

REPUBLIC OF RWANDA



NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

SCIENCE, TECHNOLOGY AND INNOVATION POLICY

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ABBREVIATIONS AND ACRONYMS

AU	African Union
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GoR	Government of Rwanda
HDI	Human Development Index
HEC	Higher Education Council
HLIs	Higher Learning Institutions
ICT	Information and Communication Technology
IMTC	Inter-Ministerial Technical Committee
IPR	Intellectual Property Right
M&E	Monitoring and Evaluation
MDGs	Millennium Development Goals
MINAGRI	Ministry of Agriculture and Animal resources
MINECOFIN	Ministry of Finance and Economic planning
MINEDUC	Ministry of Education
MINICOM	Ministry of Trade and Industry
MINICT	Ministry of ICT and Innovation
MINIJUST	Ministry of Justice
MININFRA	Ministry of Infrastructure
NCST	National Council for Science and Technology
NIRDA	National Industrial Research and Development Agency
NISR	National Institute of Statistics of Rwanda
NRIF	National Research and Innovation Fund
NST1	National Strategy for Transformation
PSF	Private Sector Federation
R&D	Research and Development
RAS	Rwanda Academy of Science
RDB	Rwanda Development Board
S&T	Science and Technology
SDGs	Sustainable Development Goals

SME	Small and Medium Sized Enterprise
SRMP	SMART Rwanda Master Plan
STEM	Science, Technology, Engineering and Mathematics
STI	Science, Technology and Innovation
STISA	Science, Technology and Innovation Strategy for Africa
STRI	Science, Technology, Research and Innovation
STRIP	Science, Technology, Research and Innovation Policy
TVET	Technical and Vocational Education and Trainings
UNECA	United Nations Economic Commission for Africa
UNESCO	United Nations Educational, Scientific and Cultural Organization
UR	University of Rwanda
WIPO	World Intellectual Property Organization



1. INTRODUCTION

1.1. Background

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

To guide implementation of national development prospects, the government of Rwanda established a National Strategy for Transformation (NST1), which serves as a medium-term national development plan for the period 2017-2024, which encompasses the closing stages of Vision 2020 and launches into Vision 2050.

NST1 is underpinned by three pillars: Social Transformation, Economic Transformation and Transformational Governance. STI cuts across various areas of intervention set under the three NST1 pillars including job creation, urbanization, industrialization, export promotion, environment protection, improved agricultural productivity, ensuring a healthy population, natural resource exploitation, promoting research and development (R&D), stimulating innovation, as well as developing competitive and capable Rwandans.

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

1.2. Context

In 2005, the cabinet adopted a National Science, Technology and Innovation policy that focused on addressing prospects set in the Vision 2020. Through the Policy, the government committed to establish an enabling environment to facilitate knowledge and technology creation, transfer, diffusion and application.

During the period of close to fifteen years, a significant number of changes, both in terms of policy and institution setup, have taken place at the national, regional and international levels. Multiple sector policies and strategies were adopted to accommodate Rwanda’s rapid socio-economic dynamics, including the Broadband Policy, the Smart Rwanda Master Plan, the Green Growth Strategy, the Energy Sector Strategy and the Made in Rwanda Policy, among others.

Similarly, the government’s regional and international commitments have seen changes including the adoption of the United Nations (UN) Sustainable Development Goals (SDGs), the African Union (AU) 10-year Science, Technology and Innovation Strategy for Africa (STISA 2024), the Transform Africa Agenda, the establishment of the East African Science and Technology Commission (EASTECO), and the recent adoption of the African Continental Free Trade Area (AfCFTA).

Furthermore, in assessing performance and progress of STI in Rwanda, multiple independent studies highlighted gaps within Rwanda’s Innovation System. Of note, a 2015 Go-Spin¹ report by UNESCO² on “Mapping Research and Innovation in the Republic of Rwanda” observed a range of issues in areas of STI governance, R&D capacity, technology transfer, entrepreneurship, and the overall application of STI in the sectors of agriculture, health, environment, energy, water and sanitation, ICT and education. A 2017 report on “Rwanda Science, Technology and Innovation Policy Review” by UNCTAD³ comprised of important recommendations towards of structuring the innovation ecosystem, generating demand for technology in industry, and use of technology to build competitive and comparative economic advantages.

1.3. Rationale

The formulation of the present STI Policy is founded mainly on the need to fast-track and strengthen the performance indicators within the national system of innovation (NSI)⁴ in line with implementation of the National Strategy for Transformation. The (high) rates of economic and social development targeted in NST1, coupled with the need to plug the prevalent systemic gaps, as well as address changes observed within the STI environment, collectively necessitate establishment of a revised, coherent and up-to-date policy framework to guide the strategies and interventions of the various STI actors.

¹ The Global Observatory of Science, Technology and Innovation Policy Instruments (GO-SPIN) is a methodological tool to map national STI

² United Nations Educational, Scientific and Cultural Organization

³ UNCTAD - United Nations Conference on Trade and Development

⁴ Building Knowledge Economies – Advanced Strategies for Development, World Bank Institute Development Studies

2. SITUATION ANALYSIS

2.1. STI Policy Landscape

Over the last 20 years, Rwanda has registered a steady economic growth averaging around 7% annually. This period remarkably also witnessed a major achievement in which over one million Rwandans were lifted out of poverty. Spurred-on by the tremendous achievements, the Government of Rwanda set its sights even further - on achieving upper middle income by 2035 and becoming a high income country by 2050.



As Rwanda transitions from Vision 2020 to Vision 2050, the government acknowledges the need to establish capacities and capabilities in areas of scientific research and technology innovation. This is reflected across all three NST1 pillars: Economic, Social and Governance.

NST1 features interventions including developing and supporting priority sub-sectors with high potential for growth and employment; supporting and empowering youth and women to create business through entrepreneurship; developing and operationalizing a thriving skills ecosystem; operationalizing the innovation fund to support firms in the innovation and technology industry; improved access to quality education and health services; supporting the establishment of new and improving performance of existing Centers of Excellence; and promoting research & development.

To reinforce Rwanda’s growth trajectory, reports including the “Future Drivers of Growth in Rwanda, 2018” produced with the support of the World Bank, the “Global Competitiveness Index, GCI 2019” produced by

the World Economic Forum (WEF), and the “Global Innovation Index, GII 2019” championed by the World Intellectual Property Organization (WIPO), collectively highlight specific factors and metrics that Rwanda needs to improve in order to further spur its growth and competitiveness.

The future drivers of growth in Rwanda are: innovation, integration, agglomeration, and competition. These four represent vital areas that Rwanda needs to master in order to achieve its aspirations of becoming a middle-income and subsequently a high-income country. Importantly also, the study characterized capabilities (including people, firms and institutions) as the missing link in Rwanda’s development quest. The report emphasized the need to: build human capital (quantity and quality), strengthen the ecosystem of technology innovation, as well as develop robust institutions of governance.

In terms of productivity, the GCI 2019 report notably ranked Rwanda as number 100 out of 141 economies. Although the rank represents a remarkable jump (8 places) from 108 in 2018, and overall progressive trends over the years, it also highlights low performance in areas of ICT adoption (38%), skills (40%), market size (35%) and innovation capability (31%).

In terms of innovation, the GII 2019 ranked Rwanda highest (1st) in the low income group (19 economies), 5th in sub-Saharan Africa (24 economies), and 94th in general (of 130 economies), despite gaining 5 positions in the previous ranking (135th in 2018 report). And of the 80+ metrics measured, Rwanda scored above the average of the low-income group in all innovation dimensions. The report further commends the high performance of the health system in Rwanda, which is notably attributed to the government’s readiness to integrate technology innovation as well as partner with technology experts from the private sector. According to the report, the weak performing areas that need to be addressed are: human capital and research (102), Knowledge and technology outputs (125), and creative output (108).

Beyond the national boundaries, Rwanda’s policy environment relates to both regional and international commitments. Building on the progress registered under the Millennium Development Goals (MDGs), Rwanda also set to achieve the 17 SDGs adopted in 2015 by 193 UN member states under Agenda 2030, which notably identify STI as key to implementing the SDGs.

Regionally, Rwanda proactively champions transformative initiatives within the East African Community (EAC) and the African Union (AU) advocating for functional reforms, policy harmonization, regional integration, free movement, and strengthening STI performance, among others. Of note, the widely celebrated establishment of the African Continental Free Trade Area, signed in Rwanda, is a major cause for optimism and opportunities in terms of increasing regional trade, growth and competitiveness.

Rwanda notably also hosts the East Africa Science and Technology Commission among other regional headquarters.

2.2. STI Coordination

The crosscutting nature of STI raises challenges in terms of organizational structures, priority setting, public funding, and management of STI capacity development. This underlines the need for a strategic framework to guide interventions of the various STI actors, activities and interactions.

A lack of cohesion and fragmented initiatives has been documented as one of the important areas that need to be addressed to achieve better STI performance. As noted in the 2017 UNCTAD STI Policy Review, the embryonic nature of Rwanda's National System of Innovation makes it susceptible to challenges like weak linkages between actors, disjointed roles of STI actors, and scattered resources.

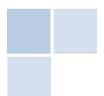
Between 2005 and 2018, various changes on the local STI governance scene have seen the establishment of the Ministry of ICT and Innovation (MINICT), the National Council for Science and Technology (NCST), the National Industrial and Research Development Agency (NIRDA), the Rwanda Information Society Authority (RISA), the Rwanda Agriculture and Animal Resources Development Board (RAB), the Rwanda Biomedical Center (RBC) and the Rwanda Standards Board (RSB), among others.

Rwanda's drive to establishing a knowledge-based economy will require a solid STI governance framework in terms of policy, regulations, standards and coordination mechanism to create an enabling environment.

2.3. STI Capacity (Human and Infrastructure)

At the core of Rwanda's STI capacity is the education system that includes public and private institutions from lower levels to higher levels of education, scientific research and technology development.

Over the years, tremendous public investment has been channeled towards improving performance across all levels of Rwanda's education including pre-primary education, primary education, secondary education, Technical and Vocational Education and Training (TVET), as well as universities and research Institutions. Investment in the education sector has resulted in remarkable trends. As per the Education Statistics of 2018, the number of higher learning institutions (HLIs) increased from just one (1) in 1994 to thirty (30). Rwanda has one public university, the University of Rwanda (UR), which was established in 2013 after merging six major public universities. The UR currently comprises of six colleges each specializing in a distinct area: the College of Sciences and Technology (CST); the College of Agriculture, Animal Sciences



and Veterinary Medicine (CAVM); the College of Medicine and Health Sciences (CMHS); the College of Business and Economics (CBE); College of Arts and Social Sciences (CASS); and the College of Education (CE).

The changes within the education landscape have not only contributed to a significant reduction in the human capital gap, but also increased overall enrollment and graduation ratios. Of the 23,100 graduates throughout the tertiary institutions in 2017, 28% graduated in STI related disciplines including 5% in Natural Sciences, Mathematics and Statistics, 7% in Information and Communication Technologies, (ICT) 12% in engineering, manufacturing and construction, and 4% in agriculture, forestry, fisheries and veterinary. Notably also, of the 6,429 (28%) students that graduated in STI related disciplines, 30% were female and 70% were male. To compliment local HLIs, a pro-Science and Technology (S&T) education policy set ratios of both government funded and cooperation scholarship schemes at 70% and 30% for S&T and non-S&T fields, respectively. This strategic intervention was adopted in order to develop scarce skills and increase the number of STI graduates.

In recent years, the Rwanda STI system has also been boosted by the establishment of various Centers of Excellence (CoE) many of which serve a regional and pan – African audience. The Centers include: a regional branch of the International Center for Theoretical Physics (ICTP), the international headquarters of the African Institute for Mathematical Sciences (AIMS), Carnegie Mellon University Africa (CMUA), Regional CoE in Biomedical Engineering (CEBE), in addition to 4 African Centers of Excellence (ACE); in Internet of Things (ACEIoT), Data Science (ACE-DS), Energy for Sustainable Development (ACEESD), and Innovative Teaching and Learning Mathematics and Science (ACEITLMS).

Despite the registered progress, the global indicators show that Rwanda still ranks low in terms of Human Capital and Research (102th GII 2018). This performance stems from low performance in areas including tertiary education (116th) and research & development (117th). Rwanda needs concerted efforts to develop and strengthen STI capacities, competencies, specialization and expertise across the various priority sectors.

Rwanda ranked 87th in terms of Infrastructure, and still faces challenges of limited research and innovation infrastructure as well as inadequate and outdated equipment. This points to the need for a sustained STI infrastructure investment scheme to boost research and innovation quality and output.

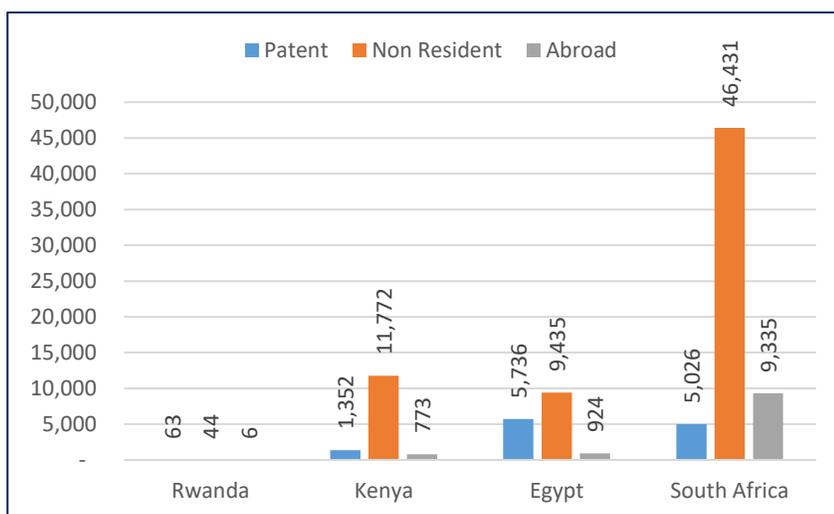
Another important aspect noted in various STI status and policy review reports is the need to strengthen synergies between key actors in the NSI including the government, the private sector (industry) and the

academia mainly in terms of knowledge, skills and technology transfer.

2.4. Research Productivity

Besides making progress in developing STI graduates, Rwanda's overall research productivity has been very marginal. The Go-Spin survey of 2015 noted that despite registering an increase in the number of scientific publications listed by international databases in recent decades, in 2013 Rwanda occupied the 125th rank in the world and the 25th rank in Africa in terms of scientific publications. Between 1996 and 2013, Rwanda produced 1,061 scientific publications listed by Scopus⁵, which received 8,700 citations of which 767 were self-citations, and averaging around 14.08 citations per article.

Another key indicator used in measuring national R&D productivity is intellectual property (IP) which broadly refers to the number and quality of patents produced at national level. Historically, the number of patent applications and patent grants in Rwanda has been relatively small compared with other countries in the region and globally. For instance, Rwanda presented only two patent applications at the United States Patents and Trademark Office, between 1991 and 2010. Between 2012 and 2018, Rwanda generated 113 patent applications compared to Kenya (13,897), Egypt (16,095) and South Africa (60,792) according to the World Intellectual Property Office.



⁵ Scopus is Elsevier's abstract and citation database

2.5. STI Funding and Support System

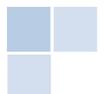
In Rwanda, the Government is the major funds provider for both higher education and research. Over the years, research programs were mostly funded through regular budget support without a consolidated monitoring framework to measure the volume of national R&D expenditures and assessment of their impact on development. The 2016 R&D survey report carried out by NCST estimated Gross Expenditure on R&D (GERD) at 0.66% of Rwanda's gross domestic product (GDP).

In 2018, the Research and Innovation funding landscape in Rwanda received a substantive boost with the establishment of the Rwanda Innovation Fund and the launch of the National Research and Innovation Fund. The two complimentary funding avenues provide support across specific areas of the research-innovation value-chain, including fundamental, applied, and experimental development forms of research, as well as testing prototyping, commercialization, and scaling technology products.

In particular, the National Research and Innovation Fund (NRIF) focuses on funding scientific research and research-led innovation that is aligned to the national research agenda, while the Rwanda Innovation Fund (RIF) is an investment vehicle focused on funding tech-enabled Small and Medium-Sized Enterprises (SMEs) as a pathway to developing national innovation and entrepreneurial capacity.

Furthermore, the national STI funding landscape comprises of other specialized funding streams including the Rwanda Green Fund (FONERWA), the Business Development Fund (BDF), as well as direct funding provided to research performing institutions like RAB and RBC.

In 2007, the Government of Rwanda committed to increase the gross domestic expenditures on R&D to 1% of their annual gross domestic product (GDP) as called for in the Lagos Plan of Action. Besides the government funding commitment, there is also need to also get private sector investment in R&D. As observed in various literature, in top performing economies, the private sector contributes significantly in some cases over two-thirds (2/3) towards R&D financing.





3. POLICY VISION, MISSION AND OBJECTIVES

Rwanda’s remarkable growth over the past two decades is testament to good governance and transformative restructuring of the economy towards increased productivity, competitiveness and improved standards of living. To sustain and even surpass the current growth trends, the government recognizes the need for structural adjustments to boost STI performance as a basis for developing, attaining and sustaining a knowledge intensive economy.

This section defines the STI Vision, Mission and a number of policy objectives that are in alignment with NST1.

3.1. Vision

The vision of STI is anchored on the core feature of the drive to become a knowledge-based economy which is a functional innovation system. Accordingly, the vision of the STI system adopted by this Policy is:



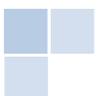
Rwanda attains and sustains an innovation-driven society through efficient and effective application of knowledge and technology.

3.2. Mission

A functional innovation system comprises of key features that are consistent with establishing a knowledge-based economy. One key features is a critical mass of scientists, researchers and innovators with the capacity to develop, apply and transfer knowledge, skills and technology from the academic sector to effect industrial productivity and societal-wellbeing. The stated Mission adopted for this Policy is:



To establish a vibrant STI environment with capacity, enabling policies, and adequate funding capable of producing quality graduates, research, and modern technology products and services to cater for the needs of the productive sector and the society.



3.3. General Policy Objectives

The Policy Vision and Mission will be achieved through appropriate policy management, improvement of STI capacity, increased scientific excellence, increased and targeted STI funding, gradual reinforcement of the innovation system, and open international collaboration. These are encapsulated in five set policy objectives:



- Policy Objective 1: Effective STI Governance
- Policy Objective 2: Increased Scientific and Technology Output
- Policy Objective 3: Increased R&D and Innovation Financing
- Policy Objective 4: Improved STI Capacity and Knowledge Networks Development
- Policy Objective 5: Enhanced International STI Collaboration

3.4. Guiding principles

This Policy covers a broad range of national level research and innovation activities founded on the following principles:



Enabling Environment: The STI Policy aims to create favorable and forward-looking conditions for research and innovation to thrive.

Need-based and Citizen-centric: National STI programs and activities shall be focused on addressing current and future needs of society, citizens and industry.

Multi-sectoral: The Policy cuts across multiple sectors of the economy in accordance with the cross-cutting nature of STI. It takes into consideration the need for a synergistic framework that fosters inter-institutional collaboration.

Private Sector engagement: The Policy observes the need to empower the private sector in research and innovation.

Research and Innovation Culture: The Policy aims to contribute to demystifying research and innovation through addressing cultural attitudes and mindsets that may hinder performance.





4. POLICY DIRECTIONS AND STRATEGIES

Based on the assessment of the current STI performance and future national development aspirations, this sections outlines critical policy issues to guide the interventions under the five Policy Objectives.

4.1. Objective 1 - Effective STI governance

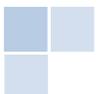
Strategic governance of STI broadly encompasses establishing an enabling policy environment as well as coordination mechanisms aimed at strengthening of linkages between science, economy and society to encourage research and innovation;

It is important to engage the various sectors across STI of the economy, as well as establish an enabling and conducive environment founded on horizontally and vertically integrated STI related laws, policies, priorities, incentives and standards.

4.1.1. Strengthen STI coordination and cross – pollination

In a resource-constrained environment like Rwanda, it is important to increase performance by addressing gaps in implementation, consolidating the various initiatives, and importantly, ensuring key STI actors do not allow for duplication of efforts. Essentially, this can be achieved through developing and sharing organizational work plans, establishing and implementing well designed M&E tools, as well as fostering inter-institutional communication. Strategies include:

- Putting in place a sound STI governance and policy intelligence framework that identifies gaps, strengths and weaknesses within the NSI and derives strategic interventions to ensure that STI activities in Rwanda are properly developed, coordinated, and managed.
- Strengthening policy-making capacity in terms skills, capabilities and expertise.
- Putting in place a strong STI M&E framework which will track progress; document experiences, challenges, lessons learnt and assessing impacts; inform decision making in the implementation of interventions; and review the achievement of various set strategies of this STI policy.
- Establish operationalize research departments/units in in public and private institutions.



4.1.2. Develop STI legal and regulatory framework

The Future Drivers of Growth in Rwanda report emphasizes the need to adopt standards and regulatory frameworks in order to foster global competitiveness. This encompasses laws, regulations, quality assurance, incentives and international standards in carrying out scientific, industrial and commercial activities.

Modern society is increasingly becoming reliant on green (environmentally-friendly) technology. However, some technology products are made of complex components with hazardous materials or chemical compounds. It is important to establish strategies to minimize the impact of such material in an effort to protect the environment. Strategies include:

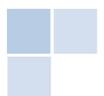
- Strengthening STI laws, regulations and guidelines with an aim of fostering quality, standards, efficiency and regional integration.
- Fostering environmentally friendly technologies through advocacy and enforcing standards both in development and import of technologies that are in accordance with green growth goals set by Rwanda, and in compliance with international standards, norms, conventions and protocols on environmental protection.

4.1.3. Define the focus and topic of actions (STI agenda setting) in line with national goals

Successful creation of a knowledge-based economy is predicated on evidence-based results and trends. STI planning and implementation will primarily be oriented towards the ambitions set in NST1 and Vision 2050.

This entails streamlining STI planning and implementation across the STI actors. Key Sector stakeholders shall organize an Annual Joint Planning session to establish STI activities aligned to the national goals. Strategies include:

- Putting in place a comprehensive STI monitoring and evaluation framework linking programme outcomes to long term impacts.
- Developing an STI Data Mining System to inform policy decision making on trends and performance within the National System of Innovation.



4.1.4. Strengthen Intellectual Property (IP) system

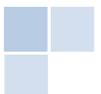
Strengthening Rwanda's intellectual property system will not only enable and maximize incentives for the generation, protection and utilization of IP, but also create a conducive and attractive environment for international researchers and innovators. Strategies include:

- Establishment of an IP Office to provide services including protecting IP rights, promoting IP awareness, putting in place a Patent Bank, developing and strengthening IP capacity, and providing technical assistance in identifying appropriate technologies that comply with international standards.
- Put in place mechanisms that ensure efficient and effective processes and procedures to acquire IP services.

4.1.5. Strengthen advisory on strategic and cost-effective STI Investment

As the government continues to invest in establishing an enabling STI environment, it is important to ensure lean management of existing STI facilities and resources to optimize their utilization. This calls for mechanisms that assess and learning from past experience, and making necessary adjustments to ensure cost-effectiveness and value-for-money. Strategies include:

- Conduct Science and Technology foresight studies
- Establish STI advisory committees and STI clusters
- Provide advises on STI investments and targets.



4.2. Objective 2 - Increased Scientific and Technology Output

Rwanda seeks to optimize the performance of the National System of Innovation as a pathway to improving overall economic performance in terms of innovation (94th) and competitiveness (100th) as registered in the Global Innovation and Global Competitiveness Indices of 2019, respectively.

The necessities boosting national capability in terms of Adapting, Inventing and Innovating (All) technology products and services towards sustainable socio-economic development. Importantly also, current global techno-economic paradigm changes present a window of opportunity for the 'newcomers' to not only leapfrog and bypass competition, but also become leaders in specific technologies.

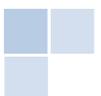
4.2.1. Technology Innovation Support Mechanism

The National Systems of Innovation needs to create an environment that supports all technology development levels from concept to utilization. Strategies include:

- Creation of knowledge and technology nodes including science and technology parks, R&D centers, centers of excellence, incubation centers and technology to boost the performance of the national STI ecosystem.
- Establishment of technology transfer and innovation spaces as platforms to stimulate productive competition and creativity, particularly among the youth.
- Facilitate commercialization of innovation products through establishment of technology demonstration centers, rapid prototyping and testing centers, as well as innovation villages including rural technology innovation and production centers.
- Establish and strengthen R&D and Innovation development departments in priority sectors of the economy, private sector, universities and higher learning institutions.

4.2.2. Technology Import and Adaptation

In the drive to promote "Made-in-Rwanda", the country is faced with a 'make' or 'buy' dilemma influenced by the limitations in terms of knowledge, capacity and expertise (on one hand), and cost, quality, risk and



market demand (on the other hand). Inevitably, some technologies will be imported while some will be developed leveraging local and traditional knowledge and expertise.

In the drive to close the technology gap and catch-up to advanced economies, Rwanda needs to create an entrepreneurial and innovation friendly environment. The environment needs to be capable of supporting various levels of technology development from concept to utilization, including ideation, product testing, prototyping, patenting and commercialization is necessary. Strategies include:

- Developing a framework and capabilities for identifying, importing, learning, adapting, absorption, and utilizing appropriate foreign technology in areas like agriculture, mining and manufacturing.
- Establishing roadmaps to promote, export and deploy local knowledge, homegrown solutions abroad.
- Deriving a policy on open source, evolving and non-binding technologies with less dependency on proprietary technologies.

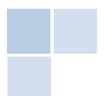
4.2.3. Promote research and innovation in new and emerging technologies

Rwanda can gain a competitive edge by venturing in new and emerging technologies through strategic research and international STI collaboration. Strategies include:

- Formation of research clusters in S&T fields including artificial intelligence (AI), space, cyber security, e-commerce, digital health, biotechnology, nanotechnology, quantum sciences, neurosciences, genetic engineering, internet of things (IoT), big data, quantum technologies, photonics, nuclear sciences and precision agriculture.

4.2.4. Strengthening the cooperation with the Diaspora and International scientists and innovators

An attractive and conducive environment is a critical factor in motivating and attracting both the Rwandan diaspora and International scientists, researchers, innovators, entrepreneurs and tech venture capitalists. Special strategies will be established to engage renowned scientists from the diaspora into the academia, research and innovation initiatives. The diaspora will be involved in review of national scientific infrastructure projects, STI dialogue, innovation support programmes, and in established advisory bodies and specialized Adhoc committees in order to pass on their knowledge, experiences and expertise gained abroad.



Strategies include:

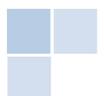
- Establishment of an Association of Rwandan STI Diaspora, and developing a database of Rwandan scientists, professors, researchers, and innovators around the world.
- Increasing initiatives that tap into the pool of Rwandans living, studying and working abroad in an effort to strengthen local knowledge and improve implementation of STI activities.
- Creating mechanisms to actively involve the scientists, researchers and innovators in national development planning, as well as in implementation of development programs and projects.
- Putting in place an enabling environment to attract Rwandan diaspora and international scientists, researchers, innovators, entrepreneurs and tech venture capitalists.

4.2.5. **Promote advancement of indigenous knowledge, home grown solutions and local technologies**

The use of formal and informal indigenous knowledge has been instrumental in establishment of novel home grown solutions that were used to address complex societal challenges, for instance the Gacaca judiciary system, the One-Cow-per-Family (Girinka) program, and the Umuganda community services.

There are other various forms of knowledge and innovated techniques applied as part of Rwanda's cultural and knowledge heritage including fields like traditional medicine and handicraft arts. Strategies to further harness local technologies and indigenous knowledge will include:

- Supporting the development, promotion, protection, application, diffusion, and commercialization of indigenous knowledge and local technology.



4.3. Objective 3 - Increased R&D and Innovation Financing

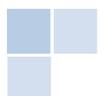
Growing Rwanda's scientific research and technology innovation requires development of a grants system to incentivize and reward R&D and innovation excellence. A broad range of funding schemes are needed to support the different levels of technology development, entrepreneurship, human capital development, and infrastructure development.

A major challenge concerns addressing the prevalent funding gaps between basic research and the development and commercialization of a new product. It is essential to grow the volume of funding and diversify its sources.

4.3.1. Increase investments in R&D and Innovation from public and private sector sources

As a developing country with a budding industrial base, the bulk of the research and innovation financing is provided by the government. In an effort to ensure coordinated funding in research and innovation, the government established a National Research and Innovation Fund (NRIF) that is dedicated to supporting the implementation of the National Research Agenda. Strategies include:

- Putting in place necessary frameworks to manage, streamline, guide and operationalize research and innovation funds, and as well as avail funds for investment in strategic R&D and Innovation activities geared to national economic growth. The frameworks shall provide not only mechanisms to ensure transparent, fair and efficient disbursement of research and innovation funds, but also provide a model that indicates how research and innovation funds (existing funds and NRIF) will be governed.
- Develop and implement schemes to support the realization of targets set in national development agenda including addressing societal challenges, strengthening areas in which Rwanda has or can establish a competitive advantage, as well as supporting technology companies and start-ups in order to create jobs.
- Put in place an agile and effective resource mobilization strategy to guide activities of raising funds from government, business sector and other sources including regional and international partners, research foundations and philanthropic organizations.



- Put in place strategies to ensure gross expenditures, as a percentage of GDP, on R&D increases to at least 1% of GDP by 2024. This projection notably include funds from the private sector and other partners.
- Establish and adopt incentive schemes, that are both adaptable to Rwanda’s context and that have been effective in other countries, to attract private sector to fund research and innovation activities.

4.3.2. Diversified initiatives to promote women in STI

Despite efforts to provide women greater access to education in Science and Technology, women are still under represented in many such programs compared to men. Strategies to advance Women in Science include:

- Putting in place strategies to integrate women in STI as well as establish mechanisms aimed at actively promoting involvement of women in STI disciplines. This includes considerations for establishing quotas in research projects, specific funding schemes, tech companies, and across the lower levels to the higher levels of STEM.

4.3.3. Ensure adequate research infrastructure

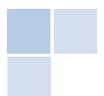
Creating an innovation and investment led economy requires infrastructure. This includes research infrastructure: modern equipment, laboratories, processes and procedures to allow researchers to effectively conduct experiments and scientific studies, as well as infrastructure for science and technology business development and incubation. Infrastructure investment is also a powerful avenue for attracting foreign companies to invest in Rwanda. Strategies include:

- Increasing R&D infrastructure through establishing, renewing, upgrading and equipping R&D facilities.

4.3.4. Incentivize Academia and Private Sector collaboration

Academia – Industry collaboration is a key facet of a healthy innovation system. However, realizing this goal is a major challenge mainly due to divergent targets for both groups. Complimentary measures should be taken to both encourage private sector collaboration and foster local technology uptake. Strategies include:

- Establish funding schemes that require industry and academia participation as a prerequisite. The partnership will help broker research collaborations.



- Incentivize private sector R&D as well as public-private R&D to not only conduct and invest in R&D activities, but also contribute through initiatives like structured trainings, recognition schemes, and collaborative grants and awards schemes.
- Establishment of private R&D and Innovation funding mechanisms such as venture capitals, crowdfunding, seed funds, as well as direct donations through foundations or bequests.

4.4. Objective 4 - Human Capital and Knowledge Networks Development

Building human capacity is a prominent step to developing robust innovation systems. And fittingly, human capital ranks as the major determining factor limiting Rwanda's ability to meet current and future demands as well as the country's competitiveness.

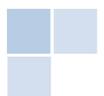
To achieve this, STI human capital development will be geared towards establishing a critical mass of Rwandans with knowledge, skills, and competencies to support a knowledge-economy. The government will seek not only to align skills development and utilization through market and industry-relevant STI training, but also boost the volume and quality of STI professionals.

Rwanda will also strive to attract and retain globally competitive talent leveraging the existing enabling migration environment.

4.4.1. Ensure dynamic STI human resources development

In line with the Education Sector Policy, Rwanda needs intensive capacity building initiatives across the educational spectrum in order to develop a critical mass to support the country's ambitions. Strategies include:

- Assessing the kind of capacity needed, human capital gaps, and challenges, which will be used to propose forward-looking capacity strategies to progressively increase the quantity and quality of human capital in line with national demand patterns, growth rate and global technology changes.
- Promoting innovative pedagogy that strengthens critical thinking, creativity, and problem solving, leveraging science, technology, engineering and mathematics (STEM) at all levels of the education.



- Adopting strategies that ensure availability of competent researchers, particularly at PhD level, in order to effectively implement advanced research and innovation programs.

4.4.2. **Stimulate Research and Innovation culture and mind-set**

The Government of Rwanda aims to establish an enabling and conducive environment to foster creativity and productivity of scientists, researchers and innovators. Strategies include:

- Investing in initiatives aimed at nurturing a research and innovation culture, starting from the early stage of the learning process.
- Working closely with relevant stakeholders to design and implement targeted national research and innovation promotion programs.
- Create awards models aimed at fostering research and innovation.

4.4.3. **Promote researchers' profession and learned societies**

The research profession has been hindered by lack of a clear framework for development and advancement of researchers' careers. This has led to a low level of motivation, particularly among the youth, to undertake research as a well-recognized attractive profession. Nationally, this is an obstacle in regards to raising a critical mass of competent research personnel needed for implementation of STI activities, nationwide. Strategies include:

- Putting in place mechanisms to support and promote research career across the whole R&D and innovation value chain.
- Establishment and operationalization of bodies such as the Academy of Sciences and other R&D and scientific professional organizations.

4.4.4. **Strengthen STI community outreach**

The importance of STI to the nation-building process and to citizen-welfare is increasingly becoming evident in the Rwandan society. There is need for increased public understanding of science and improved awareness of the role of innovation and new technologies for society and economy. Strategies include:



- Developing programs to ensure that the Rwandan community is able to relate science to everyday life. In this way, society will learn to appreciate how Science and Technology can improve its economic, social and cultural well-being.
- Establishing mechanisms to boost diffusion of scientific findings and science culture needed for the adoption and integration of STI as tools to support community growth.

4.5. Objective 5 - Enhancing International Cooperation in the fields of Science and Innovation

The government of Rwanda is committed to enabling participation of Rwandan scientists, researchers and innovators on global arena, as well as promoting regional and international STI development initiatives that are in line with existing financial means and strategic interests.

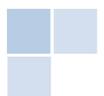
This objective seeks to provide an overarching framework through which bilateral, multilateral, regional and international cooperation can be structured to strengthen Rwanda's NSI performance.

4.5.1. Promote strategic partnerships and collaborations

Science for diplomacy, and diplomacy for science are two paradigms that continue to shape international cooperation between nations and regions. In particular, research collaboration across borders is increasingly becoming prevalent through north-south and south-south cooperation.

The Government of Rwanda seeks strategic STI partnerships and collaboration with advanced regional and international institutions as an important dimension in the drive to establish a knowledge-based economy. Through cooperation and collaboration, Rwanda see partners with the shared ambition of advancing knowledge and expertise, reinforcing national skills and competencies, acquiring advanced technology, as well as fostering research excellence. Strategies include:

- Establishing mechanisms that ensure strategic international STI cooperation and partnerships are identified, promoted and established.
- The Government shall put in place mechanisms and create a conducive environment for research and innovation that attracts support of not only the private sector, industries, and research firms in



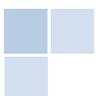
Rwanda, but also attracts foreign STI funding through regional and international collaborations.

- Promote access to international research-innovation infrastructure, as well as, establishing mechanism to open national research-innovation infrastructure to foreign researchers and innovators.

4.5.2. **Attract foreign R&D and Innovation firms**

Over the years, Rwanda has attracted a wide range of investment by leveraging the conducive business environment. In equal measure, Rwanda needs to establish an enabling STI environment to inspire collaborative and multi-disciplinary research, as well as attract international R&D firms. Strategies to attract R&D firms include:

- Collaborate and host international networks and fora, to enable cross-disciplinary interaction.
- Put in place appropriate mechanisms and incentives that facilitate cross-border collaborative, multi-disciplinary research in universities, research institutions and private sector.





5. PRIORITY SECTORS

Implementation of the national development agenda (Vision 2020 and Vision 2050) is mainly channeled through the various sectors of the economy. And as STI cuts across majority, if not all, of the sectors of the economy, this underscores the need to integrate STI across all sectors to stimulate economic growth.

It is noteworthy, however, that concentration is a prerequisite for increased excellence and expertise in research and innovation priority fields. This policy adopts a limited number of priority sectors that will be focused on in an effort to concentrate scarce resources.

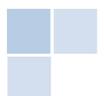
In order to foster priority sector-led research and innovation, a mapping exercise of various aspects of the national development agenda, Africa's STISA and the Global SDGs, resulted in the following six STI priority sectors: Sustainable Energy; Food Security and modern agriculture; Health and Life Sciences; Local Production and Value addition; Digital Services, Products and Lifestyles; and Environment, Tourism, Natural Resources and Climate change.

5.1. Sustainable Energy

The majority of Rwanda's energy needs (85%)⁶ are met by biomass (mainly firewood and charcoal) while the rest is met by other sources of energy including electricity, biogas, kerosene, gas and renewable energy sources. This mix puts pressure on the country's forests and has consequences on the environment due to deforestation and smoke related diseases as well as other social factors associated with firewood collection and usage. This also links to a "resilient environment and natural resources" as a research priority area, reducing the effects of climate change.

In addition, as Rwanda's infrastructure base grows and expands, the energy production will need to match the growing demand and diversification. Research and innovations in alternative and rural energy will ensure that Rwanda increases its share of renewable energy sources with a goal to provide affordable and clean energy. There is also a need to invest in research on low to carbon – free energy, modern energy storage solutions, green transport and smart grid solutions.

⁶ Energy Sector Strategic Plan 2013 – 2018, MININFRA, March 2015



5.2. Food Security and Modern Agriculture^{7,8}

Agriculture contributes about 39% of GDP in current prices (as of 2005), employs about 88% of the economically active population (though much of it employed only seasonally), and is the main earner of foreign exchange, supplying up to 80% of exports.

The agriculture sector is one of the major sectors of the Rwandan economy and its modernization is seen as: (i) improving living conditions of farmers, (ii) increasing exports and growing agro processing industries, and (iii) most importantly increasing the country's food security.

A key challenge is the adequate and safe production of food, for which research will be essential to solve. This includes how to reduce waste and increase the shelf life of food so that everyone has access to safe and nutritious food, and it is fit for consumption and trade. There is a strong relationship between food security, the environment (climate, water, soil) and health.

Other research and innovation areas include using modern technologies, including Unmanned Aerial Vehicles (UAVs), satellite imagery, Internet of Things (IoT) and other emerging technologies to increase agriculture productivity and efficiency, irrigation and mechanization as well as research in climate – resilient crop varieties.

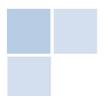
5.3. Life and Health Sciences

This research priority sector groups intervention areas geared towards providing solutions leading to a healthy and resilient population. It tackles challenges in prevention and treatment of diseases, in improvement of maternal and child health, in development of new medicines and in applying emerging technologies in health. Operational research is a key mechanism for addressing many of the challenges in health and life sciences.

Innovations in inclusive products and services such as Female Technology (Femtech), focusing on women's health in areas like fertility and reproductive system healthcare will be encouraged.

⁷ Additional information from “Strategic Plan for the Transformation of Agriculture in Rwanda – Phase II (PSTA II)”, Ministry of Agriculture and Animal Resources, GOR 2009

⁸ Rwanda Agriculture Board < <http://rab.gov.rw/departments/research/>>, accessed on October 11, 2016



5.4. Local Production and Value Addition

Trade deficit can be a threat to Rwanda’s economic stability⁹. Going forward Rwanda will need to not only diversify its portfolio of “Made in Rwanda” products, but also seek to add value to other export items such as minerals and cash crops.

Through targeted and sustained economic actions, the “Made in Rwanda” program will continue to present opportunities for producers to put products on the Rwandan and international markets. It also offers local employment consumption and reduces unnecessary importation and controls the balance of payment in Rwanda’s favor.

Clearly high quality and standards, as well as significant improvements along the whole product value chain will define success and competitiveness of Rwandans exports. Moreover, Rwanda’s industrial base must be modernized and expanded both in width (of products) and depth (of production volume per firm).

Augmented Construction and Mining industries can benefit from research innovation by bridging traditional sectors with modern technologies and good practices (safety, quality, velocity) towards affordable and green building, increasing mineral inputs traceability, better quality outputs, increased safety and export diversification. Another area that necessitates attention is sustainable harvesting of wood furniture to increase wood products output.

Given that agriculture occupies a large portion of the country’s productivity, Food Technology (Foodtech) that as applied to food production, supply chain and distribution models will remain a priority.

In addition, in order to improve production processes on a firm level, Production Processes and Management Capabilities are considered a key priority.

5.5. Digital Services, Products and Lifestyles

Information and Communication Technologies (ICTs) and other technologies have the potential to greatly improve the lives of the population by creating more connected societies, breaking technological barriers, making service delivery quicker and effective and providing solutions to different local and global challenges.¹⁰

As the world is becoming more connected, information and data are becoming both indispensable and

⁹ <http://www.rdb.rw/rdb/manufacturing.html>

¹⁰ http://www.mitec.gov.rw/fileadmin/Documents/Strategy/SMART_RWANDA_MASTER_PLAN_FINAL.pdf



vulnerable assets at the same time. Rwanda’s ambition to become a digitally smart nation requires robust solutions to keep the nation’s cyberspace active, productive, safe and secure.

Key research and innovation areas include Technology – enabled Creative Industries solutions for producing and packaging content and making it available to digital consumers, Financial Technology (Fintech), Cyber-security, Data Privacy and Security and advanced Digital Identification technologies among others.

5.6. Resilient Environment and Climate Change

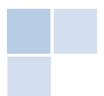
Rwanda has made climate change mitigation one of the main priorities¹¹. In fact, the country’s Green Growth and Climate Resilience Strategy¹² outlines Rwanda’s ambitions to advance low carbon development and climate resilience and adaptation.

In addition, there is a need to constantly supplement Rwanda’s growing leadership in climate and green economy with solutions and programs aiming to protect the environment, manage and add value to the country’s natural resources. Awareness raising about the impact of climate change is also important.

Other research and innovation areas include Clean Technology and Green Production processes, Biodiversity Conservation and Technology – enabled Atmospheric and Climate Science that leverage Big Data and emerging technologies for a better understanding and prediction of climate change and its impacts.

¹¹ “Green Growth and Climate Resilience: National Strategy for Climate Change and Low Carbon Development” GoR, 2011

¹²https://www.rema.gov.rw/rema_doc/RGG&CRS%202011/Rwanda%20Green%20Growth%20Strategy%20FINAL%20high%20res.pdf





6. INSTITUTIONAL FRAMEWORK

A key prerequisite for successful implementation the STI Policy is the establishment of functional cooperation between stakeholders including ministries, public agencies, academic and research institutions, as well as the private sectors and partner institutions.

This section is designed to indicate the roles of key stakeholder institutions in implementing the policy.

6.1. Ministry and Institutions in charge of Science, Technology, Research and Innovation

Will, in close collaboration with relevant stakeholders, develop policies, legislations, strategies and programs to support science, technology, research, and innovation as well as encourage collaboration within the NSI to develop an enabling environment and supporting sector specific innovations for global competitiveness.

Will catalyze strategic partnerships and cooperation at national, regional and international levels.

6.2. Ministry and Institutions in charge of Education

Will, in close collaboration with relevant stakeholders, ensure a critical mass of competent human resources in STEM at all levels of education.

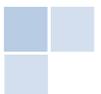
Will, in close collaboration with relevant stakeholders, ensure the quality of students and graduates provide the industry sector with the necessary skills, competencies and expertise required.

6.3. Science Granting Councils

Will provide strategic advice on matters relating to STI, inspire development of the agenda for national research and innovation in priority areas, adoption of emerging technologies and their effective applications.

Will help mobilize funds, provide risk funding for research and innovation, attract and facilitate late stage funding for commercialization, and ensure proper use of these funds for nationally relevant research and innovation.

Will monitor and evaluate the implementation of policies, strategies, and legislations in the area of science, technology, research and innovation.



Will advise on the regulation of proper scientific research activities in Rwanda and provide advice on laws, regulations, standards and quality assurance, with the aim of ensuring that impactful research and innovation programs are implemented.

6.4. STI Sector Institutions

Science, Technology, Innovation and Research institutions including public and private sectors, academic institutions and research institutes, as well as civil society organizations, will ensure that policies, strategies and programs are implemented in line with the national STI policy.

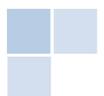
Will be responsible to conduct their sectorial M&E in alignment to the national STI M&E framework.

6.5. Institution in charge of Standards

Will work with sector-specific regulatory authorities to make sure that locally developed and imported technologies, R&D products as well as inventions meet the required technical and quality assurance standards.

6.6. Private Sector

Will closely collaborate with the Government, Academia and Research institutions in implementing the national STI policy. The areas of collaboration shall include human capacity building, knowledge transfer, R&D projects, research products commercialization, and contribute to STI funding and international collaboration.





7. LEGAL IMPLICATIONS

To strengthen her economic development in the context of both regional and global socioeconomic environments, Rwanda has put in place both legal and regulatory instruments which are conducive to STI development. These include: the telecommunications Law, the E-transaction law, environment Law, and other laws providing for example, for management of national standards, for energy and industrial sectors. However, in order to consolidate her position at regional and global levels, Rwanda will still need to develop and establish pro-R&D and innovation legal and regulatory instruments which adjust to continuously changing global science, technology and innovation environments and trends.

The legal framework governing STI issues is currently observed in the STI Policy of 2005. To strengthen national economic performance in context of both regional and global socio-economic environment, Rwanda strives to put in place both legal and regulatory instruments aimed at guiding implementation and providing an enabling and conducive environment for STI development.

However, Rwanda will still need to enact an STI law and establish pro-R&D and innovation regulatory instruments vertically and horizontally integrated to other existing sector policy instruments.



8. FINANCIAL IMPLICATIONS

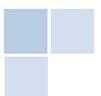
The National STI Policy highlights a number of strategic initiatives that require financial resources. This includes the operationalization of the Rwanda Innovation Fund, and the National Research and Innovation Fund (NRIF) as a principal granting agency for science, technology and innovation in Rwanda.



9. IMPLEMENTATION PLAN

To successfully implement the set activities, and achieve desired policy objectives, there is need for close collaboration in terms of planning and implementation between various stakeholders. It should be noted that, this section is designed to only provide high level guidance and foster synergies across STI actors. More detailed measures and activities, tagged with deadlines, will be developed by sectors and institutions Action Plans depending on their priorities, strategies and programs.

The present Implementation Plan is derived from the five (5) stated policy objectives, each comprising of specific actions to be implemented in order to achieve the set goals.



POLICY OBJECTIVES	STRATEGIES	KEY POLICY ACTIONS	TIMELINE	Budget	Source of Funds	RESPONSIBLE/KEY STAKEHOLDERS
Effective STI Governance	Strengthen STI coordination and cross – pollination	Establish a Sound STI Governance framework	2020	60,000,000	National Budget	MINICT, MINEDUC, MINICOM, MINAGRI, MOH, MININFRA, MOE, RDB, NCST, NIRDA, RBC, RSB, REG, HEC, UR, RP, PSF, MIFOTRA, SECTORS
		Establish and operationalize a National Science, Technology and Innovation (STI) Committee and Thematic Groups	2020-2021	20,000,000	National Budget	
		Foster industry – academia collaboration.	2020 - 2024	20,000,000	National Budget	
		Establish operationalize research departments/units in in public and private institutions.	2020-2024	10,000,000	National Budget	
	Define the focus and topic of actions (STI agenda setting) in line with national development goals	Establish annual STI implementation plans across sectors	2020 - 2024	20,000,000	National Budget	MINICT, MINEDUC, MINICOM, MINAGRI, MOH, MININFRA, MOE, RDB, NCST, NIRDA, RBC, RSB, REG, HEC, UR, RP, PSF, MINECOFIN, Sectors
		Put in place a comprehensive STI M&E framework linking program outcomes to long term impact	2020	50,000,000	National Budget	
		Develop an STI data tools to inform policy decision making on trends and performance within the National System of Innovation.	2021	100,000,000	National Budget	
		Conduct R&D and Innovation surveys	2020 - 2024	400,000,000	National Budget	
		Conduct STI foresight studies to ensure research and innovation are in line with Rwanda's growth ambitions and global trends	2020 - 2024	400,000,000	National Budget	



	Develop STI legal and regulatory framework	Strengthen research regulations and accreditation.	2019 - 2024	100,000,000	National Budget	NCST, RDB, RSB, MINICT, NIRDA, MINICOM, PSF
		Develop STI Standards	2021	60,000,000	National Budget	
		Establish flagship programs to promote investment	2021	20,000,000	National Budget	
	Strengthen the National intellectual property (IP) system	Establish an IP Office	2020-2022	500,000,000	National Budget	MINICOM, MINICT, RDB, NCST, NIRDA, MINIJUST, RIB, RSB, RDB, RBC, PSF, HLIs and TVETs
		Provide services including protecting IP rights, promoting IP awareness, administer IPR, and promoting Innovation	2020 – 2024	1,000,000,000	National Budget	
	Strengthen advisory on strategic and cost-effective STI Investment	Conduct Science and Technology foresight studies	2020-2024	---	National Budget	MINICT, MINEDUC, MINICOM, MINAGRI, MOH, MININFRA, MOE, RDB, NCST, NIRDA, RBC, RSB, REG, HEC, UR, RP, PSF
		Establish and operationalize STI advisory committees and STI clusters	2020-2021	---		
		Provide advises on STI investments and targets.	2020-2024	---		
	Increased Scientific and Technology Output	Strengthen Technology Innovation Support Mechanism	Establish knowledge nodes, R&D and Innovation Centers including technology parks, centers of excellence, research institutes to boost the performance of the national STI ecosystem.	2020 - 2024	4,000,000,000	National Budget Partners and Private Sector
Establish & strengthen innovation support systems (incubation & tech transfer centers)			2020 - 2024	3,000,000,000	National Budget Partners and Private Sector	



Foster Technology Import, Adaptation and Export.	Develop capabilities to identify, import, domesticate, adapt & utilize appropriate foreign technology	2020- 2024	1,500,000,000	National Budget Partners and Private Sector	MINICT, RSB, MINICOM, NIRDA, NCST, RCI, MINECOFIN, HLIs, RDB, PSF
	Foster environmentally friendly technologies through advocacy and enforcing standards both in development and import of technologies.	2020 - 2024	100,000,000	National Budget	MINICT, RSB, MINICOM, NIRDA, NCST, RCI, MINECOFIN, HLIs, RDB, PSF
	Establish roadmaps to promote, export and deploy local knowledge, homegrown solutions & tech abroad	2020 - 2024	500,000,000	National Budget Partners and Private Sector	MINICT, RSB, MINICOM, NIRDA, NCST, RCI, MINECOFIN, HLIs, RDB, PSF
	Adopt a policy on open source, evolving and non-binding technologies with less dependency on proprietary technologies.	2020	50,000,000	National Budget	MINICT, RSB, MINICOM, NIRDA, NCST, RCI, MINECOFIN, HLIs, RDB
Strengthen cooperation with the Diaspora and International scientists and Innovators	Establish Association of Rwandan STI Diaspora	2020	10,000,000	National Budget	NCST, MINAFFET, MINICT, RDB
	Establish and operationalize initiatives that tap into the pool of Rwandans living, studying and working abroad in an effort to strengthen local knowledge and improve implementation of STI activities.	2020 - 2024	300,000,000	National Budget	MINICT, NCST, RDB, NIRDA, MINECOFIN, MINEDUC, HLIs, MINAFFET
Promote advancement of indigenous knowledge and local technologies	Support the development, promotion, protection, application, diffusion, and commercialization of indigenous knowledge and local technology.	2020 - 2024	800,000,000	National Budget Partners and Private Sector	MINICT, MINICOM, NCST, NIRDA, MINECOFIN, MINEDUC, HLIs, RDB, MINAFFET, PSF
Promote research and innovation in new and emerging technologies	Formation of research clusters in S&T fields including artificial intelligence (AI), space, cyber security, e-commerce, digital health, biotechnology, nanotechnology, quantum sciences, neurosciences, genetic engineering,	2020-2024	5,000,000,000	National Budget	MINICT, MINICOM, NCST, NIRDA, MINECOFIN,



		internet of things (IoT), big data, quantum technologies, photonics, nuclear sciences and precision agriculture			Partners and Private Sector	MINEDUC, HLIs, RDB, MINAFFET, PSF
Increased R&D and Innovation Financing	Increase investments in R&D and Innovation from public and private sector sources	Advocate for annual % increase in allocation of national budget towards STI activities	2020 - 2024	1% of GDP	National Budget Partners and Private Sector	MINICT, MINEDUC, MINICOM, MINAGRI, MOH, MININFRA, MOE, RDB, NCST, NIRDA, RBC, RSB, REG, HEC, UR, RP, PSF
		Develop fundraising strategy to supplement national research and innovation funds	2020	40,000,000	National Budget	
		Develop mechanism to monitor R&D and Innovation funding.	2020	50,000,000	National Budget	
		Implement schemes to fund high impact R&D and innovation projects in key sectors.	2020 - 2024	20,000,000,000	National Budget Partners and Private Sector	
	Establish and sustain adequate research infrastructure	Increase R&D infrastructure through renewal, upgrade and creation of support infrastructure and equipping R&D facilities. Monitor and Optimize utilization of R&D facilities Monitor and Optimize utilization of R&D facilities	2020-2024	10,000,000,000	National Budget Partners and Private Sector	NCST, MINICT, MINEDUC, NIRDA, MINICOM, MINECOFIN, RDB, RBC, RSB, MINAGRI, MOH, MININFRA, REG, MOE, PSF, HLIs
	Incentivize Academia and Private Sector collaboration	Establish strategies to foster industry and academia participation in R&D.	2020-2021	20,000,000	National Budget	NCST, MINICT, RDB, MINICOM, PSF, STI, MINEDUC, Sectors
		Establish and operationalize R&D incentives for the private sector.	2020-2024	2,000,000,000	National Budget Partners and Private Sector	RDB, MINICT, NIRDA, RRA, NCST, MINICOM, PSF



Improved STI Capacity and Knowledge Networks	Ensure dynamic STI human resources development	Conduct capacity needs assessments and design forward – looking strategies to increase the quality and quantity of human capital in line with national demand patterns, growth rate and global technology changes.	2020 - 2024	200,000,000	National Budget	NCST, MINICT, RDB, NIRDA, HLIs and TVETs, , MINEDUC, HLIs
		Promote innovative pedagogy that strengthens critical thinking, creativity, and problem solving, leveraging STEM at all levels of education.	2020 - 2024	100,000,000	National Budget Partners and Private Sector	MINEDUC, REB, HLIs, PSF, HEC
		Develop unconventional teaching, learning, and training programs that augment formal STEM education system.	2020 - 2024	1,000,000,000	National Budget Partners and Private Sector	NCST, MINEDUC, WDA, RDB, UR, PSF, HEC
		Develop programs to increase the number of competent researchers, particularly at PhD level, in order to effectively implement advanced research and innovation programs.	2020 - 2024	2,000,000,000	National Budget Partners and Private Sector	NCST, MINEDUC, UR, HLIs
	Diversified initiatives to promote women in STI.	Put in place strategies to integrate women in STI, including establishing quotas in research projects, tech companies, and across all levels of STEM.	2020 - 2024	500,000,000	National Budget Partners and Private Sector	NCST, MIGEPROFE, MINEDUC, MINICT, UR, HLIs
	Stimulate Research and Innovation culture and mind-set	Invest in initiatives aimed at nurturing a research and innovation culture, starting from the early stage of the learning process.	2020 - 2024	100,000,000	National Budget	MINEDUC, NCST, REB, PSF, ECD
		Design and implement targeted national research and innovation promotion programs.	2020 - 2024	100,000,000	National Budget	NCST, MINICT, MINEDUC, RBA, HLIs, MEDIA



	Promote researchers' profession and learned societies	Put in place mechanisms to support and promote research career across the whole R&D and innovation value chain.	2020-2021	50,000,000	National Budget	NCST, MINICT, RDB, NIRDA, HLIs and TVETs, MINICOM, RAS, PSF, MINEDUC, HLIs and TVETs, STI Sectors,
		Support R&D and scientific professional organizations.	2019-2024	200,000,000	National Budget Partners and Private Sector	NCST, RDB, MINICT, MINEDUC, UR, PSF, RGB
	Strengthened STI Community Outreach.	Develop and implement mechanisms to sensitize communities on the benefits of Science and Technology.	2019-2024	200,000,000	National Budget Partners and Private Sector	NCST, MINICT, MINEDUC, RBA, HLIs, MEDIA, Sectors
		Establish mechanisms to boost diffusion of scientific findings and integration of STI as tools to support community growth.	2019-2024	500,000,000	National Budget Partners and Private Sector	NCST, MINICT, MINEDUC, MINALOC, UR, HLIs, PSF
Enhanced International STI Collaboration	Promote Strategic Partnerships and Collaborations.	Create a conducive environment that attracts foreign investments in STI.	2020-2024	200,000,000	National Budget Partners and Private Sector	RDB, RRA, MINECOFIN, NCST
		Promote and establish strategic partnerships in R&D with emphasis on capacity building, knowledge and technology transfer.	2020-2024	100,000,000	National Budget Partners and Private Sector	RDB, NCST, MINEDUC, UR, HLIs, MINICT, RCI, NIRDA



		Collaborate in international networks and enable cross – disciplinary interaction between research entities and industry.	2020-2024	200,000,000	National Budget	NCST, UR, HLIs, PSF, RDB, MINICT, MINEDUC, Sectors
		Create mechanisms and incentives that facilitate cross – border collaborative, multi – disciplinary research in universities, research institutions and private sector.	2020-2024	1,000,000,000	National Budget Partners and Private Sector	RDB, MINAFFET, RCI, NCST, MINICT, MINEDUC, NIRDA, PSF
	Attract foreign R&D and Innovation firms	Identify and attract world – class R&D firms focusing on areas where Rwanda has potential to lead.	2020-2024	4,000,000,000	National Budget Partners and Private Sector	RDB, MINECOFIN, MINICOM, MINICT, NIRDA, RAB, RBC, CoEs





National Council for Science and Technology
Grand Pension Plaza, Nyarugenge
P.O. Box 2285 Kigali Rwanda
www.ncst.gov.rw

