI.
h) Provide financial support for participation in international scientific activities through maintaining membership to appropriate international science organizations;
i) Provide financial support for collaboration, co-operation and sharing of research information and knowledge including supporting conferences, workshops, seminars, meetings and other symposia;
j) Promote the provision of an information infrastructure linking research institutions to facilitate co-operation and sharing of research information and knowledge;
k) Initiate liaison with bodies involved in the protection of intellectual property rights;
l) Compile and maintain a national database of research and innovation funded by the Fund as well as those funded by other agencies.
5.6 Research Institutes

Research institutes will be hosted by the respective sector ministries. The NACOSTI will work with the sector ministries to restructure and rationalize the research institutes to promote product-oriented multi-disciplinary research. The policy, planning and budgeting of the sector-based research institutes will be harmonized under the Commission. These research institutes will competitively access funds from the NRF to carry out projects that have been prioritized by the Commission.

A County Government in liaison with NACOSTI may establish specialized research institutes or innovation centres of excellence to carry out mandates that have been prioritized by this level of Government.

5.7 Centres of Excellence

Kenya’s drive to achieve the Vision 2030 goals and realise the constitutional mandates is predicated on effective institutions, driven by appropriate leveraging of ST&I. Lessons from the BRICS and other rapidly developing countries indicate that achieving national and regional economic competitiveness as well as sustainable development is key to this effort. This requires growth of institutions dedicated to scientific research and technological innovation, which are the bedrock of a modern knowledge economy. In this regard, the Ministry responsible for Science, Technology and Innovation in collaboration with the National Commission on Science, Technology and Innovation, the Kenya Innovation Agency and the National Research Fund, will establish Centres of Excellence (COEs). The Centres will be established at the county and national levels, by virtue of having achieved a high level of repute or profile within its area of performance in respect of ST&I. The Centres will be carrying out work guided by a Centre of Excellence Programme (CoEP) dedicated to initiatives focusing on identified national priority areas.
IMPLEMENTATION MATRIX

<p>| Sector Goal: To transform the national economy into a knowledge-based economy |</p>
<table>
<thead>
<tr>
<th>Policies and Strategies</th>
<th>Expected Results</th>
<th>Performance Indicators</th>
<th>Means of Verification</th>
<th>Indicative Targets And Time Frames</th>
<th>implementing Agency</th>
<th>Estimated costs in Millions (Ksh.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy 1: The Government will establish an institutional and regulatory framework to promote, coordinate, mobilize resources and manage ST&amp;I</td>
<td>ST&amp;I policy and legal framework developed</td>
<td>% completion of ST&amp;I policy and legal framework</td>
<td>ST&amp;I policy ST&amp;I Act</td>
<td>100% completion by 2016</td>
<td>Ministry responsible for ST&amp;I</td>
<td>238</td>
</tr>
<tr>
<td>Strategy 1.1: Mainstream ST&amp;I in all sectors of the economy both at national and county government levels;</td>
<td>ST&amp;I integrated in all Sectors of the economy</td>
<td>No. of ST&amp;I programmes in the sectors; % of budget allocated to ST&amp;I programmes in the sectors</td>
<td>Sectors reports; Budget estimates</td>
<td>At least one ST&amp;I programme integrated and funded by all sectors by 2017;</td>
<td>Ministry responsible for ST&amp;I NACOSTI KENIA NRF</td>
<td>60</td>
</tr>
<tr>
<td>Strategy 1.2: Re-engineer institutions to provide a governance framework to support autonomy, coordination, gender parity and partnership-based application of ST&amp;I</td>
<td>ST&amp;I policy and legal framework developed; ST&amp;I policy and legal framework implemented;</td>
<td>% completion of ST&amp;I Policy and legal framework; % implementation of ST&amp;I policy and legal framework</td>
<td>ST&amp;I policy ST&amp;I Act; progress report M&amp;E Reports Regulations legal notices gazette notices</td>
<td>100% completion by 2016 100% implementation by 2025</td>
<td>Ministry responsible for ST&amp;I NACOSTI KENIA NRF</td>
<td>16</td>
</tr>
<tr>
<td>Strategy 1.3: Build capacity to assure quality standards and accreditation of ST&amp;I Institutions and programmes in accordance to national and international requirements</td>
<td>Human resource skills upgraded; Relevant infrastructure in place; Financial resources enhanced</td>
<td>%. of people trained; No. of laboratories; Percentage increase in budgetary allocation</td>
<td>Training reports; Inspection reports; Budget estimates</td>
<td>100% of NACOSTI technical staff trained annually At least 1% of technical staff in research institutions trained in quality assurance</td>
<td>Ministry responsible for ST&amp;I NACOSTI NRF Research Institutions</td>
<td>16</td>
</tr>
<tr>
<td><strong>Strategy 1.4</strong>: Develop a policy for commercialization of inventions and innovations</td>
<td>Policy on commercialization of inventions and innovations developed</td>
<td>% of policy development</td>
<td>Policy document Report on technologies commercialized</td>
<td>100% policy developed by 2017</td>
<td>Ministry responsible for ST&amp;I KENIA</td>
<td></td>
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</tr>
<tr>
<td><strong>Strategy 1.5</strong>: Establish ST&amp;I recognition and award scheme</td>
<td>ST&amp;I recognition and award scheme in place</td>
<td>% completion of ST&amp;I recognition and award scheme.</td>
<td>ST&amp;I award and recognition Framework</td>
<td>100% Award scheme established by 2016</td>
<td>Ministry responsible for ST&amp;I KENIA NACOSTI</td>
<td></td>
</tr>
<tr>
<td><strong>Strategy 1.6</strong>: Monitor and evaluate the implementation of ST&amp;I policy, Legal framework and programmes</td>
<td>M&amp;E system developed M&amp;E conducted</td>
<td>% completion of M&amp;E system Number of M&amp;E activities</td>
<td>M&amp;E Framework; M&amp;E reports</td>
<td>100% completion of M&amp;E System Bi-annual M&amp;E per year</td>
<td>Ministry responsible for ST &amp;I NACOSTI NRF KENIA</td>
<td></td>
</tr>
</tbody>
</table>

**Policy 2:** The Government will leverage ST&I to transform the economy through identified national priority areas

<table>
<thead>
<tr>
<th><strong>Strategy 2.1</strong>: Develop a framework for determining national priority areas in ST&amp;I</th>
<th>Framework developed</th>
<th>% completion of the Framework</th>
<th>The framework Report</th>
<th>100% framework developed by 2016</th>
<th>NACOSTI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategy 2.2</strong>: Identify and review national priority areas in ST&amp;I</td>
<td>ST&amp;I priority areas identified and reviewed</td>
<td>Number of priority areas identified and reviewed</td>
<td>National Priority Areas Reports List of priority areas</td>
<td>At least 10 priority areas identified by 2016 Priority areas reviewed annually</td>
<td>NACOSTI</td>
</tr>
<tr>
<td><strong>Strategy 2.3</strong>: Establish and sustain ST&amp;I Centres of Excellence in the national priority areas</td>
<td>Centres of Excellence in the national priority areas established and sustained</td>
<td>Number of CoEs established and sustained</td>
<td>CoEs establishment Report Certificate of registration</td>
<td>At least 1 CoE in each priority area by 2025</td>
<td>Ministry responsible for ST&amp;I NACOSTI KENIA NRF</td>
</tr>
<tr>
<td>Strategy 2.4: Review on-going ST&amp;I programmes and align them to the national priority areas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ST&amp;I programmes aligned to national Priority areas</td>
<td>% of ST&amp;I programmes reviewed</td>
<td>Report on alignment of ST&amp;I</td>
<td>100% by 2025</td>
<td>Ministry responsible of ST&amp;I NACOSTI</td>
<td></td>
</tr>
</tbody>
</table>

| Strategy 2.5: Establish ST&I Parks |
| ST&I Parks established | Number of ST&I Parks established | ST&I Parks establishment Reports | At least one National ST&I Park by 2020 | Ministry responsible for ST&I NACOSTI KENIA NRF |

| Policy 3: The Government will allocate resources, mobilize and motivate stakeholders to participate in the R&D sub-sector funding to at least 2% of GDP annually |
| 2% of GDP allocated to ST&I | % of GDP allocated to ST&I | Budget statements Annual Report of NRF ST&I inventory | 2% of GDP by 2018 | Ministry responsible of ST&I NRF |

| Strategy 3.1: Develop a Framework for resource mobilization for ST&I. |
| A framework for resource mobilization for ST&I developed | % completion of the Framework Development | Framework document | 100% completion by 2017 | Ministry responsible for ST&I NRF NACOSTI KENIA |

| Strategy 3.2: Increase Government allocation for R&D |
| Increased funding for R&D | % of national budget allocated to R&D | Budget estimates | 1% of national budget annually | Ministry responsible for ST&I NRF |

| Strategy 3.3: Enhance national and international collaborations to increase investments in ST&I Initiatives |
| National and International collaborations and partnerships increased | Number of collaborations and partnerships | MOUs Agreements List of beneficiaries reports | Two collaborations and partnerships annually starting 2016 | Ministry responsible for ST&I NRF NACOSTI KENIA |
**Strategy 3.4:** Develop an incentives framework for Public Private Partnerships (PPPs) to increase R&D funding and promote in-house R&D in enterprises

<table>
<thead>
<tr>
<th>Incentives framework developed</th>
<th>% completion of the incentives framework</th>
<th>Incentives framework report</th>
<th>100% completion of Incentives framework report by 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased R&amp;D funding from the private sector</td>
<td>% increase in R&amp;D funding through PPPs</td>
<td>R&amp;D expenditure reports</td>
<td>5% increase of R&amp;D funding through PPPs annually</td>
</tr>
<tr>
<td>In-house R&amp;D units in enterprises established</td>
<td>% of enterprises with in-house R&amp;D units</td>
<td>ST&amp;I inventory</td>
<td>At least 60% of enterprises with in-house R&amp;D units by 2020</td>
</tr>
</tbody>
</table>

**Policy 4: The Government will facilitate acquisition of Intellectual Property Rights (IPRs) by scientists, researchers and innovators**

<table>
<thead>
<tr>
<th>Acquisition of IPRs facilitated</th>
<th>Number of IPRs acquired per year</th>
<th>KIPI inventory report</th>
<th>100 patent acquisitions by Kenyans annually</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ST&amp;I inventory report</td>
<td>KENIA NACOSTI KIPI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WIPO Statistical Country profile report</td>
<td></td>
</tr>
</tbody>
</table>

**Strategy 4.1:** Sensitise stakeholders on Intellectual Property Rights

<table>
<thead>
<tr>
<th>Stakeholders sensitized on IPR</th>
<th>Number of stakeholders sensitization forums held</th>
<th>Report on stakeholder sensitization forums</th>
<th>At least 4 stakeholders sensitization forums held annually</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>KENIA NACOSTI KIPI</td>
</tr>
</tbody>
</table>

**Strategy 4.2:** Review and implement a National Intellectual Property Policy

<table>
<thead>
<tr>
<th>National Intellectual Property Policy reviewed and implemented</th>
<th>% of National Intellectual Property Policy reviewed and implemented</th>
<th>Policy document</th>
<th>100% policy document by 2017</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

<p>| Ministry responsible for ST&amp;I NRF NACOSTI KENIA | 6 |</p>
<table>
<thead>
<tr>
<th>Strategy 4.3: Document the indigenous resources and traditional knowledge</th>
<th>Indigenous resources and traditional knowledge documented % documentation of indigenous resources and traditional knowledge</th>
<th>Inventory of documented indigenous resources and traditional knowledge</th>
<th>100% documentation by 2018</th>
<th>KENIA NMK</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategy 4.4: Review IPR regime to facilitate the verification and acquisition of protection for indigenous resources and knowledge</td>
<td>IPR regime reviewed Indigenous resources and knowledge Verified and protected % review of IPR regime % of the documented indigenous resources and knowledge verified and protected</td>
<td>IPR regime review report progress reports KIPI inventory report KENIA progress report</td>
<td>100% regime review by 2018 At least 50% of indigenous resources and knowledge verified and protected by 2020</td>
<td>KENIA NACOSTI KIPI NMK</td>
<td>30</td>
</tr>
<tr>
<td>Strategy 4.5: Facilitate commercialization of intellectually protected products and services</td>
<td>Intellectually protected products and services commercialized % of Intellectually Protected products and services commercialized</td>
<td>Annual reports</td>
<td>100% of Intellectually Protected products and services commercialized annually by 2025</td>
<td>KENIA NRF KIPI</td>
<td>500</td>
</tr>
<tr>
<td>Policy 5: The Government will promote ST&amp;I knowledge sharing and awareness creation</td>
<td>ST&amp;I knowledge sharing and awareness creation promoted % increase in ST&amp;I awareness levels</td>
<td>survey reports</td>
<td>At least 50% increase in ST&amp;I awareness levels by 2020</td>
<td>Ministry responsible for ST&amp;I NACOSTI KENIA</td>
<td>5562</td>
</tr>
<tr>
<td>Strategy 5.1: Develop and implement ST&amp;I communication policy</td>
<td>ST&amp;I communication policy developed and implemented % completion and implementation of ST&amp;I communication policy</td>
<td>Policy document Progress reports M&amp;E reports</td>
<td>100% completion of policy document developed by 2016 100% implementation by 2018</td>
<td>Ministry responsible for ST&amp;I NACOSTI</td>
<td>16</td>
</tr>
<tr>
<td><strong>Strategy 5.2:</strong> Increase ST&amp;I awareness among policy makers and industry practitioners</td>
<td>Awareness on ST&amp;I among policy makers and industry practitioners increased</td>
<td>% increase in ST&amp;I awareness among policy makers and industry practitioners</td>
<td>Survey reports Progress reports M&amp;E reports</td>
<td>At least 50% increase in ST&amp;I awareness levels by 2020</td>
<td>Ministry responsible for ST&amp;I NACOSTI</td>
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</tr>
<tr>
<td><strong>Strategy 5.3:</strong> Develop programmes for ECDE and Primary School learners to engage in creative activities for raising interest in science and mathematics</td>
<td>Programmes to increase interest in science and mathematics for ECDE and Primary School learners developed</td>
<td>Number of science and mathematics programmes for raising interest in ECDE and Primary Schools</td>
<td>Programme reports Quality Assurance Reports</td>
<td>At least two programmes developed by 2017</td>
<td>Ministry responsible for Education and ST&amp;I NACOSTI ESQAC KICD</td>
</tr>
<tr>
<td><strong>Strategy 5.4:</strong> Increase participation in STEM at secondary and tertiary levels of education</td>
<td>Participation in STEM at secondary and tertiary levels of education increased</td>
<td>% increase in enrollment in STEM courses in secondary and tertiary institutions.</td>
<td>EMIS reports Enrollment records</td>
<td>At least 20% annual increase in students enrolling in STEM courses in secondary and tertiary institutions</td>
<td>Ministry responsible for Education and ST&amp;I NACOSTI</td>
</tr>
<tr>
<td><strong>Strategy 5.5:</strong> Establish Science Centres at national and county levels to promote ST&amp;I</td>
<td>Science Centres at national and county levels established</td>
<td>Number of science centers at national and county levels</td>
<td>Progress reports Certificates of registration</td>
<td>At least one Science Centre by 2018</td>
<td>Ministry responsible for ST&amp;I KENIA NRF NACOSTI</td>
</tr>
<tr>
<td><strong>Strategy 5.6:</strong> Establish national and county ST&amp;I museums</td>
<td>National and county ST&amp;I museums established</td>
<td>Number of ST&amp;I museums</td>
<td>Progress reports Certificates of registration</td>
<td>At least one ST&amp;I museum by 2018</td>
<td>Ministry responsible for ST&amp;I KENIA NMK NRF NACOSTI</td>
</tr>
<tr>
<td><strong>Strategy 5.7:</strong> Establish a Knowledge Management Information System (KMIS) for ST&amp;I</td>
<td>KMIS established</td>
<td>% completion in establishment of KMIS</td>
<td>Progress Reports M&amp;E Reports</td>
<td>KMIS established by 2017</td>
<td>Ministry responsible for ST&amp;I</td>
</tr>
<tr>
<td>Strategy 5.8: Establish a National ST&amp;I Observatory</td>
<td>A National ST&amp;I Observatory established</td>
<td>% Completion of National ST&amp;I Observatory</td>
<td>Progress Reports M&amp;E Reports</td>
<td>A National ST&amp;I Observatory established by 2017</td>
<td>Ministry responsible for ST&amp;I</td>
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<tr>
<td><strong>Policy 6: The Government will develop human resource capital in ST&amp;I to meet the demands of the economy</strong></td>
<td>ST&amp;I human resource capital in the economy increased</td>
<td>% increase in ST&amp;I human resource capital in the economy</td>
<td>ST&amp;I inventory reports Progress reports M&amp;E reports</td>
<td>At least 20% increase annually</td>
<td>Ministry responsible for Education and ST&amp;I</td>
</tr>
<tr>
<td>Strategy 6.1: Establish ST&amp;I skills inventory</td>
<td>ST&amp;I skills inventory established</td>
<td>% completion in the establishment of ST&amp;I skills inventory</td>
<td>Progress reports M&amp;E Reports</td>
<td>A Skills inventory established by 2017</td>
<td>Ministry responsible for Education &amp;ST&amp;I NACOSTI</td>
</tr>
<tr>
<td>Strategy 6.2: Mainstream and involve women, youth and PLWDs, in ST&amp;I programmes</td>
<td>Increased participation of women, youth and PLWDs in ST&amp;I programmes</td>
<td>% of women, youth and PLWDs participating in ST&amp;I programmes</td>
<td>ST&amp;I inventory reports M&amp;E reports</td>
<td>At least 30% of women, youth and PLWDs, participating in ST&amp;I programmes by 2020</td>
<td>Ministry responsible for ST&amp;I NACOSTI NRF KENIA</td>
</tr>
<tr>
<td>Strategy 6.3: Develop a framework to attract and retain talented Kenyans in ST&amp;I locally and from diaspora</td>
<td>Framework to retain and attract talented Kenyans in ST&amp;I locally and from diaspora developed</td>
<td>% completion of framework to retain and attract talented Kenyans in ST&amp;I locally and from diaspora</td>
<td>Progress reports M&amp;E Reports</td>
<td>100% completion by 2017</td>
<td>Ministry responsible for ST&amp;I NACOSTI NRF KENIA</td>
</tr>
<tr>
<td>Strategy 6.4: Establish incubation and innovation centres to facilitate entrepreneurial development among innovators</td>
<td>Incubation and innovation centres established</td>
<td>Number of incubation and innovation centres established</td>
<td>Progress reports M&amp;E reports ST&amp;I inventory report Certificate of registration</td>
<td>At least one incubation and innovation centre in every County by 2025</td>
<td>Ministry responsible for ST&amp;I KENIA</td>
</tr>
<tr>
<td><strong>Strategy 6.5:</strong> Establish research chairs for identified ST&amp;I priority areas</td>
<td>Research chairs for identified ST&amp;I priority areas established</td>
<td>Number of research chairs established for identified ST&amp;I priority areas</td>
<td>M&amp;E reports Progress reports</td>
<td>At least 10 research chairs by 2020</td>
<td>Ministry responsible for ST&amp;I NACOSTI NRF</td>
</tr>
<tr>
<td><strong>Policy 7:</strong> The Government will develop infrastructure to support ST&amp;I programmes in identified priority areas</td>
<td>ST&amp;I infrastructure in identified priority areas developed</td>
<td>% of priority areas provided with infrastructure and equipment</td>
<td>Progress Reports M&amp;E reports Inventory report</td>
<td>100% of identified priority areas provided with infrastructure and equipment by 2025</td>
<td>Ministry responsible for ST&amp;I NACOSTI NRF KENIA</td>
</tr>
<tr>
<td><strong>Strategy 7.1:</strong> Establish the status of ST&amp;I infrastructure in the identified priority areas</td>
<td>status of ST&amp;I infrastructure in the identified priority areas</td>
<td>% completion of establishment of status of ST&amp;I infrastructure in the identified priority areas</td>
<td>Status report Progress Reports M&amp;E reports Inventory report</td>
<td>100% completion by 2018</td>
<td>Ministry responsible for ST&amp;I NACOSTI NRF KENIA</td>
</tr>
<tr>
<td><strong>Strategy 7.2:</strong> Provide ST&amp;I infrastructure in identified priority areas</td>
<td>ST&amp;I infrastructure in identified priority areas provided</td>
<td>% of priority areas provided with infrastructure</td>
<td>Progress Reports M&amp;E reports Inventory report</td>
<td>100% of priority areas provided with infrastructure by 2025</td>
<td>Ministry responsible for ST&amp;I NACOSTI NRF KENIA</td>
</tr>
<tr>
<td><strong>Strategy 7.3:</strong> Provide equipped science laboratories in learning institutions</td>
<td>Equipped science laboratories in learning institutions provided</td>
<td>% of learning institutions provided with equipped science laboratories</td>
<td>Progress Reports M&amp;E reports Institutional laboratory/equipment inventory</td>
<td>All learning institutions to be equipped by 2025</td>
<td>Ministry responsible for Education and ST&amp;I NRF</td>
</tr>
<tr>
<td><strong>Total Estimated Cost (Ksh.)</strong></td>
<td></td>
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