

FINAL TECHNICAL REPORT / RAPPORT TECHNIQUE FINAL RWANDA PE2 CASE STUDY - MAY 2020

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Updating the Case studies of the Political Economy of Science Granting Councils in Sub-Saharan Africa

National Case Study Report of Rwanda Science Granting Council

To the International Development Research Centre (IDRC)

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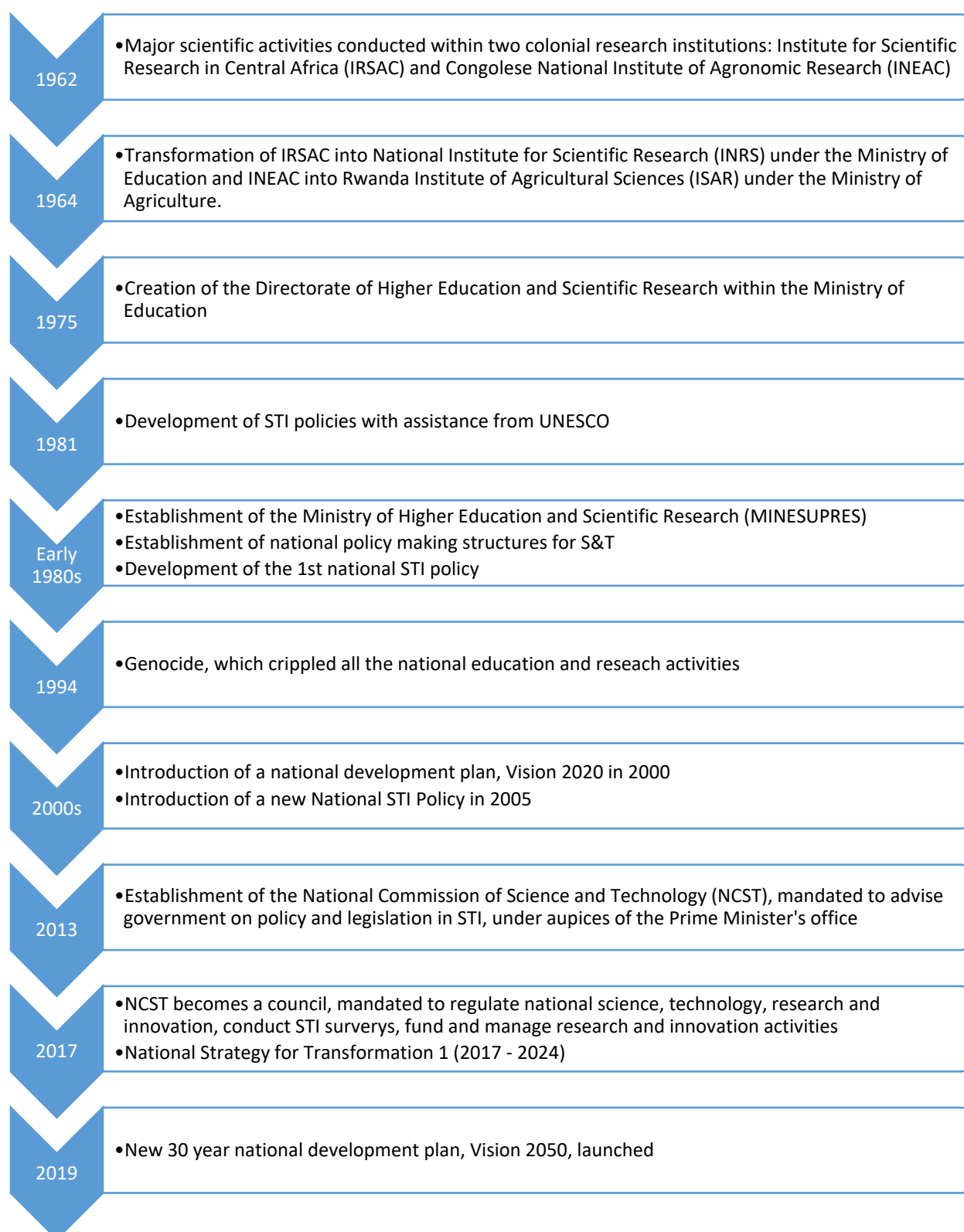
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1 Context of Rwanda's STI System

Figure 1: Historical milestones that have influenced the STI ecosystem in Rwanda



Rwanda, also known as “the Land of a 1000 hills”, is located in the Central and East African region, bordered by Tanzania, Uganda, Burundi and the Democratic Republic of the Congo. Over recent years, Rwanda has experienced significant economic, infrastructural and social development under the leadership of the Rwandan Patriotic Front (RPF). The government has put in place strategies to strengthen the national education and research capacity through establishment of science and technology institutions. One of these bodies includes the National Commission of Science and Technology (NCST) which was established in 2013. Its main mandate was to advise government on policy and legislation in science, technology and innovation (STI) under the auspices of the office of the Prime Minister. NCST was restructured in 2016 into the National Council for Science and Technology with an additional mandate of regulating national science, technology, research and innovation activities, conducting R&D and innovation surveys, as well as funding and managing research and innovation activities in the country, under the auspices of the Office of the President of the Republic. In 2017, the NCST was further restructured to reframe its governance structure. The STI system in Rwanda has gone through tremendous changes over the years. Figure 1 above gives a brief summary of the historical milestones that have affected the STI system over the years. Limited resources have been a major hindrance to the Government’s efforts to strengthen STI. In 2017, the World Bank reported that Rwanda has only 12 R&D researchers per million of the population.

The main aim of this case study is to identify the different political, economic and social aspects affecting the performance of STI in Rwanda. Key informants from different sectors were interviewed either via Skype/phone or in person (see the Annex for interview information). Additional information was collected from secondary sources during a thorough literature review. This study was carried out between May and September 2019.

1.1 Contextual factors arising between 2017 and 2019

1.1.1 Political overview

Currently, Rwanda enjoys political stability, economic growth and public safety (Congressional Research Service, 2019). 64% of the Parliamentary seats in Rwanda are filled by women. The Rwandan Patriotic Front (RPF) remains the majority ruling party. There are two opposition parties: Social Party Imberakuri and Democratic Green Party of Rwanda, each with two parliamentary seats (World Bank, 2019).

Civil society in Rwanda is highly underdeveloped due to several constraints. Normally, civil society organizations (CSOs) function in collaboration with the government’s political and development plans. The CSOs who do not operate within this context are frustrated by the government. Despite the increased involvement of CSOs promoted by decentralization and new legislation, human rights work is highly politicized and under heavy scrutiny (ICNL, 2019).

In August 2018, President Paul Kagame was re-elected to a 7-year term. This decision was made after there was a constitutional amendment in December 2015 that allowed him an additional 3rd term in the Presidency (World Bank, 2019).

1.1.2 Economic overview

An annual economic growth rate of 4-9% has been observed over the past decade as a result of donor aid, political stability, reduced corruption and investor friendly policies (Congressional Research Service, 2019). Rwanda has one of the fastest growing economies in Africa. The Country’s economy grew by 7% in 2018. This growth has been fueled by expansion of various sectors: e.g. agriculture, services and industry

(ICNL, 2019). The agricultural sector experienced an 8% growth rate in financial year 2017/2018 as a result of high productivity of food crops and livestock (Republic of Rwanda, 2019). In 2018, agriculture contributed 67% of the total job opportunities, whereas the services sector and industry contributed 25% and 8% of total employment respectively (FTF Council Analytical Unit, 2018).

It was noted by the International Monetary Fund (IMF) that, despite Rwanda's progress in economic growth, the country's economy remains vulnerable to fiscal risks and external shocks (Twagiramungu & Sebarenzi, 2018). Despite the tremendous progress that Rwanda has made in recent years, there are still some challenges that hinder the efficient functioning of some government entities. The challenges arise from the following areas:

- a) Lack of effective coordination mechanism among government entities
- b) Weak professional development plans, capacity building and rewarding mechanism in major government institutions
- c) Centralised decision making and lack of far sightedness and innovation mind-set in local government

A case in point is the example of *imihigo* (performance contracts to a traditional practice of determining and accomplishing goals) (for more details, see World Bank, 2018). Performance monitoring among government entities has created a strong sense of competition that has hindered sharing of knowledge and collaboration among the government officials/institutions. To address this, the *imihigo* coordination unit is expected to conduct continuous monitoring of the planning and implementation of the *imihigo*. However, overlapping mandates between government entities (both local and national) have contributed towards increased competitiveness and mistrust among the entities thus weakening collaboration. In an effort to improve coordination between government entities, the Rwandan government launched a joint Imihigo, which required all entities to work together to accomplish the joint performance contract.

Furthermore, inadequate staff skills and numbers are other challenge in the country's public sector. Most of these public institutions, especially in the agriculture and energy sectors, are under-staffed compared to other agencies. This is mostly attributed to the absence of long-term skills/career progression plans (World Bank, 2018).

1.2 Science and Technology System overview of Rwanda

In 2019, the Ministry of Information and Communication Technology (ICT) and Innovation was formed. In addition, in 2018, there was appointment of the Director of Science, Technology, Innovation and Research (STIR) Unit, under the Department of Education Planning, in the Ministry of Education. This change was a result of the restructuring of the Ministry of Education that included the abolition of the former Directorate of Science Technology and Research (DSTR). Following the abolition of DSTR and the re-establishment of the National Council for Science and Technology (NCST), some of the major activities, including STI policy oversight, funding research and innovation (including the RIEF) and regulation of research, were transferred from the Ministry of Education to NCST.

The National Council for Science and Technology is the principle body mandated to coordinate and monitor national science, technology, research and innovation activities, although the coordination of innovation policy will have to be shifted to the newly formed Ministry of ICT and Innovation. The NCST is governed by the Council, co-chaired by the Minister of Education, which is mandated to set up a firm research and innovation system that ensures the alignment of STI with the national development goals (MINEDUC,

2018). Nonetheless, the NCST remains a semi-autonomous agency reporting directly to the Office of the President of the Republic.

That being said, one respondent did note that she felt that having NCST housed within a ministry of education did mean there was a sharp focus on universities and their role in STI production. Such a statement suggests insufficient emphasis on industrial partners and the private sector or community groups. Other interviewees confirmed this with all interviewees noting a lack of coordination between actors and insufficient linkages with the private sector. However, it was noted that the creation of the National Industrial Research and Development Agency (NIRDA) had the potential and mandate to change this.

The implementing agencies involved in STI and research activities in Rwanda were identified by an UNCTAD review in 2017. The list of implementing agencies and major funding mechanisms associated with these is outlined in Table 1.

Table 1: STI funding agencies, implementing agencies and purposes in Rwanda

Fund	Implementing agency	Purpose
Green Fund (National Climate and Environment Fund)	FONERWA - MINIRENA	Environment and climate change fund
REIF - Rwanda Innovation Endowment Fund	MINEDUC	R&D for innovation priority, economic and social areas
SDF - Skills Development Facility	Workforce Development Authority	Expanding the number of individuals with the relevant skills in critical sectors
RIF - Rwanda Innovation Fund	Rwanda Development Board	Funding of KIC related STI programmes
NRIF - National Research and Innovation Fund	NCST	Align research with national priorities
BDF	BDF	SME support credit guarantees, credit lines, matching grants, quasi-equity and advisory services
FAPSA - Fund for African Private Sector Assistance	AfDB	Untied grants for technical assistance and capacity-building
ICT-SME fund	MYICT and RDB	Public-private funding for job creation
NIRDA	NIRDA	R&D for industry needs
EGF - Export Growth Facility	Rwanda Development Bank	Investment catalyst, matching grants for market entry costs, export guarantee
SEEP III Fund	WDA - AfDB	Skills, entrepreneurship development and job creation programme

Source: UNCTAD (2017)

In the Phase I political economy study (Chataway et al., 2017), it was noted that the Ministry of Education (MINEDUC) provides funds through the Rwanda Innovation Endowment Fund (RIEF) with the main aim of funding innovation and other priority economic and social sectors (World Bank, 2018). However, this mandate was handed over to NCST in 2017 and launched the National Research and Innovation Fund (NRIF) in its place. The fund will facilitate the implementation of the national research and innovation agenda (Bizimungu, 2018). The Rwanda Development Board also funds STI activities in Rwanda through the Rwanda Innovation Fund (RIF).

NIRDA has a specific mandate to increase R&D funding with the private/industrial sector. There is a focus on funding commercialization and pre-commercialisation efforts. In 2018, NIRDA implemented its firm-level development strategies through the advertisement of open calls for support in business development,

technology and management. This call was open for those involved in the garment and banana wine value chains. Through NIRDA's STEM (science, technology, engineering and mathematics) Lab, they are supporting applied research and development for other value chains through knowledge management and generation as well as provision of physical space. Their main focus area is data analytics in industrial software systems, mechatronics and energetics. NIRDA plans to collaborate with various research organizations under this initiative (Shepherd & Twum, 2018).

The World Bank, for example, has noted that funding of innovation beyond start-ups would be instrumental in boosting the success of innovation in Rwanda (World Bank, 2018). The STI system and funding situation is governed within the framework of the current government funding modality of the medium-term expenditure framework (MTEF). This is based on the need for immediate outputs and returns to the economy. That being said, it has been noted that STI in Rwanda requires a different funding arrangement that entails sustained long-term financing commitments in order to realize its long-term contribution to GDP (GESCI, 2017).

1.3 Policies governing the Science Granting Council and R&D in Rwanda

Rwanda is still working towards its "Vision 2020" through implementation of consecutive medium term strategies. These strategies have included the Poverty Reduction Strategy Paper (PRSP I, 2002-2006), and the Economic Development and Poverty Reduction Strategies I (2007-2012) and II (2013-2018). The most recent strategy commenced in 2018. The National Strategy for Transformation (NST1) is meant to bridge the completion of the Vision 2020 and the commencement of the Vision 2050. Vision 2050 is Rwanda's guideline towards achieving high-income country status (UN, 2019).

The 2013 revised STI Policy is still the main policy document providing guidance for NCST and others in their efforts to promote the production and use of STI in Rwanda. Further review of the Rwandan STI policy was conducted by UNCTAD in 2018. The recommendations from this review include strengthening of policy synergies and identification of interrelationships and trade-offs among the goals. It also recommended that national STI policy should be formulated based on the national innovation system (NIS) conceptual framework (UN, 2018). The prolonged approval process of the revised STI policy hinders its implementation. The preparation of a National Research Agenda document by the NCST is still ongoing.

2 STI ecosystem

In the first Political Economy Study (Chataway et al., 2017), it was observed that Rwanda has a fledgling STI system that is coordinated by MINEDUC. The issues raised in the PE1 study were:

- High levels of expectations
- Legacies of historical past
- Absence of a central regulatory authority
- Limited interaction between research organisations
- Limited resources (financial and human) and incentive structures

The last two issues were raised in this study during interviews conducted for fieldwork and from the literature review, but they were joined by a number of other factors. These are discussed below.

2.1 Evolution of STI ecosystem 2017 to 2019

2.1.1 Lack of capacity of staff in STI institutions

Lack of expertise in STI was identified as a major challenge by several of the interviewees with whom we met during this follow-up study. This was noted to be a problem both within research institutions – e.g. universities – but also within the bodies responsible for regulating and promoting STI in the country. One interviewee focussed on the need to increase the opportunity for staff involved in these institutions to study at PhD level. However, he – and several others – also focussed on the need for more practical action through promoting more centres of excellence and innovation hubs. It was noted that the lack of infrastructure capacity within universities (e.g. laboratory facilities) was a hindrance in building STI researcher capacity.

That being said, the STI policy in Rwanda does recognise the need for STI related skills to be promoted. Specifically, it notes that, for Rwanda to be globally competitive in the production of goods and services, the country needs to build engineering, entrepreneurship and technical skills. In addition, it identified the following objectives to promote the creation of skills (GESCI, 2017):

1. Knowledge acquisition and deepening: reinforcement of STI teaching and resources in all stages of education
2. Creation of knowledge: development of research capacity in all the national priority areas
3. Transfer of knowledge: STI capacity reinforcement in economic priority areas
4. Creation of an innovation culture: encouragement of innovation at all levels to contribute towards economic growth

Furthermore, efforts are being made to increase training opportunities. The government has implemented a policy where 70% of university scholarships are awarded to students enrolled in STI related courses. In addition, an agreement between public universities and the Swedish International Development Agency (SIDA) targets to produce 1500 PhDs between 2012 and 2022 (GESCI, 2017).

2.1.2 Reliance on external actors for funding

While there was widespread recognition of the value of NIRDA's efforts to promote R&D within the industrial sector and that the NCST's launch of the National Research and Innovation Fund (NRIF) were important opportunities to increase funding available for STI, major issues remained. Notably, there was still an overreliance on external actors (especially international development partners) for funding. Interviewees outlined two efforts that were being made to start to reverse this trend. The first was that the Private Sector Foundation had revitalised its Research Centre. However, several interviewees noted that until the private sector recognized the value of investing in R&D – notably how they can realise profit maximization and return on their bottom line investments – they will be reluctant to invest in this area. The second activity was to focus on what was already there: i.e. to conduct frugal innovation, and use resources and traditional knowledge, to produce lab equipment and research infrastructure to enable world class research to take place, even if in resource poor environments.

2.1.3 Limited interactions between STI stakeholders

All of the interviewees highlighted the limited interaction between STI stakeholders (policy makers, universities, private sector, communities etc.). That said, a couple of interviewees acknowledged an increase in interaction between some elements of the private sector and universities, as a result of the initiatives outlined above. There was also some discussion by two interviewees (one from within the education sector and the other a policy maker) that more regional cooperation would be helpful to bridge gaps in interaction (especially where knowledge does not exist in country).

2.1.4 Improving research quality starting with the school curriculum and TVET

Recognition of the importance of increasing research quality starting from school age has increased in the last two years. The Ministry launched another phase of the “Quality Education Enhancement Awareness Campaign” in 2019. One of the main aims of the campaign is to emphasise the role of ICT in increasing the quality of education. The Ministry is also training teachers and head teachers on the use of the laptops, and it monitors the use of ICT equipment. Over the last few years, the initiative is championed with increasing the use of technology by students and teachers. Alongside this, the Rwanda Coding Academy was launched to build capacity in programming at the tertiary level of education.

Furthermore, a majority of interviewees focussed on the positive changes more broadly within the education and skills building arena in Rwanda: notably, a change to a competency-based curriculum across primary and secondary schools, and an increased focus on technical and vocational education and training (TVET) and the role of innovation outside of formal research environments within universities. Mention was also made of an AfDB initiative that was attempting to link industry and higher education establishments. That being said, there was recognition from at least one interviewee that the cost of education – fees for university in particular – limited the numbers who were able to access education and training; limiting the opportunities for young people to come into contact with innovation hubs and research activities.

2.1.5 Fit with development priorities

All interviewees stressed the need for STI and research activities to have a focus on developmental priorities. Some specifically focussed on the need for alignment with the SDGs; others focused on the need for prioritisation of community-based problems. Some recognised the importance of looking at the latest cutting-edge research and STI areas (notably the 4th industrial revolution) for solutions.

3 Progress against indicators

Limited documentation and access to records of R&D activity in Rwanda were seen to be of major concern by interviewees and came out in the literature review. A recent report on STI activity in Rwanda noted that the most accurate way of assessing success in STI is through outcomes and not through the inputs to STI (UNCTAD, 2017). Unfortunately, this follow-up review found no improvement in the collection and analysis of STI related indicator data.

In this section we outline the data tables that were reported in the original study and update were possible. We then provide some additional narrative comments on the status of these indicators, where new data are available.

3.1 Science funding

	2017	2019	Comments
R&D expenditure as % of GDP	0.17%	No new data	Rwanda self-reported data in 2017
- Distance to national target of 0.5%	0.33%	No new data	
- Distance to regional target of 1%	0.83%	No new data	
- % from government	No data	No data	
- % from business enterprise	No data	No data	
Role of foreign funders over the past five years	↑	↑↑	

↑↑↑ high and increasingly on agenda; ↑ on agenda and slow increase in attention; --- no change.

There are no new national figures available related to routine science funding indicators since the last study report was developed in 2017. Another version of the National R&D Survey had been conducted since the first political economy report was published; however, the final version had not been cleared for distribution and publication at the time of this study.

In 2017, 0.17% of GDP was spent on R&D as opposed to the target 0.5% (Chataway et al., 2019). However, as reported above, the National Research and Innovation Fund (NRIF) was recently launched. Specifically, it was launched in March 2018 through a loan (US\$30 million) from the African Development Bank (AfDB). The main objective of the loan was to resolve the issue of insufficient funding for supporting young entrepreneurs and new ventures. The fund will provide capacity building, business planning and management for technology entrepreneurs. NRIF aims to support research and innovation and create employment opportunities for aspiring innovators. Science and technology institutions including National Industrial Research and Development Agency (NIRDA), Rwanda Agriculture Board (RAB) and University of Rwanda will also be supported through this fund. The fund aims to provide 2000 direct jobs, 6000 indirect jobs and support approximately 170 companies (Hall, 2018).

A review of news reports found that, in 2019, it was announced that the Rwandan Government had awarded 9,968 scholarships to study STEM subjects at university in 2019-2020 academic year (Ashimwe, 2019). During the literature search, it was also found that the African Center of Excellence in Energy for Sustainable Development (ACEESD) based in the University of Rwanda recently received a grant worth USD 250,000 from the World Bank as part of the Africa Centers of Excellence for East and Southern Africa Project (ACE II). The ACEII project is supported by the Inter-University Council for East Africa (IUCEA), a Regional Facilitation Unit for the World Bank (East African Community, 2019).

3.2 Science impact

	2017	2019	Comments
Field of science receiving most R&D funds	No data	No data	
Place of STI on policy agenda over the past five years	↑↑↑	-	No change observed
Importance of applied research over the past five years	↑	-	No change observed
Importance of multidisciplinary research over the past five years	↑	No data	No interviewee mentioned this
Importance of user-integrated research over the past five years	No data	No data	No interviewee mentioned this

↑↑↑ high and increasingly on agenda; ↑ on agenda and slow increase in attention; --- no change.

Again, no updated figures with regard to science impact were found during the literature review or fieldwork for this follow-up political economy study. That said, this study did find that the National Research and Innovation Fund (NRIF) granted RWF 50 million to business in the banana value chain to improve technologies and production quality. Some of these funds were allocated to NIRDA to facilitate implementation of the project “Enhancement of processing technologies, quality and competitiveness among banana beverages in Rwanda” (Nkurunziza, 2019). The fund also awarded a total of RWF 550 million to the Excellent Research Grant initiative. In September 2019, the Excellent Research Grant initiative awarded funding to 11 beneficiaries¹.

¹ <https://twitter.com/hashtag/ExcellentResearchGrant?src=hash>, accessed 08/10/19

3.3 Science capacity

	2017	2019	Comments
Researchers in R&D (per million people)	12.29	No new data	UNESCO, 2015: Rwanda 2009 data
# of staff in SGC	13	No new data	
- Distance to target	No data	No new data	
Improvement in science system to absorb funds in terms of researcher quality	No data	No data	Difficulty assessing this in follow up when no reliable funding figures
Improvement in science system to absorb funds in terms of fund manager quality	No data	No data	Difficulty assessing this in follow up when no reliable funding figures

There is low adoption and integration of STI due to lack of qualified human resources. However, efforts have been put in place to enhance capacity building in STI (GESCI, 2017). The shortage of qualified human resource has been identified as a major challenge across various sectors in Rwanda in STI policy reviews. Different recommendations have been received from different agencies: e.g. UNEP, WIPO, UNCTAD, etc.

The enrollment rate in tertiary education institutions remains low but has been increasing at a high rate. In 2015, only 8% of the youth enrolled for tertiary education. Very few complete their tertiary education. The government had taken steps towards the improvement of tertiary education in the country through consolidation of public universities into the University of Rwanda. This move was aimed at improving governance of the tertiary education system. Tertiary education institutions have been seen to be innovation hubs in Rwanda. The number of patents and publications has been gradually increasing but remains low. Enrolment rates in science and engineering have also been low compared to social sciences and law. In 2017, social sciences, health, engineering and sciences had 45%, 9%, 6% and 9% enrolment rates respectively (World Bank 2018). There have been other important changes and progress in the Rwandan STI system. For example, the Rwandan Government in collaboration with the African Development Bank launched a new campus of Carnegie Mellon University as a regional ICT hub with the aim of addressing regional development challenges and enhancing research capacity in the country and in the region. This initiative is part of the African Higher Education Centers of Excellence project funded by the World Bank (Simpkin et al., 2019).

4 Conclusion and recommendations

4.1 Main findings and conclusion of the report

This update to the first round of the political economy case study of Rwanda's STI system has highlighted a number of new funding initiatives being rolled out by the National Council of Science and Technology in Rwanda and efforts being made to enhance the sustainability of research activities in the country through a focus on STEM across the education sector. However, the lack of a clear overview of funding that has been granted, and the status of STI in the form of indicators, makes it difficult to assess the impact of the STI system. The consolidation of research within a single university (University of Rwanda) is a major effort by the Rwandan government to focus research efforts. The success or otherwise of this initiative is yet to be seen and should be evaluated as it is a very different approach to the neighbouring countries.

4.2 Recommendations for the STI actors in Rwanda

Science Granting Council: NCST

A revision of the website to provide a clear and transparent overview of the grant process and available funding schemes would provide an incentive to researchers to apply for grants and enable more effective grant management.

Education providers

A review of the decision to consolidate research into a single university will be needed in the coming years. A thorough review of all efforts to stimulate STI and research is also needed. There appear to be many different initiatives at different levels from clusters work and innovation hubs through to PhD studies. A review of the indicators of successful STI is also required to ensure that the focus is not simply on patents and publications as the efforts being made are now greater than this.

Private sector actors

Efforts of the Private Sector Foundation and those working with universities are to be commended. More, however, needs to be done. Those representing the private sector must find ways of making the arguments for R&D investment and for making STI attractive to those in business. More recognition of the different types of business and the need for innovative action at all levels of business (not just formal manufacturing of products) would also be beneficial. The current focus on TVET education is a an opportunity for in-roads in this area to be made.

Policymakers

All interviewees noted the difficulty of implementing the STI Policy due to the fact it has not been ratified as yet. Furthermore, all interviewees noted the need to make the public aware of the STI policy and for its promotion through a clear implementation plan, where progress of the plan is monitored on a regular basis.

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Annex: Interview details

Interviewee	Interview mode	Interview date
Research fellow at the Ministry of education	Skype	11 July 2019
Researcher at University of Rwanda	Skype	19 July 2019
Management staff at EASTECO	Skype	24 July 2019
Management staff at the Ministry of education	Skype	5 September 2019
Student at University of Rwanda College of Science and Technology	Face to face	5 September 2019
Research consultant	Face to face	5 September 2019
Researcher at Private Sector Federation	Face to face	6 September 2019
Researcher at University of Rwanda	Face to face	6 September 2019