

FINAL TECHNICAL REPORT / RAPPORT TECHNIQUE FINAL KENYA 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 Kenya Science Granting Council

To the International Development Research Centre (IDRC)

Science Policy Research Unit (SPRU), University of Sussex, United Kingdom

African Centre for Technology Studies (ACTS), Kenya

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1 Context of Kenya's STI System

The phase one political economy study of 2017 (Chataway et al., 2017) outlined how the role played by science, technology and innovation in catapulting Kenya into middle income country status has been recognized in the Kenya Vision 2030, the country's current national development plan. Furthermore, in the Kenyan constitution, science and indigenous technologies are seen to be crucial tools in national development. The Kenya Vision 2030 also outlined that the enactment of the STI Act in 2013 led to the realignment of STI programmes to the national agenda as well as strengthening of the national system of innovation (NSI). Through the STI policy, three organizations were established to coordinate national STI activities. These are the National Commission of Science, Technology and Innovation (NACOSTI), the Kenya National Innovation Agency (KeNIA) and the National Research Fund (NRF).

The 2017 report also outlined that the introduction of free primary education in 2003 and more recently free secondary education has impacted positively on the number of children now eligible for university places and the rise of university education in the country. Technical and vocational education and training (TVET) has, since 1967, had a role in the training landscape of Kenya, when the first TVET institution – Kenya Polytechnic – was established by the Ministry of Education. More technical colleges have been established since then due to the increased demand for technical skills (Mwatire & Mwami, 2019).

The main aim of this case study is to identify the different political, economic and social aspects affecting the performance of STI in the Kenya. 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.

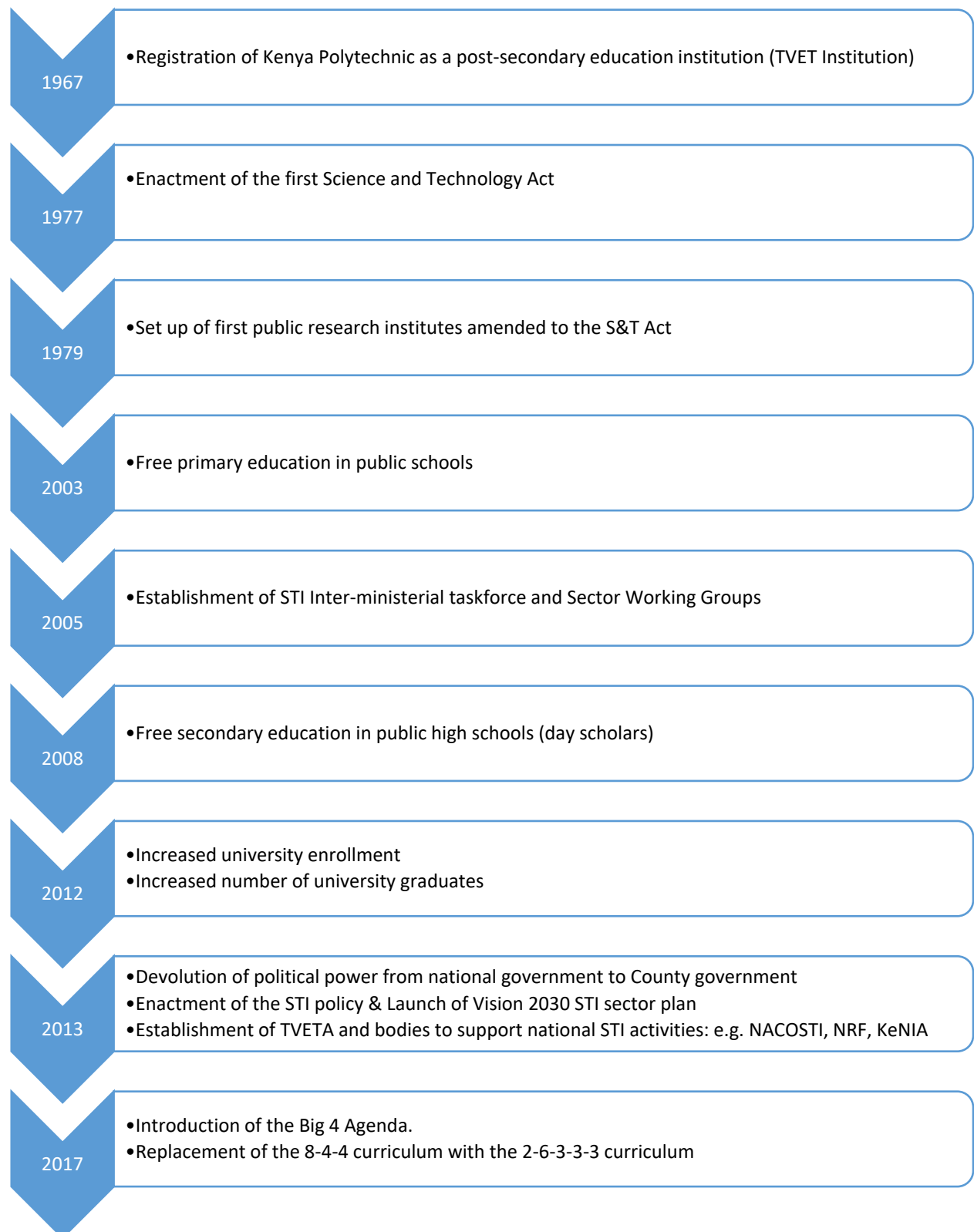
1.1 Contextual factors arising between 2017 and 2019

1.1.1 Political overview

Since the first study was conducted in 2017, Kenya's political landscape has been altered by the introduction of the Government of Kenya's "Big Four" initiative. This is a targeted approach to achieving Kenya's Vision 2030 through a focus on four key challenges: food security, affordable housing, manufacturing, and affordable healthcare. For example, Kenya Vision 2030's Third Medium Term Plan (MTP III) highlights major policies, programmes and reforms that are to be implemented between 2018 and 2022 and gives high priority to the Big Four initiatives (GoK, 2018). The MTP focusses on several foundations/enablers that will act as drivers towards national transformation of which Science, Technology and Innovation (STI) is one.

Noted in the first political economy study (Chataway et al., 2017), and still of importance, is the issue of devolution. In fact, according to the World Bank, devolution has been the greatest success from the August 2010 constitution. It piloted in a new system of political and economic governance. It has promoted greater grassroots investments, service delivery in the public sector and accountability (World Bank, 2019). Devolution has enabled decentralisation of fiscal resources from central government to county government and increased development of infrastructure at county level: e.g. hospitals/health centres, roads, etc. However, at the same time, it has been reported that devolution has potentially reignited land ownership issues and increased competition for resources, which in turn has increased corruption and ethnic politics (The Conversation, 2018).

Figure 1: Timeline showing major historical milestones affecting the national STI ecosystem



1.1.2 Economic overview

Over the last 10 years, Kenya has experienced a steady increase in economic growth, enabling it to move from low-income country to lower-middle income status. In 2018, the Real GDP grew an estimated 5.9% from the previous year's growth rate of 4.9% (ADB, 2019). This economic growth has been attributed to the recovery of the tourism sector, stability of the macroeconomic environment, development infrastructure and increased remittance inflows (World Bank, 2019).

In 2017, Kenya exported USD 6.17 billion and imported USD 17.1 billion, resulting in a negative trade balance of USD 11 billion. (OECD, 2019). Agriculture, fishing and forestry contributed 22% to GDP while manufacturing, education and financial and insurance activity contributed 11%, 7%, 8% and 6% respectively (Trading Economics, 2019).

That said, in 2018, the rate of unemployment among the youth was estimated to be about 11.4% (Ng'ethe, 2018). One of the reasons for unemployment is noted to be the lack of school leavers and graduates who have the skills required by the job market. The introduction in 2017 of a new curriculum that divides schooling into year classifications of 2-6-3-3-3 (as opposed to the previous 8-4-4 system), together with a new competency based curriculum in 2019, are efforts to address these challenges. For example, the 2-6-3-3-3 curriculum is promoted by the Government to meet one of the objectives in Vision 2030, which requires technical training in schools (Wanjala, 2017).

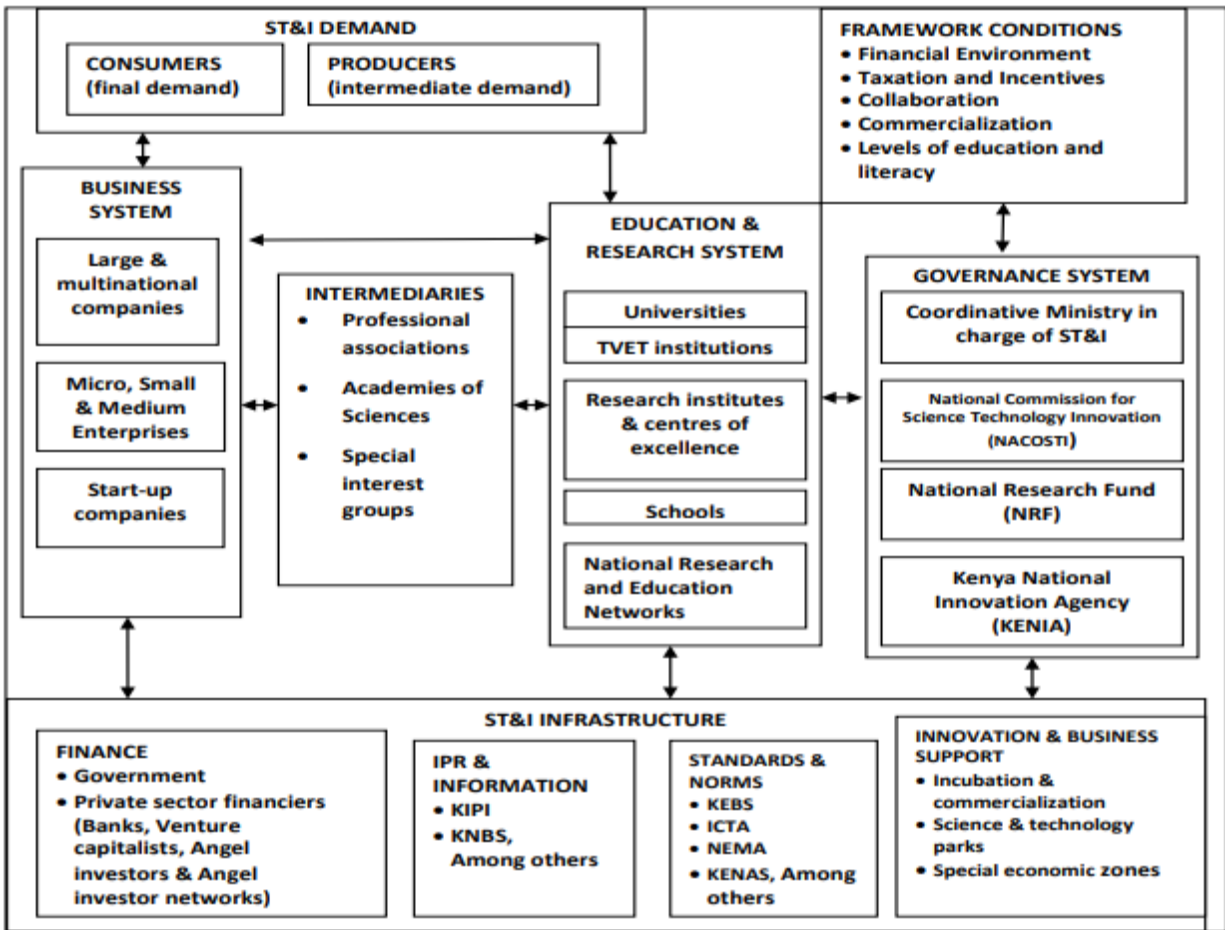
1.2 STI system overview in Kenya

Figure 2 below is an illustration of the major actors in STI and the national innovation system (NIS). As noted above, the implementation of the STI Act in 2013 led to the establishment of three major STI institutions: NACOSTI, NRF and KeNIA. The creation of these institutions led to enhanced governance in the National Innovation System. As noted in the first political economy study (Chataway et al., 2017), NACOSTI is mandated with coordination/regulation of STI activities in the Kenya. The NRF is responsible for mobilization and management of R&D funds, sector wide activities and development of infrastructure in research institutions and universities. KeNIA coordinates the activities of the national innovation system and enhances cooperation among major actors (government, industry and academia) (GoK, 2017).

STI in Kenya is housed within the Ministry of Education, Science and Technology (MoEST). MoEST is divided into four state departments, which coordinate the following areas: Technical and Vocational Education and Training (TVET); Post training and skills development; University Education and Research; and Early Learning and Basic Education. The State Department for University Education and Research is mandated to coordinate agencies, parastatals and institutions with responsibilities in R&D, and university education. The institutions/agencies in university education and R&D, including NRF, KeNIA and NACOSTI, report to the Directorate of Research, Science and Technology (DRST) within the Ministry.

The government has put in several strategies to ensure efficient coordination of national STI activities. These include development of legal frameworks to ensure synchrony between research activities and the NIS. Despite these efforts, the poor coordination of national STI activities remains a challenge due to the scattered distribution of research institutions across ministries (Ayisi et al., 2019). For example, health research institutes are under the Ministry of Health and agricultural research institutions are under the Ministry of Agriculture.

Figure 2: National Innovation System (NIS) and major actors in Kenya



Source: Ayisi et al. (2019)

Key: STI – Science Technology and Innovation; TVET – Technical, Vocational, Education and Training; NRF – National Research Fund; NACOSTI – National Commission for Science Technology and Innovation; KENIA – Kenya National Innovation Agency, IPR – Intellectual Property Rights; KIPI – Kenya Industrial Property Rights; KNBS – Kenya National Bureau of Statistics; ICTA – Information, Communication and Technology Authority; NEMA – National Environmental Management Authority; KENAS – Kenya National Academy of Sciences.

2 STI ecosystem

In the first Political Economy Study (Chataway et al., 2017), it was observed that Kenya had taken the step of delineating responsibility of STI regulation and promotion across three different agencies. The issues facing these three agencies and other stakeholders highlighted in the PE1 study were:

- The role of policy instruments and political cycles
- The relative power and influence of different stakeholders
- Research quality and impact
- The relative merits of different funding types
- The availability of needed capability and skills

Several of these issues were raised in this follow-up study during interviews conducted for fieldwork and from the literature review. However, they have been discussed in rather different ways or from different perspectives. These are discussed below.

2.1 Evolution of STI ecosystem 2017 to 2019

2.1.1 Funding available for research, science, technology and innovation

Funds contributed by the national government remain low due to competition from priority sectors. It was acknowledged by a number of interviewees that government funds are currently directed towards supporting priority sectors in the Big Four agenda: i.e. health, food security, housing and manufacturing.

There was a consensus amongst all interviewees that there was insufficient funding for research and STI, and that funding was often given out in a patchy manner such that everyone competed for what scarce resources were available. Two interviewees called for a new financing model for STI and research funding; that funding for education and training was separated from that for research and STI. This is currently the case because the STI related organs of government (NRF, KeNIA and NACOSTI) report to the Ministry of Education, Science and Technology.

Perhaps unsurprisingly, one interviewee was in favour of a dedicated Ministry of Science and Technology (something Kenya has had before) while others noted the need for more support from high level leaders/organs of government (see below).

All interviewees noted that the scarcity of funds meant that everyone had to look for funds from a variety of sources, notably from foreign partners. It was also noted that there was extremely limited private sector funding of research and the little that was available was unevenly distributed. One interviewee highlighted how a research institution like the Kenya Medical Research Institute (KEMRI) receives large amounts of funding from the private sector but the research institute responsible for industrial research and development hardly has any private sector funding. He called for more effective implementation of private-public partnership frameworks to stimulate increased funding for R&D from the private sector.

There was disagreement amongst the interviewees on the level of private sector in-house R&D. While one interviewee argued many private sector players invested in R&D, another noted that most private sector players in Kenya are small and medium sized enterprises who cannot afford to conduct R&D. That said, a 2019 UNESCO report found that R&D funding from the local private sector remains low at 0.5% of revenue

generated. It also found that the majority of the private sector have internal R&D, which they prefer funding as opposed to investing in R&D in universities and research institutions. The report argued that this could be attributed to the high level of mistrust and prolonged timelines before delivery (UNESCO, 2019).

Interviewees continued to mention LIWA – an organisation tasked with linking industry with academia and mentioned in the original political economy study (Chataway et al., 2017) – as an organisation that is working to change the situation.

2.1.2 Weak interlinkages between universities, research institutes and industry

According to a report by UNESCO (2019), the absence of strong linkages between learning institutions, research institutions and the industry/private sector has been a recurrent problem over the years in Kenya. As a consequence, knowledge generated in universities and research institutes that could have great impact in industry/the private sector remains untapped, sitting instead in the form of publications (UNESCO, 2019).

Interviewees were in agreement that private sector institutions did not invest often because they did not see the importance of research and, where they did, they kept it in-house; they rarely linked with universities or other research organisations. This is slightly at odds with the information above with regards to the fact some research organisations receive significant funds from the private sector. We assume that this difference is based on whether the private sector is a Kenyan organisation (as per the statements in this section) and the degree to which they are internationally based (in the previous section where international pharmaceutical companies pay for clinical trials research in Kenya).

As noted in the earlier report (Chataway et al., 2017) Linking Industry with Academia (LIWA) has been instrumental in encouraging collaborations between industries and academia. LIWA has created over 15 partnerships between major companies – e.g. Safaricom and Huawei – and universities. Kenya Education Network (KENET), a national research and education network, is another initiative by the government established to enhance knowledge sharing across universities. These collaborations have been beneficial in several aspects: curriculum review that ensures graduate skills are matched with industry needs, capacity building in innovation and technical skills, well-coordinated research agendas with no duplication, and encouraged private sector funding for R&D (UNESCO, 2019).

2.1.3 Level of skills and capacity for STI

The mismatch between graduate skills and industry requirement has been a major contributor to the high level of unemployment among the youth in Kenya. This is mainly attributed to weak linkages between universities and industries, poorly structured curricula, rapid conversion of technical learning institutions into universities and limited infrastructure (UNESCO, 2019). These arguments were mirrored in the interviewee comments we received. Specifically, interviewees commented that graduates of universities and technical colleges were often not ready for the job market when they completed, that there was significant lack of relevant technical skills and this was often due to the lack of relevant education/curriculum.

Kenya has continued to place an importance on TVET training over the last three years. Currently, there are 180,000 students enrolled in institutes of technical and vocational training. Technical vocational centres and national polytechnics have 98,000 and 82,000 enrolled students respectively (Ochunge, 2019). TVET graduates are expected to be equipped with practical knowledge and skills to contribute towards economic

development in both formal and informal sectors. A high quality TVET education system is therefore crucial for national development and achievement of the national agenda (Mwatire & Mwami, 2019). This was reiterated by Mr. Kevit Desai, TVET Principal Secretary for Kenya, during the opening of the Kenya Association of Technical Training Institutions (KATTI) in Western Kenya in 2019, “The government recognizes vocational training as the central pillar of youth employment and sustainable enterprise development needed to ensure Kenya becomes a middle-income earner by 2030.” There are plans by the government to provide scholarships and grants to innovators in TVET to support their innovations. The government also plans to assist the innovators to patent their products (Ochunge, 2019).

2.1.4 Unclear mechanisms for policy implementation, monitoring and evaluation

Kenya has been known to have the most progressive policies in Africa. However, the inefficient or lack of adoption of a rigorous development and implementation framework by policy makers has resulted in failed policy implementation (Machari, 2019). During a workshop in 2018, Prof Ndemo, an ICT expert, pointed out the absence of supportive institutional structures and mechanisms for top policy makers in the identification and use of evidence in decision making (AFIDEP, 2018). Again, these arguments were mirrored by our interviewees. They pointed to a need for alignment of policies rather than fragmentation of policies; clear implementation frameworks and stronger engagement by relevant stakeholders in government to push implementation forward.

One interviewee noted that NRF, KeNIA and NACOSTI were still in their infancy (in their new roles) and therefore were still “finding their feet” in terms of how to operate. Other interviewees noted that lack of staff in the NRF limited its ability to effectively achieve its mandate. Two interviewees noted that silos between ministries and lack of interaction between stakeholders more generally limited the ability for effective policy implementation. Furthermore, interviewees mentioned the lack of stakeholders’ engagement in policy formulation, review and evaluation processes.

2.1.5 Fit with development priorities

One of the reasons for the lack of implementation, put forward by at least two interviewees, was that the “common man” did not see the value of STI for their own benefit. Similarly, others argued – as noted above – that private sector actors also do not see the relevance of R&D when the majority of Kenyan businesses do not innovate beyond perhaps a small amount of incremental change to existing products and services. One of the reasons put forward for this was because of the lack of fit with developmental priorities. However, one interviewee noted that the STI Policy of Kenya was, in 2019, undergoing an alignment with the Sustainable Development Goals. In addition, as noted above, there was recognition that national level priorities, notably the Big Four agenda, was dominating all policy discussions, including funding of STI decisions.

2.1.6 Addendum: recognition of the issues facing STI implementation

It is important to note that some of the issues raised above – and in the first report (Chataway et al., 2017) – have been acknowledged as challenges by NACOSTI, Kenya’s National Commission for Science, Technology and Innovation, which is tasked with regulating and advocating for the sector. Specifically, it has identified the challenges outlined in Table 1.

Table 1: STI challenges and interventions in the national STI environment

S/No.	Challenges	Interventions
1.	Inadequate human capacity	Enhance human resource capacity
2.	Inadequate monitoring, evaluation and reporting system	Establishment of the Directorate of Strategy, Planning and Compliance
		Develop an effective monitoring, evaluation, reporting and learning system
3.	Inadequate Standards and Guidelines to operationalize the ST&I Regulations	Review regulations and develop relevant Standards and Guidelines
4.	Low public awareness on the Commissions mandate	Enhance public awareness
		Strengthen stakeholder engagement
5.	Challenges in operationalization of research advisory committees as provided for in the ST&I Act, 2013	Review of legislation
6.	Inadequate capacity in science communication	Develop capacity in science communication
7.	High dependency on GoK grants to finance the Commission's operations	Diversify sources of funding

Source: NACOSTI (2018)

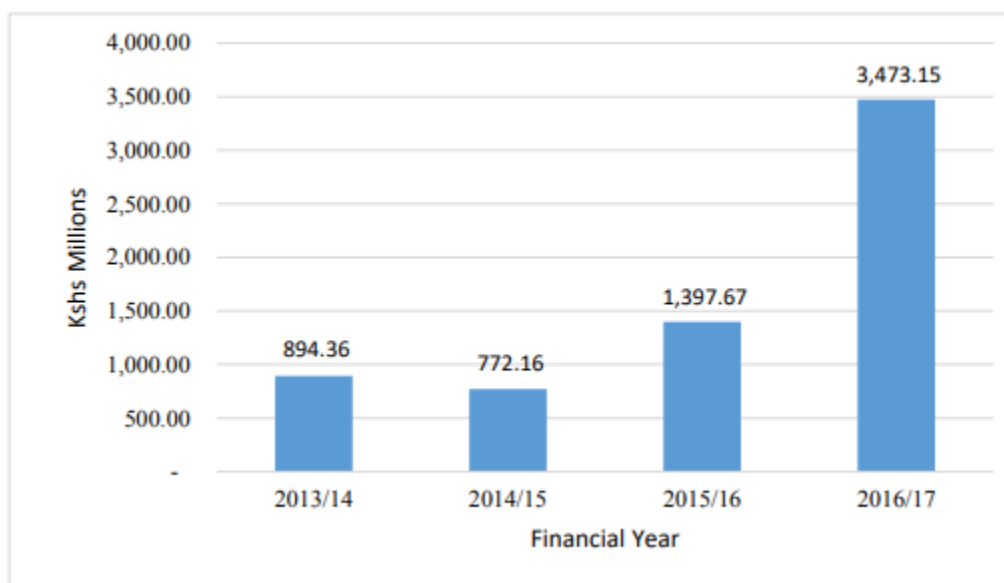
3 Research funding

3.1 Science funding

	2017	2019	Notes
R&D expenditure as % of GDP	0.79%	No update	UNESCO, 2015: Kenya 2010 data
Distance to national target of 2%	1.21%	No update	
Distance to regional target of 1%	0.21%	No update	
% from government	25.96%	No update	UNESCO, 2015: Kenya 2010 data
% from business enterprise	4.35%	No update	UNESCO, 2015: Kenya 2010 data
Role of foreign funders over the past five years	↑		No change since 2017 observed

Kenya's GERD/GDP ratio is one of the highest in Africa (Ndichu & Wacuka, 2017). The allocation of R&D funds from the government has tremendously increased from fiscal year 2015/16 to 2016/17, as shown in Figure 3 below.

Figure 3: R&D budget allocation (2013/14- 2016/17)



Source: GoK (2018)

Government funds for R&D are managed by the National Research Fund (NRF). There has been an increased funding for R&D from the government from USD 3.3 million to USD 5 million over the period 2008 to 2016. 1,816 STI related projects have been supported through these funds (UNESCO, 2019). It was noted that a large portion of funding for R&D is from foreign sources in the form of research grants from major organizations: e.g. World Bank, DFID, DANIDA and IDRC. Major corporations like IBM, Google and Nokia are also funding R&D projects through universities. In most cases, research supported by donor funding is aimed towards achieving donor agendas and is not aligned to national priority areas (UNESCO, 2019). This supports the findings of the first case study and some interviewee comments in this current study.

The government has intensified efforts to support innovation in priority sectors through provision of funds by the Commission of Higher Education (CHE) via NACOSTI. The grant amount had increased from KES 250 million to KES 497 million in 2015/2016 fiscal year (NRF, 2019).

Table 3: Fund allocation per student by government to public universities (2017/18)

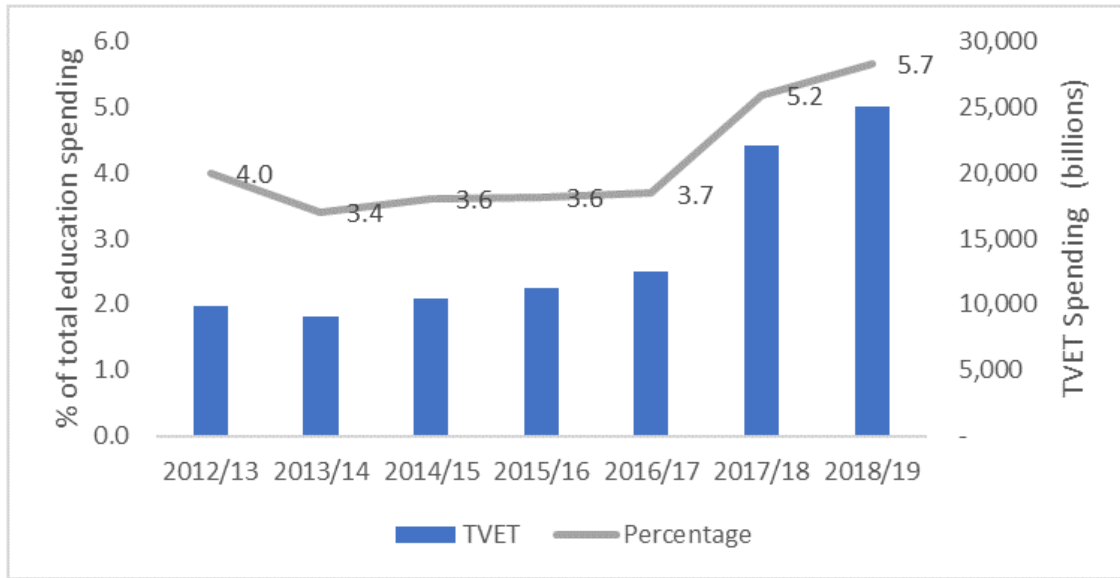
Universities	Enrollment	Government Budget (KES, millions)	Per-Student Subsidy (KES, thousands)
University of Nairobi	26,009	6,300	242
Egerton University	15,223	2,800	184
Kenyatta University	21,462	3,100	144
Jomo Kenyatta University of Agriculture and Technology	12,029	1,700	141
Technical University of Kenya	8,636	1,070	124
Technical University of Mombasa	4,520	770	170
University of Eldoret	14,275	1,100	77
Machakos University College	5,056	340	67

Source: World Bank (2019)

The University of Nairobi received the lion's share (KES 6300 million) of funding from the government while Machakos University College received the least amount of funding (KES 340 million), as shown in Table 3 above. The fund allocation was done in accordance to the enrolment/number of students received in the university.

From 2012/13 to 2018/19, the government increased financing to technical training and education to an average of 4.2% of the total education expenditure, as shown in Figure 4 below. The drastic increase in TVET financing 2017/18 to 2018/19 was aimed towards increasing training institutions, certification of Technical and Vocational Education and Training Authority (TVETA), curriculum development, staff recruitment and training. Students joining TVET through the Kenya Universities and Colleges Placement Service (KUCCPS) will be beneficiaries of an annual KES 30,000 bursary and KES 40,000 Higher Education Loans Board (HELB) loan to support in tuition fees and upkeep. The government has also reduced the TVET annual tuition fees by 30% from KES 92,000 to KES 56,420 (Mwatare & Mwami, 2019).

Figure 4: TVET financing from 2012-2018



Source: Mwatire & Mwami (2019)

At agency levels, NRF released grants worth KES 3 billion to a total of 411 researchers in institutions of higher education (218 PhD and 193 masters researchers). The PhD and masters researchers were granted KES 2 million and KES 0.5 million respectively (Oduor, 2017). KeNIA, on the other hand, provides grants to individual innovators. Approximately KES 5 million was disbursed in 2018 to support innovations, as pointed out by an informant from KeNIA. KeNIA also holds recognition awards where they reward KES 1 million to successful innovations.

3.2 Science impact

Interviewees in this study argued that there was both too much focus on applied as well as basic research. However, there are some signs of increasing focus on impact by government with regard to use of STI funds and resources. Notably:

1. The Kenyan and Japanese governments signed an MoU to extend the Pan-African University for Science, Technology and Innovation (PAUSTI) network project under JKUAT. The main aim of the project is to strengthen Science, Technology and Innovation Training in Africa. This will boost manufacturing and encourage economic growth across the continent (Tumo, 2019).
2. NACOSTI Research Manufacturing Chair is responsible for the coconut value addition strategies through which natural industrial products are manufactured from coconut husks and fibre. This contributes to the Big Four agenda. Other outcomes that are expected from the Manufacturing Research Chair include: value added food products to be sold in both local and foreign markets, and infrastructure development for SMEs within the coconut value chain (JKUAT, 2019).

3. There are plans by government, in collaboration with the private sector, to fund innovations from TVET institutes. This move is aimed towards boosting the manufacturing and agricultural sectors, which are vital in Vision 2030. Kenya has 230 technical and vocational colleges and 11 national polytechnics (Ochunge, 2019).

	2017	2019	Notes
Field of science receiving most R&D funds	Agricultural science		UNESCO Science report 2015
Place of STI on policy agenda over the past five years	↑↑↑	↑↑↑	
Importance of applied research over the past five years	↑	No change	
Importance of multidisciplinary research over the past five years	↑	No change	
Importance of user-integrated research over the past five years	No data	No change	

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

3.3 Science capacity

	2017	2019	Notes
Researchers in R&D (per million people)	230.73	No change	UNESCO, 2015: Kenya 2010 data
# of staff in SGC	3	No change	
- Distance to target	70	No change	
Improvement in science system to absorb funds in terms of researcher quality	No data	No change	
Improvement in science system to absorb funds in terms of fund manager quality	No data	No change	

According to one interviewee, there are plans to set up state-of-the-art research/scientific infrastructure in local institutions to attract and retain highly qualified human resources. This will enable research analysis within the country compared to outsourcing it to foreign institutions. There continue to be a low number of staff in NRF in 2019.

4 Conclusion and recommendations

4.1 Main findings and conclusion of the report

Since the last report, Kenya's policy landscape has been shaped by a move towards the "Big Four" agenda and a marked shift in emphasis on TVET and enhancing TVET opportunities in the country, including innovation through TVET colleges. This latter move is partly due to a continued recognition of the skills gap facing the country. More generally, with regards STI funding, this study has found that private sector funding remains low and there are calls for a new model for STI funding to be introduced. Specifically, there is a need to de-link education funding from funding for STI at Ministry level.

4.2 Recommendations for the STI actors in Kenya

Science Granting Council: NRF

The data available on the NRF website have improved in terms of lists of projects funded. However, there is still no clear public access to funding figures in terms of the amount of funding given. Having publicly available information on the demand and uptake of funding will provide significant support for increasing funding allocated to the agency.

Private sector actors

There is huge scope, with the focus on TVET, for a set of initiatives that increases innovation in SMEs and consideration of R&D outside of "the lab". Potentially, this is also important given the type of private sector actors working in Kenya, the majority of whom are not focussed on traditional R&D intensive sectors.

Policymakers

There are renewed efforts to align Kenya's STI activities with various agendas (Big Four, Vision 2030 and the SDGs). It will be necessary to ensure that there is coordination of these efforts to avoid duplication, overlap or contradiction.

On funding, it has been argued that introduction of tax incentives/waivers, recognition and award schemes could encourage financing of research activities from the private sector, development partners and philanthropists (Njau, 2018).

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Annex: Interview details

Interviewee	Interview mode	Interview date
NACOSTI representative	Phone interview	25 June 2019
Academic at Egerton University	Phone interview	29 July 2019
LIWA representative	Phone interview	7 August 2019
Staff at Maseno University	Phone interview	8 August 2019
KENIA representative	Face to face	9 August 2019
Researcher at Kenyatta University	Face to face	14 August 2019
NRF representative	Phone interview	16 August 2019
Ministry of education representative	Face to face	16 August 2019
Researcher at KAM	Face to face	30 August 2019