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African Higher Education Leadership in Advancing Inclusive Innovation for Development / AHEAD

585919-EPP-1-2017-1-RO-EPPKA2-CBHE-JP

Analysis of the National Innovation System in Kenya

Kenyatta University, Kibabii University, Catholic University of Eastern Africa, Kisii University, Mount Kenya University

Work Package 1.3

AHEAD
Inclusive Innovation for Development

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Capacity Building in Higher Education

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Introduction

The Erasmus+ project “African Higher Education Leadership in Advancing Inclusive Innovation for Development / AHEAD” is implemented by a consortium of 15 institutions from Europe and East Africa, including:

- 4 Universities from Europe:
  - University of Medicine, Pharmacy, Sciences and Technology of Tîrgu Mures, Romania
  - Birmingham City University, the United Kingdom
  - University of Molise, Italy
  - University of Social Sciences, Poland

  joined by the consultancy company European Center for Quality, Bulgaria

- 2 Universities from Tanzania:
  - Dar es Salaam Institute of Technology
  - The State University of Zanzibar

- 3 Universities from Uganda:
  - Kyambogo University
  - Lira University
  - Makerere University

- 5 Universities from Kenya:
  - Kenyatta University
  - Kibabii University
  - Kisii University
  - Mount Kenya University
  - The Catholic University of Eastern Africa

The project seeks to initiate a long-term partnership to mobilize EU expertise in support of building capacities of Kenyan, Tanzanian and Ugandan universities to lead and manage innovation that best fits their countries’ inclusive and sustainable development needs.

As part of the project work plan, partner universities from Kenya, Tanzania and Uganda carry out the analysis of the National Innovation System (NIS) in their countries. The implementation of this activity is based on the AHEAD Guidance and Benchmarking Tool for NIS analysis (WP 1.1). It aims to:

- help partner universities identify areas where National Innovation Systems in Kenya, Tanzania and Uganda are well-developed and where they are underperforming;
- assess the gaps in the performance between Kenya, Tanzania, Uganda and EU countries;
- develop recommendations for action and improvement;
- guide the planning of the upcoming project activities at partner universities.

The report on the Analysis of the National Innovation System in Kenya provides the necessary background knowledge of the context, in which the project capacity-building activities in Kenya will take place.

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I. Performance of the National Innovation System

1. Gross domestic expenditure on R&D

- Gross domestic expenditure on R&D (as percentage of GDP)

Research and Development Expenditure as a percentage of GDP data was reported at 0.786%.

Source: UNESCO Institute for Statistics, 2010.

2. Government Sector expenditure on R&D (GERD)

	Gross domestic expenditure on R&D (GERD)	
	GERD as a percentage of GDP	*0.80%*
	GERD by sector of performance (%)	
1.	*Business enterprise*	*8.66%*
2.	*Government*	*40.64%*
3.	*Higher education*	*39.05%*
4.	*Private non-profit*	*11.65%*

Source: UNESCO Institute for Statistics, 2010.

3. Patents and licenses

- Royalty and license fees payments (per capita)
- Royalty and license fees receipts (per capita)

Once a certificate is issued by the Kenya Industrial Property Institute, it is not possible to tell what royalties or license fees accrue to the person or groups of persons who obtain the license.

- IP filing activity originating in the country
- Number of IP applications and grants

From the KIPI register, the number of patent applications between 2013 and 2017 were 1,308. Of these 253 were granted. The number of utility models applied for over the same duration were 746 and of these 193 were granted.

- Success rate of IP applications from locally-based individuals / companies (ratio of IP grants to the number of applications)

This is hard to determine because there are pending applications. Further, until 2018 there was a legal requirement that there be an 18-month period between the application for the granting of an IP and its publication.

4. Scientific production

- Number of publications included in Scopus and Web of Science databases:

H. Index	*Documents*	*Citations*	*Citations per Document*
216	*31,237*	*558,837*	*17.89*

- Scientific publications rated among the top 10% most cited: **No data**
- Number of scientific and technical journal articles: **29,535**

Source: http://www.scimagojr.com/countryrank.php 1996-2016

5. Research capacity

- Number of researchers per million of inhabitants

As at 2010, the number of researchers per million is 225.029.

Source: UNESCO Institute for Statistics, 2010.

II. Context and structure of the National Innovation System

Business Environment

1. Business structure and business financing system

1.1. Industrial structure

- Share of large firms and mature SMEs in the total number of enterprises
  No data
- Share of technology-based high-growth companies in the total number of enterprises:
  No data
- Size of the informal sector in the economy
  Large

Kenya's informal sector is large and dynamic with 95% of the country's businesses and entrepreneurs falling under the informal category.

Source: World Bank's Enterprise Surveys www.enterprisesurveys.org

1.2. Firms' capacity for innovation creation and absorption

- Innovation capacity of national firms
  High

Firm-level innovation rates in Kenya are relatively high. According to the enterprises survey of 2010-2012, 53% of firms introduced either a product or a process innovation during the period (available at: https://www.enterprisesurveys.org/~/media/GIAWB/EnterpriseSurveys/Documents/ResearchPapers/Firm-Level-Innovation-and-Productivity-in-Kenya-2016.pdf). While the 2012 national innovation survey, carried out by the MoEST, indicated an overall innovation intensity of 89.9%.

Source: The Kenya Innovation Survey Report 2012.

1.3. Level of development of banking and venture capital

- Availability of financing through the local equity market
  Medium

According to the world economic Forum Global Competitive Index, Kenyan's availability of financing through local equity was ranked at 4.41 in comparison to a world median of 3.60.
Parameters being 1-7.

Source: https://tcdata360.worldbank.org/indicators/haf3e424e?country=KEN&indicator=525&countries=BRA&viz=line_chart&years=2007,2017; Also noted in THE REPORT Kenya 2016.

The capital markets industry in Kenya has come a long way and gained substantial traction among corporates seeking to raise capital. In 2014, the exchange saw KSh6.1bn ($67.1m) in additional equity issues and KSh19.84bn ($218.2m) in corporate debt from various listed companies, as well as three new listings on its Growth Enterprise Market Segment (GEMS). This shows Kenyan companies are gradually opting to raise capital for their various initiatives through the capital markets.

Note: The Growth Enterprise Market Segments (GEMS) was launched in 2013 to provide more options for SME finance. The GEMS operates under listing requirements that are tailored to SMEs.

- Availability of venture capital
  Low

Venture funds in Kenya are more specialized than private equity firms and there is less capital available vis-à-vis private equity. Firms operating in the early stage technology and VC space in Kenya include VC funds as well as accelerators.

Source: http://documents.worldbank.org/curated/en/820451538402840587/pdf/WPS8598.pdf

- Affordability of loans for enterprises
  Low

Cost of credit for SMEs remains high; the large majority of SME loans are overdrafts; this exposes SMEs to interest rate and liquidity risks, particularly if overdrafts are used to finance longer term investments.

Source:
https://www.centralbank.go.ke/images/docs/Bank%20Supervision%20Reports/BankFinancingSMEsKenya.pdf

- Ease of access to loans
- Share of SMEs that have secured a loan

The total SME lending portfolio in December 2013 was estimated to be KSh332 billion, representing 23.4% of the banks' total loan portfolio. The SME portfolio grew fast in absolute values but also as a percentage of total lending: in 2009 and 2011 the total SME portfolio was estimated to be KSh133 and KSh225 billion, respectively, representing 19.5% and 20.9% of total lending. These figures show that in the context of the general growth of the financial sector, SME financing is growing at a relatively fast rate, and is thereby representing a growing share of the commercial banks' portfolios.

Source:
https://www.centralbank.go.ke/images/docs/Bank%20Supervision%20Reports/BankFinancingSMEsKenya.pdf

- Share of low-interest loans for SMEs within the total number of loans for SMEs

Across all types of financial Institutions, our survey finds that the average annual interest rate is 20.6% for microenterprises, 18.5% for small enterprises, 17.4% for medium enterprises and 15.3% for large enterprises. There are differences, however, depending on bank size and ownership. Mid-sized banks appear to offer the lowest interest rates to micro, small and medium enterprises, whereas small banks appear to offer lower interest rates to what they define as large firms.

Source:
https://www.centralbank.go.ke/images/docs/Bank%20Supervision%20Reports/BankFinancingSMEsKenya.pdf

- Stability of the banking system

The Kenyan banking sector registered improved financial strength evidenced by an increase in total assets between 2016 and 2017 supported by growth in investment in government securities. Over the same period, banking sector capital and reserves registered a 7.81% increase attributable to additional capital injections as well as retained earnings from the profits realized.

The capital adequacy ratio stood at 18.8% in 2017, well above the regulatory requirement of 14.5%. Similarly, average liquidity ratio in 2017 stood at 43.7% which was well above the minimum regulatory liquidity ratio of 20%. The banking sector remained profitable by posting a profit before tax of Ksh.133.2 billion in 2017.

Source:
https://www.centralbank.go.ke/uploads/banking_sector_annual_reports/873911276_2017%20Annual%20Report.pdf

- Availability of financial services

According to the 2016 FinAccess household survey Frequency of use of Financial Services demonstrate the availability of finance service for use, %:

Service/Product	***Daily***	***Weekly***	***Monthly***	***< Month***
Mobile financial Services	*12.4*	*35.4*	*38.4*	*13.8*
Mobile Bank Account	*5.7*	*31.0*	*47.3*	*16*
Informal Mechanism	*3.9*	*36.0*	*54.8*	*5.3*
Sacco	*3.0*	*9.1*	*67.5*	*20.4*
Bank Account	*1.8*	*16.2*	*59.5*	*22.5*
Micro-finance Institution	*1.1*	*15.3*	*71.0*	*12.5*

Source: http://fsdkenya.org/publication/finaccess2016/

- Affordability of financial services

According to a study on transparency and cost of leading banking services sold in Kenya, Kenya has experienced tremendous improvements in access to financial services over the last few years. However, little is known about the trends in affordability of financial services, especially for low-income earners. Policy interventions to address the cost of financial services have mostly focused on the lending side, with widespread acknowledgement that the level of interest rates in Kenya is high. The recent launch of a “cost of credit calculator” by the Kenya Bankers’ Association (KBA) represents a very important step

to increase transparency in bank lending. The deposit side, however, has received little attention, with data on the comparable cost of opening and operating a bank account remaining unavailable. Bank account usage is still low and evidence suggests that informal instruments are still widely used to manage savings and day-to-day financial needs. Part of the reason has been attributed to cost of formal services. All too often, bank accounts are used for a single specific function such as receiving a payment. In 2016, only 6.1% of Kenyans cited banks as their most important financial instrument for everyday use, down from 7% in 2013. The study also found that the costs of financial services are extremely diverse, depending on the bank and the type of accounts chosen.

1. The funds required to open a bank account varied from KSh155 to KSh5,660 (averaging KSh1,322), mostly because of some bank's minimum opening balance requirements.
2. The annual cost for running a bank account (including withdrawals, money transfers and account maintenance fees) is extremely diverse running from KSh3,629 to KSh13,460 annually.
3. Closing a bank account ranges from KSh495 to KSh1,815, averaging KSh1,002

Source:
http://s3-eu-central-1.amazonaws.com/fsd-circle/wp-content/uploads/2017/08/30105200/17-08-30_Price-of-being-banked-report.pdf

Firm behaviour

2.1. Managerial Talent

- Share of higher education students studying in areas of business, administration and law
- Quality of management schools

No data

2.2. Time horizon and risk tolerance of firms

- Share of capital investment in companies' expenditures:
- Share of R&D investment in companies' expenditures:
- Risk tolerance of firms:

No data

2.3. Adoption of ICT in firms

- Corporate investment spending in hardware, software, and telecommunications as share of overall capital investment:

Total ICT Spending (USD M) by Technology 2015:

	2015
IT Services	209.04
Software	132.4
Hardware	1192.11

Source: http://icta.go.ke/pdf/Julisha%20Final%20Report%201.pdf

Cultural factors

3.1. Demand for innovation

- Final consumption expenditure of households
- Secondary education enrolment rate and tertiary education enrolment rate (as proxies to receptiveness to innovative products and services)

	2009
Secondary education enrolment rate	57.84%

	2016
Tertiary education enrolment rate	11.66%

Source: UNESCO Institute for Statistics.

- Population receptiveness to innovative products and services
- Innovation-intensive pockets within industries already exist

No data

3.2. Social attitudes to risk taking and entrepreneurship

- Success and failure rates of new start-ups
- Societal acceptance of business failure and entrepreneurship-related risk

No data

3.3. Social attitudes towards Science and Technology

- Secondary education enrolment rate and tertiary education enrolment rate (as proxies for attitude of the population to science and technology)

As mentioned above, the secondary education enrolment rate is 57.84%, and the tertiary education enrolment rate is 11.66%.

- Quality of math and science education at all levels - as a proxy for attitude of the population to science and technology

No data

- Societal acceptance of technology and its impact

No data

III. Trade, Tax, and Regulatory Environment

Long-term structural economic factors influencing the innovation system

1.1. Specialization of industry

- Contribution of high-tech, medium-tech and low-tech sectors to the trade balance
  No data

- Manufacturing trade as percentage of GDP: **17.5%** (Source: www.statista.com)

- High-technology exports as percentage of manufacturing exports

High-technology exports (% of manufactured exports) in Kenya was reported at 3.7586% in 2013, according to the World Bank collection of development indicators, compiled from officially recognized sources.

- Capital goods imports as share of overall imports

Import volume index, capital goods in Kenya was reported at 534 in 2010, according to the World Bank collection of development indicators, compiled from officially recognized sources.

- Capital goods exports as share of overall exports

Exports of goods and services (% of GDP) in Kenya was reported at 14.57% in 2016, according to the World Bank collection of development indicators, compiled from officially recognized sources.

Note: There is no distinct data on capital goods export. Thus, exports of goods and services represent the value of all goods and other market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services.

1.2. Foreign Direct Investment (FDI)

- FDI outflow as percentage of GDP

In 2017, net FDI outflows (% of GDP) for Kenya was 0.3%.

Source: https://knoema.com/atlas/Kenya/topics/Economy/Balance-of-Payments-Capital-and-financial-account/Net-FDI-outflows-percent-of-GDP

- FDI inflow as percentage of GDP

In 2017, net FDI inflows (% of GDP) for Kenya was 0.8%.

Source: https://knoema.com/atlas/Kenya/topics/Economy/Balance-of-Payments-Capital-and-financial-account/Net-FDI-inflows-percent-of-GDP

1.3. Knowledge intensity of the economy

- Share of knowledge-intensive industries and services in the value added in the business sector (GDP-by-industry)
- Knowledge-intensive services exports as share of overall exports
  No data

1.4. Hotspots in key technologies

- There are key technology sectors or regions specializing in technological industries that emerge as hotbeds of innovation: **Yes**

1.5. Communication and ICT infrastructure

- Internet subscribers per 100 inhabitants: **14.8%**
- Share of households with Internet access at home: **47.6%**
- Computers per 100 inhabitants: **2.7**
- Fixed-broadband internet penetration (subscribers per 100 inhabitants): **8%**
- Internet access tariffs (20 hours per month), as percentage of per capita income
  Fixed broadband Internet access tariff ($ per month) **$37.90**

Source: Kenya ICT Board, M & E Survey Results (2013).

- Percentage of localities with public Internet access centers by number of inhabitants (rural/urban)

Access to Internet services is limited throughout Kenya and differences in access between rural and urban areas are high. While in most urban areas the rate of access is above 25.7%, in some rural areas it is less than 6.5%.

Regulatory Environment

2.1. Antitrust and competition policy

- Competition and anti-trust laws at national level are modernized and comparable to world standards

Yes, this is captured in the competition act 2010 and in the constitution of Kenya 2010 (available at: https://www.cak.go.ke/images/Competition_Act_No._12_of_2010.pdf, CAP 31). The constitution and the competition act of 2010 were developed after benchmarking with other countries across the globe.

- Competition is strong within the economy and there are not many monopolized market segments
- Anti-monopoly policy is effective

Yes, the competition law prohibits restrictive trade practice. (can be accessed at: https://www.cak.go.ke/images/Competition_Act_No._12_of_2010.pdf, CAP 31).

2.2. Ease of starting a business and ease of doing business

- Ease of starting business

Medium: according to World Bank ease of doing business report that acknowledged reforms made in Kenya.

- Ease of doing business

Medium: Kenya is ranked number 80 according to the World Bank report on ease of doing business for 2018.

2.3. Ease of closing business, resolving insolvency and laying off workers

- Entrepreneurs do not have to struggle with excessive bureaucratic requirements when downsizing or closing business

Yes. The procedures for down-sizing or closing down business are clearly outlined in the companies Act 2015. This can be accessed at http://kenyalaw.org/kenyalawblog/dissolution-and-restoration-of-a-company/. According to the Ease of Doing Business flagship Report (World Bank, 2017), Kenya scores 43.39%, which is about 13% higher than the average score of 30.16% for Sub Saharan Africa. Kenya is ranks higher scores compared to other countries such as Uganda (39.4%) and Tanzania (41.04%).

- Business does not have to meet excessive criteria or provide excessive compensations when laying off workers or making collective redundancies

Yes, the procedures are outlined in the Kenyan Employment Act 2007 which can be accessed at http://www.kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/EmploymentAct_Cap226-No11of2007_01.pdf or https://www.corporatestaffing.co.ke/2017/02/kenya-labour-law-on-redundancy/

- Investors can obtain reasonable capital recovery rates when a business goes bankrupt

Yes.

- The insolvency regime allows for companies facing temporary distress to restructure in order to avoid liquidation

Yes, when a business goes bankrupt, investors are able to recover reasonable capital and the insolvency regime allows for companies facing temporary distress to restructure in order to avoid liquidation. This is outlined in the Kenya insolvency Act 2015 which can be accessed at http://kenyalaw.org/kl/fileadmin/pdfdownloads/Acts/Insolvency_Act18of2015_-_compressed.pdf or https://www.bmmusau.com/the-salient-features-of-the-kenya-insolvency-act-2015-from-a-practitioners-perspective/.

2.4. Transparency, anti-corruption and the rule of law

- There are objective criteria on the basis of which firms can receive government services, such as permits, subsidies, grants and quality certificates

Yes, there are objective criteria on how firms receive innovation-related government services. The criteria are outlined in the trade licensing act cap 497. More details can be found in this handbook; Doing Business in Kenya - A Handbook for Local Investors.

2.5. Tax policies

- Tax support for business R&D (allowances, credits or other forms) is available in the country

Yes. The country's tax policies support business R&D. Expenditure on R&D such as scientific research expenditure is an allowable deduction and hence it is a benefit to the taxpayer thereby supporting R&D. More allowable deductions are in the Income Tax Act. Refer to the Second Schedule on Deductions in Respect of Capital Expenditure in the attached Income Tax Act. More information on tax support availability can be accessed at http://invest.go.ke/kenya-mulls-tax-incentives-attract-research-funding/.

- Rate of corporate tax in the country

Medium, compared to world-wide average.
In Kenya, the corporate tax rate is 30%. The corporate tax rate for branches and non-resident entities is 37.5%. While corporate tax for Uganda is 30.00%, South Africa is 28%, United Kingdom is 19.00%, Thailand is 20.00%, Switzerland is 18.00%, United Arab Emirates is 55.00%, Liechtenstein is 12.50%. OECD Countries average for 2018 is 23.50%. North America average for 2018 is 26.75%. Europe average for 2018 is 19.48%.
This information is available at: https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html.

2.6. Intellectual property protection regime

- There are laws on patents

Yes. Kenya Industrial Property Institute (KIPI) is responsible for patenting in Kenya. The patent laws are available at: http://www.kipi.go.ke/index.php/the-community.

- There are laws on utility models

Yes. Kenya Industrial Property Institute manages utility models. Laws on utility models are available at KIPI website: http://www.kipi.go.ke/index.php/utility-models.

- There are laws on industrial design

Yes. There are laws that govern industrial design and KIPI is responsible as captured in the industrial property act No. 3 of 2001 which was revised in 2016.

- There are laws on trademarks

Yes. Laws on trade-marks are published in the KIPI website and further enshrined in the industrial property act No. 3 of 2001 which was revised in 2016.

- There are laws on copyright and related rights

Yes. There is the copyright act which was revised in 2012 and 2014, the act is available at: www.wipo.int/edocs/lexdocs/laws/en/ke/ke026en.pdf.

- There are laws on trade secrets

Yes. The law on trade secrets is available in "Trade Descriptions Act" and can be accessed at: http://www.kenyalaw.org/lex/actview.xql?actid=CAP.%20505, also the use of precedents applies, i.e. common law.

- There are laws on plant varieties

Yes. The law on plant varieties is captured as Seeds and plant varieties ACT. Chapter 326. This can be accessed at http://kenyalaw.org/lex/sublegview.xql?subleg=CAP.%20326.

- The national IP office has an independent legal status and enjoys autonomy from the government

There is a semi-autonomous government parastatal referred to as the Kenya Industrial Property Institute, KIPI.

- The national IP office has regional coverage (i.e. is not operating only in the capital)

No, but there is currently an initiative to have KIPI branches in major industrial towns in Kenya.

- The national IP office is appropriately staffed in terms of number of staff and qualifications of staff

Yes. Employee details are outlined in the website of Kenya Industrial Property Institute: http://www.kipi.go.ke/index.php/about/118.

- The national IP office can perform both formal and substantive examination of patent applications

Yes. The national IP office under the Kenya Industrial Property Institute is mandated and staffed to perform both formal and substantive examination of patent applications. Information is available at: http://www.kipi.go.ke/index.php/the-community and http://www.kipi.go.ke/index.php/about/118.

- The work of the national IP office is automated and modernized (i.e. there is no reliance on manual processing)

No. One of the requirements for application for patenting is the delivery of hardcopies of the patent application forms to the head office. Information is available at: http://www.kipi.go.ke/index.php/patent-forms.

- The mandate of the national IP office supports the enforcement of IP

Yes. One of the mandates of KIPI is to administer industrial property rights. Therefore, in extension they support the enforcement of IP.

- The mandate of the national IP office includes promotion of innovation

Yes. The mission statement of KIPI is “To grant Industrial Property Rights and promote innovation for social and economic development”. Therefore, KIPI is mandated to promote innovation activities in Kenya. The information is available at: http://www.kipi.go.ke/index.php/about.

- There is a national body competent to deal with the prosecution and management of IP rights (e.g. an IP Tribunal)

Yes. There is an industrial property tribunal under the Ministry of Industry, Trade and Cooperatives (the information can be accessed at: http://www.industrialization.go.ke/index.php/departments/state-department-for-investment-and-industry/58-industrial-property-tribunal).

2.7. Trade policy and FDI promotion

- The country has active trade agreements encouraging exports

Yes. The country has various trade agreements with other countries, for examples: Instrument of ratification trade agreement between Kenya and India 1981, Joint communique between Kenya and Djibouti 1980, Joint communique between Kenya and Egypt 1997, Ratification between Kenya and Rwanda 1986 and Trade between Kenya and Korea 1977. This information is available at: http://www.mfa.go.ke/trade-agreements/.

- The country has trade promotion policies and funding

Yes. There is a trade promotion policy "The National Trade Policy Document" which aims at transforming Kenya into a competitive export-led and efficient domestic economy. This policy is available at: http://www.trade.go.ke/sites/default/files/Kenya%20National%20Trade%20Policy%20%282016%29_0.pdf

- Public funding for FDI attraction is available

No. There is no public funding for FDI, however, there are policies that attract FDI and details are found in Government policy and Foreign investment in Kenya (available online at: http://includeplatform.net/wp-content/uploads/2014/12/KamauGovernmentPolicyAndForeignInvestmentInKenya.pdf)

2.8. Public procurement rules

- According to the applicable legislation, public procurement can be used strategically as a means of promoting innovation as a secondary objective

Yes. The link between public procurement and innovation is described in the long-term policy framework for public procurement in Kenya. It is available at: http://www.ppoa.go.ke/images/downloads/manuals/public_procurement_policy_-_draft_zero.pdf.

- There are plans or a strategy to introduce 'innovation' procurement in the country

Yes. The long-term policy framework for public procurement in Kenya has outlined these plans.

IV. Innovation policy environment

R&D and Technology

1.1. Government support for R&D

- Government funding for R&D in Universities and public research organizations (PROs)

In the 2017/2019 financial year were allocated $20 million for the infrastructural development of research institutions, additionally 57 research institutions received grants ranging from 5,000 and 20,000 dollars respectively during the ongoing financial year to enable researchers from the academia conduct research at Masters and Philosophy Degree (PhD) level.

The government through the National Research Fund intends to increase the expenditure on research and development funding from 0.48% to 2% of the Gross Domestic Product (GDP) as recommended in the NRF Science, Technology and Innovation Act 2013 to help promote productivity of new knowledge and technologies in the national innovation system.

- Direct government funding for Business R&D

Though there are avenues of government funding such as (Kenya National Innovation Agency) KENIA, it is inadequate.

Knowledge Flows

2.1. University-industry collaboration

- Number of world-class research-intensive universities in the country

One. According to the World Bank Report on The Making of World-Class Research Universities, the indicators of a World-class research-intensive university include the research output, i.e. the number of papers published and papers indexed in citation indexes and academic world ranking (http://documents.worldbank.org/curated/en/688061468337210820/pdf/646680PUB0acad00Box361543B00PUBLIC0.pdf). Based on the journals consortium ranking of 2015, only the University of Nairobi was ranked in the top 20 African Universities with a Total Influence Factor of 42.81 and a Research Publications and Citations score of 38.80.

- Are public universities encouraged and supported by the national or regional/ local governments to cooperate with industry

Yes. This happens through different ways including: establishment of a consultative process whereby the voice of different managers is considered in curriculum development so that university programs are in line with industry needs; establishing and supporting student internship programs; support for joint supervision of PhD students who are allowed to undertake their research in industries; offering scholarships to students who undertake their research in industries.

CUE report, 2015, indicated that government funds mostly science and technology related. For instance, in 2014/2015, Ksh53.8 billion were allocated purely for research and development in science & technological innovation with the 32 public universities and university colleges receiving Ksh.47 billion and the remaining amount injected into research institutions like NACOSTI. This was meant to promote research and technological innovations between universities and these bodies in the process of working towards achieving the vision 2030.

- Capacity building activities for knowledge transfer are organized:

Yes. This is ensured through the establishment of professional bodies such as the National Industrial Training Authority (NITA), Directorate of Industrial Linkages, Partnership and Collaborations (ILPC), Linking Industry with Academia (LIWA) among others to oversee the exercise.

- Level of development of university-industry cooperation

High. For instance, Linking Industry with Academia (LIWA) provides a platform and enables communication between academia and industry. It has developed a road map for government intervention through SSACs. LIWA promotes industry-based research to solve socioeconomic issues in

our society and scientific research to fuel innovation and development. This body through the SSACs committee guides and maintains oversight of skills development, development of occupational standards and curriculum, assessment of tools and centres, certification, work integrated learning standards and train the trainer programs in their respective occupation (https://www.liwwaprogrammetrust.org).

Through National Industrial Training Authority (NITA), the industries collaborate with universities to provide internship positions to students where they apply practical skills learnt at their institutions. The industrial attachment is a mandatory exercise for any professional degree programme (https://www.nita.go.ke).

After the training, these industries recruit these skilled graduates. University-based student associations and clubs, e.g. in technology, engineering, entrepreneurship etc., work closely together with professionals' bodies which allow students from different institutions to participate in workshops, seminars, and competitions. Industries enter into agreements with universities to set up learning resources in universities to aid in promoting training of practical skills. For instance, CISCO, IBM, Safaricom among others have been seen establishing training laboratories in universities.

2.2. Technology Diffusion and Adoption Systems

- There programs for firms encouraging them to adopt certain technologies.

Yes. The government initiated an e-governance system, which is an integrated system to support all government agencies in different aspects of operation. For example it is a requirement for all government institutions to use IFMIS for financial management, a software for integrated financial management.

Human Capital

3.1. Skills training

- Private sector investment in skills training as a share of GDP: **No data**
- Support is offered to disadvantaged persons to access skills training: **Yes**
- Youth apprenticeship programs exist: **Yes**
- Tax credits for company investments in workforce development are available: **No**
- There are higher education institutions that provide short-cycle degrees focused on skills training: **Yes**
- Specialized training services are available at local level: **Yes**
  Yes

3.5. Lifelong learning

- Share of the population aged 25 to 64 participating in education and training: **No data**
- Incentives for lifelong learning are offered: **No**
- Diverse opportunities for lifelong learning are available: Y**es**

Structure and specificity of the higher education system

4.1. Participation in Higher Education

- Enrolment rate in tertiary education

	2016
Tertiary education enrolment rate	11.66%

Source: UNESCO Institute for Statistics.

- Share of the population with tertiary education

Share of student population in public universities is based on infrastructural facilities and the number of courses offered in those institutions. According to KUCCPS data, universities which are highly developed in terms of infrastructure offer many courses and in turn receive more students compared with universities with insufficient infrastructure (https://kuccps.net/).

A study on graduate employability commissioned by the British Council in four African countries in 2016 showed that most students favoured public universities because of their perceived reputation, long history of training and performance of past students in the job market (https://kuccps.net/).

According to the statistics from the Kenya Universities and Colleges Central Placement Service (KUCCPS), universities that offered elite courses such as engineering, pharmacy, law, computer science and architecture among others attracted most students (https://kuccps.net/).

Also, according to KUCCPS, the institutions' grounding on research, extracurricular facilities such as sports and drama, links with other international organisations and foreign universities, students' freedom, hostels, accredited programmes by regulatory bodies (the Commission for University Education) and the marketability of courses offered determine the share of students received (https://kuccps.net/).

Between April and August 2018, KUCCPS placed 28,866 students into TVET which is much lower than those placed in Universities.

Data by KUCCPS shows the 10 most preferred technical institutes, which achieved almost 100 per cent enrolment are Bondo Technical training institute, which received 260 students, Coast institute of technology (747 students) and the East Africa School of Aviation (380 students). Others are Eldoret Polytechnic (1,563), Kenya Institute of Highway and Building Technology (283), the Kenya Institute of Mass Communication (90), Kenya School of Revenue Administration (200), Kenya Wildlife Service Training Institute (485) and the Nairobi Technical Training Institute (1,140 students).

4.2. Diversity, concentration and specialization in the Higher Education sector

- Private HEIs exist

Yes. According to CPS International (2018), in the research article "The state of research funding In Kenyan universities", the country has 18 private chartered universities (www.cps-research.com).

- Enrolment is divided between many universities (as opposed to concentrated in one major university while the others serve much smaller percentages of enrolled students)

Yes. Kenya Universities and Colleges Central Placement Service (KUCCPS) places all students who attains the minimum university entry requirement of C+ to various universities in Kenya based on their capacity. For instance, 62,851 students who had attained grade C+ and above in 2017 were successfully placed with JKUT receiving 4866 students, KU – 4667, Kisii – 1793, etc. However, Bundi (2017) observed that during the university students' enrollment in 2016/17 academic year, top ranked universities in Kenya had more students' applications compared to poorly ranked universities. For example, Mt. Kenya University (MKU) had over 15,000 students wishing to join it compared to Tangaza University which had less than 2,000 applications for the same period of time. This determined the share of student allocation.

- Share of universities performing excellent research

About 20% of Kenyan universities perform excellent research. This is based on research funding to the universities in which only 14 universities (9 public and 5 private) receive at least 1% of the research funds. This funding is based on the research activities the universities are undertaking (CPS, 2018) (Source: www.cps-research.com)

- There are universities focused primarily on teaching rather than research, while other universities typically characterized as research-intensive

Yes. Based on the number of publications, citations and academic journal referrals for each university, only 7 universities in Kenya had an index of more than 1% while the rest had less than 1% (CPS, 2018). This implies that there are those focused more on research which are few compared to those which might be focusing on teaching despite the requirement for universities to be research institutions.

- Research funding is concentrated into those HEIs that perform research (as opposed to being thinly spread among many or all universities)

Yes. Based on research funding to the universities, only 14 universities (9 public and 5 private) received at least 1% of the research funds. This funding is based on the research activities the universities are undertaking (CPS, 2018). For example, the UON had the highest number of publications, citations and academic journal referrals (39.7%) and received the highest share of research fund (17.72%).

4.3. Funding of HEI

- Public investment in Higher Education (as percentage of GDP): **No data**

- Funding for Higher Education is performance-based

Yes. Funding is based on the infrastructural development and number of students in the university. Universities with insufficient infrastructure will receive more development capitation funds than universities which have sufficient infrastructure. On the other hand, universities with large number of students receive more capitation than those with few students. In addition, research grants are given to universities which intensively participate in research activities.

- Performance contracts/ agreements are used to monitor university performance

Yes, as stipulated in the University amendment ACT, 2016. University councils sign annual performance contracts with the Ministry of Education as detailed in the performance contracting guidelines for instance for the year 2017/2018 (http://www.cohesionandvalues.go.ke/wp-content/uploads/2015/10/Performance-Contracting-Guidelines-for-MDAs-for-2017-2018-Financial-Year.pdf).

- Performance contracts/agreements are linked to funding

Yes. During performance contracting specific outcomes are expected. This requires the identification and implementation of particular activities which require funding. The many the activities approved, the higher the funding and vice-versa.
Source: http://www.cohesionandvalues.go.ke/wp-content/uploads/2015/10/Performance-Contracting-Guidelines-for-MDAs-for-2017-2018-Financial-Year.pdf

- Industry funding for universities is allowed by law

Yes, as stipulated in the University Amendments Act, 2016. Universities, during the development of performance contracts, can plan to partner with industry and capture that as one of the outcomes expected. Therefore, they can be funded to realize the proposed linkage with industry.

- Industry funding represents a substantial part of university funding

No. A substantial amount of funding from universities is from government capitation and research grants.

- Enrolment fees are payable by students

Yes, but on a cost-sharing basis.

- In Kenya HELB, a government loan scheme provides about 35% of university student financing (http://siteresources.worldbank.org/MENAEXT/Resources/Financing_Higher_Education_Middle_East_Chapter4_English_pdf)
- Government scholarships are awarded to increase access to university education (policy framework for university education-2012 http://kemi.ac.ke/)
- In addition, students receive bursaries from private sectors such as banks, constituency development Funds (CDF). This increases chances of children from poor backgrounds to access higher education.

- International funding represents a substantial part of university funding

No. However, universities receive international funding through research grants and scholarships. Universities that collaborated with International organizations attracted more funding (CPS, 2018).

4.4. Integration of knowledge transfer with core university missions

- Knowledge transfer is part of the mission and core strategy of public universities

Yes. Knowledge transfer is part of Kenyan universities' core mission. This is achieved through: educating people i.e. training skilled undergraduates, graduates and post docs; increasing the stock of codified useful knowledge through publications, patents and prototypes; problem solving through contract research, cooperative research with industry, technology licensing; providing public space through forming and accessing network, stimulating social interaction, influencing the direction of

research process, meetings and conferences, hosting standard setting forums, establishment of entrepreneurship centers and promoting alumni networks and personnel exchanges.

- There is public funding dedicated to knowledge exchange and knowledge transfer

Yes. The funding and managing innovations and knowledge transfers by the government still poses challenges. However, the establishment of innovation fund and a national innovation agency is aimed at creating structures to ensure a well-coordinated system (http://www.innovationagency.go.ke/).

- Applied sciences degrees are offered

Yes. According to CUE report (2015), all public universities in Kenya offer course/courses in applied sciences (http://www.cue.or.ke/index.php/approved-academic-programmes).

4.5. University governance

- Prevalent governance model in the university system

a) centrally-driven, state-controlled universities
Centrally driven but with checks from different state agencies such as CUE

b) universities are managed as profit-oriented corporate institutions
No for Public universities and Yes for private universities

c) academic-driven governance at universities: power for academic staff and academic interests
Deans of faculties and HODs are appointed based on the academic programmes offered at the university

d) trustee governance (Board of Trustees)
There exists body of trustees in every university, normally referred to University Councils (University Act, 2012).

e) Representational governance (governance is vested in a wide array of stakeholders, such as students, academic staff, alumni, corporate partners, government, and civil society).
Yes. In the Senate meetings, students and academic staff members are represented. In disciplinary committee meetings, students are represented as well as the teaching staff members of the department involved.

- Universities have autonomy from the state in academic matters

Yes. Universities design their own academic programmes, train students and confer them with requisite diplomas and degrees. However, the academic programmes must be approved by CUE (http://www.cue.or.ke/index.php/approved-academic-programmes).

- Universities have autonomy from the state in financial matters

Yes, but the expenditure should adhere to strict financial management austerity measures set by the national government. Additionally, the Auditor General's office audits all public Universities on their expenditure (http://www.oagkenya.go.ke/index.php/about-us/mandate).

- Universities have organizational autonomy from the state

Organizational structure is partly defined by the state. For example, each university has a chancellor and vice-chancellor both appointed by the Cabinet Secretary of the Ministry of Education. Each must have the university council and the senate as per the Universities act of 2012. Other organizational hierarchies are determined by the universities.

- Universities have autonomy with regard to staffing decisions

Yes. Universities advertise, interview and recruit staff based on their needs. However, the recruitment should be in line with CUE guidelines and within the capitation level, since it is the government that will provide funds for the staff salaries (http://www.cue.or.ke/index.php/status-of-universities-universities-authorized-to-operate-in-kenya-1?download=86:appointment-promotion-criteria-universities-2014).

- University missions are clearly stated and differentiated in terms of the goals that the institutions seek to achieve

Yes. There is a requirement for universities to design their strategic plans in which the vision, mission, goals and core values of the university are clearly stated.

- Universities in the country have strong management and strategic planning

Yes. Universities have management organs such as the university council, senate, deans' committees etc., all of which work to ensure the university programmes run efficiently. Universities are required to have strategic plans that guide their operations. Additionally, performance contracting guidelines require Universities to develop plans for the year (http://www.cohesionandvalues.go.ke/wp-content/uploads/2015/10/Performance-Contracting-Guidelines-for-MDAs-for-2017-2018-Financial-Year.pdf).

- Universities in the country are accountable to a variety of stakeholders other than the government (civil society, students, etc.) with regard to their

  a) academic output: **Yes**
  CUE monitors quality of staff, quality of academic programmes in universities and the quality of academic output.

  b) social impact: **Yes**
  This is the reason why Universities engage in Corporate Social Responsibility initiatives such as cleaning, medical camps etc. Additionally, Universities have community outreach department that coordinate how universities work with the community.

  c) financial management: **Yes**
  University books of accounts are audited on an annual basis by the Auditor General's office.

- Stakeholders other than the government have a say in university governance

Yes: students through Student bodies, teaching staff members through the deans of faculties and University Staff Unions.

4.6. Strength of entrepreneurship education

- Share of universities that offer courses on entrepreneurship or creativity

100%. All universities offer courses on entrepreneurship and creativity. This has of late been a focus of the government to encourage and support coursed on entrepreneurship and creativity (http://www.cue.or.ke/index.php/approved-academic-programmes).

Structure of the National Innovation System

5.1. Quality of public research organizations (PROs)

- PROs have substantial publishing activity
  Yes
- PROs regularly engage with industry
  Yes
- Financing of PROs is adequate

It is not adequate. The funds availed are disbursed through the following institutions: Government; Youth development fund; Women development fund; National Commission for Science, Technology and Innovation and Kenya National Research Fund.

- There is professionalized management at PROs

Yes. Professional management at PROs is exercised by the following institutions: ST&I – Science Technology and Innovations; NACOSTI – National Commission for Science, Technology and Innovation; NRF – National Research Fund; KENIA – Kenya National Innovation Agency.

- There is entrepreneurial culture within PROs

Yes. There are some institutions that enhance the entrepreneurial culture by offering entrepreneurship training, financial and advisory support to the students. This is further complemented by various agencies and non-governmental institutions developed to promote youth entrepreneurship. These include: https://youthvillage.co.ke/institutions-promote-youth-entrepreneurship-kenya/.

5.2. Research funding

- There is an independent and professional research funding agency in the country

Yes. National Research Fund (NRF) facilitates research for the advancement of science, technology and innovation. It is in charge of funds for research and innovations in Kenya. Its mandate includes:

- Mobilize Resources
- Management and investment of the Mobilized Resources
- Promote Human capital Development
- Promote Development of Research Capacities
- Promote Multidisciplinary collaborations in ST&I
- Promote Development of ST&I Infrastructure
- Promote Dissemination of R&D Findings
- ME & R of funded projects

5.3. Existence of innovation bridging institutions and boundary spanning organisations

- Incubators: **Yes**
- Accelerators: **Yes**
- Technology and science parks: **Yes**
- Technology transfer offices: **Yes**
- Networks of companies: **Yes**
- Regional development agencies: **Yes**
- R&D units within universities: **Yes**

Examples of Incubators

1. **Chandaria Incubation and Innovation Center**: It was launched in 2011 to support student innovations. Chandaria accommodates seventy percent of Kenyatta University students and thirty percent of students from other universities. The facility offers entrepreneurial training to students for a period of six months to one year. The program ignites entrepreneurial culture among students. It aims at fully supporting one hundred and twenty start-ups per year. The programme is facilitated by Manu Chandria Foundation and Youth enterprise development. URL: http://www.ku.ac.ke/chandaria-biic/.

2. **iHub**: With its location in Kenya's mega city, Nairobi, iHub, a tech operational platform for techies aims at bringing together novice entrepreneurs, mobile software programmers, researchers, and tech designers to mould them into the world's tech savvy. URL: https://ihub.co.ke/.

3. **Nailab**: Targeted at IT startups, Nailab was launched in 2011. It provides entrepreneurs with critical information capital and other vital resources. Entrepreneurs meet there to develop and share ideas. Founded and owned by Sam Gichuru, Nailab has more than 40 companies. URL: http://nailab.co.ke/.

4. **EPZ Business Incubator**: It was established for SME exporters, desiring to accelerate their operational growth to Large exporters. Among the targeted sectors are Horticulture, Fresh products, Textiles, Commercial crafts, Jewellery and gift items. URL: https://www.epzakenya.com/index.php/investment-information/epz-business-incubator.html.

5. **StartUpAfrica**: It was started by a group of Kenyans in the United States who sought to create a platform that will avail opportunities to Kenyan youth. The unfortunate PEV of 2007/2008 hastened their resolve and StartUpAfrica was born. It offers training, incubation, mentoring and connections to emerging entrepreneurs. URL: http://startupafrica.org/.

6. **C4Dlab**: C4Dlab is an R&D and Startup Incubation hub at the University of Nairobi. The lab aims at contributing towards building the Silicon Savannah, leveraging on the large University community. URL: https://c4dlab.ac.ke/.

7. **LakeHub**: LakeHub is a tech hub, which is based in Kisumu. It is open for membership from anywhere in the world. URL: https://lakehub.co.ke/.

8. **SoteHub**: The Sote Hub idea was born from the Sote ICT project which started in 2010, implementing holistic approach that combines ICT integration and training with business skills at 12 schools in Taita Taveta, reaching out to over 6000 students. Once they graduate, they can start

business or receive further career training at SoteHub, which was the first rural based business incubator in Kenya. URL: http://www.sotehub.com/.

Examples of Accelerators

1. AkiraChix – URL: http://akirachix.com/
2. TUMI Startup Accelerator – URL: https://tumiaccelerator.c4dlab.ac.ke/
3. ygap accelerator – URL: https://ygap.org/kenya/
4. Kenya Shelter Tech Accelerator Kenya – URL: https://www.pangeaa.com/entrepreneurs/
5. e4Impact Accelerator – URL: http://e4impact.org/accelerator/#
6. 88mph Garage – URL: http://www.88mph.ac/nairobi/

Examples of Technology and Science Parks

1. **Nairobi Industrial and Technology Park** (NITP) is a JKUAT /GoK/ Private Sector initiative. It provides a location in which the government, private sector and universities cooperate to foster collaboration and innovation.
2. **Konza Technopolis Park** in Malili, Machakos is an ambitious project under construction that will include a science and technology park spearheaded by the Ministry of Science and Technology, a Business Processing and Outsourcing (BPO) park among other facilities

Examples of Regional Development Authorities based in Kenya

1. Tana and Athi Rivers Development
2. Lake Basin Development Authority
3. Kerio Valley Development Authority
4. Ewaso Ng'iro South Development Authority
5. Ewaso Ng'iro North Development Authority
6. Coast Development Authority

5.4. Research ethics

- Research ethics and responsibility are discussed within the public sphere and within research circles

Yes. The National Commission for Science, Technology and Innovation (NACOSTI) has regulatory, coordination and advisory role. It regulates science, technology, research, and innovation sector. NACOSTI is the Kenyan National Ethics Committee ("NEC"). There are also Local Ethics Committees ("LECs"). Any research involving human participants must obtain approval from an Ethics Committee recognized by the NEC, i.e. an accredited-LEC, before a trial may commence. A list of accredited institutions can be found on the following link: https://www.nacosti.go.ke/research-license.

5.5. Involvement of stakeholders in the innovation system – users, grant making agencies, civil society organizations

- Channels, initiatives or innovation platforms/ networks exist for stakeholders and stakeholder organizations to become involved in innovation activities at the grassroots

Yes. The following are some of the major stakeholders of the Kenya National Innovation System:

- Universities and Colleges
- Research institutions
- Demand for science, technology and innovation
- Business system
- Intermediate organizations
- ST&I infrastructure framework conditions and governance systems

Policies and measures in support of innovation

6.1. Coordination of education, research and innovation policies

- An up-to-date government strategy/ overall policy on research and innovation exists:
  Yes

- There are policies, strategies and reform plans of international/ supranational institutions that affect research and innovation in the country
  Yes

- An up-to-date government strategy/ overall policy on higher education exists
  Yes

6.2. Reform and modernization of education and research

- There are ongoing or planned modernization reforms in the HE and research sector:
  Yes

Research and Innovation Legislations, Policies and Guidelines Environment in Kenya

1. Introduction

It is important to note that Kenya does not have a stand-alone policy on innovations, but rather a policy on Science, Technology and Innovations. Kenya is bound by regional and international instruments on Science Technology and Innovation. The country has a robust legislation, policy and strategies on HE that cover an array of areas including modernization training and research in the HEIs.

2. Legislations, Policies and Guidelines Environment

a) Science, Technology and innovation (ST&I) Act 2013

The ST&I Act of 2013 has established the ST&I institutional framework in Kenya, in a bid to complement the policy goals of Vision 2030. The ST&I Act 2013 facilitates the promotion, co-ordination and regulation of the progress of science, technology and innovation of the country. NRF while implementing its mandate under the Act, works closely with National Commission for Science, Technology and Innovation (NACOSTTI) and Kenya National Innovation Agency (KENIA) to ensure that sustainable national development is achieved.

b) The Universities Act, 2012

This is an act of parliament aimed at making better provisions for the advancement of university education in Kenya and for related purposes. National Research Fund (NRF) recognized that universities are key stakeholders in knowledge development and management. It therefore works to support the universities' efforts through continuously building their research and innovation capacity.

c) Public Financial Management Act, 2012

The PFM Act directs public officers to comply with laws relating to national government resources. It further states that every public officer employed in a national government state organ or public entity shall comply with the Constitution and all laws relating to the conduct of public officers when carrying out a responsibility or exercising a power under this Act. National Research Fund will observe prudent public financial management as advocated by this act and other relevant financial legislations such as Public Procurement and Asset Disposal Act, 2015.

d) NRF Strategic Plan 2017-2022

The NRF Strategic Plan outlines the strategic direction and objectives that ensures that the institution facilitates research advancement in national science, technology and innovation.

e) Kenya Vision 2030

The Kenya Vision 2030 recognizes the role of Science, Technology and Innovation in raising productivity and efficiency levels across economic, social and political pillars. Research and Development (R&D) plays a critical role in accelerating economic development, hence moving the country to the next level as a newly industrialized country. The National Research Fund will mobilize resources for advancement of scientific research and innovation as well as technical capabilities.

f) Medium Term Plan (MTP) II 2013 – 2017

The MTP II stipulates a numbers of priority areas that will be addressed through Science Technology and Innovation. One of the critical components to effect this is research through various initiatives such as: Public Private Partnerships (PPPs); linking industry with academia; value chain analysis; synergy and initiatives for closed cycle cluster approach for enhanced cooperation. These initiatives will harness availability of necessary technologies in all sectors of production as well as ensure quality of products, processes and services. National Research Fund (NRF) is expected to mobilize at least the equivalent of 2% of GDP annually from the Government, private sector and other sources to fund the entire ST&I value chain.

g) Industrialization Policy

The policy recognized the role of both public and private universities, research and tertiary institutions in identifying and undertaking research for commercialization by industry and technology transfer. The foundation should leverage on this recognition to strengthen its partnership with the industry.

h) Policy Framework for Science, Technology and Innovation

The policy outlines education and research as key determinants in Kenyan National Innovation system for the ability to create a knowledge-based economy. A pool of relevant and adequate skills must be

available for absorption into the economy. It is expected that National Research and Education Networks be strengthened to facilitate the sharing of research resources across the education and research system which is in tandem with the role of NRF.

i) Ministry of Education, Strategic Plan 2013 – 2017

Developing capacities in Science, Technology and Innovation is one of the strategic issues expected to be implemented within the 2013 – 2017 plan. The focus is on technologies and processes that enhance national competitiveness and facilitate the creation of quality jobs. In addition, the capacities of ST&I institutions will be enhanced through advanced training of personnel, improved infrastructure, equipment, and by strengthening linkages with actors in the productive sectors which form part of what NRF is expected to do.

j) National Education Sector Plan Volume iii, 2015/2016 – 2019/2020

Low levels of research and development due to inadequate funding is one of the issues affecting the ST&I sector. NRF through this strategic plan illustrates possible related actions of various stakeholders such as government, private sector, development partners and others in implementing strategic priorities in the entire sector. NRF will therefore support Develop ST&I processes and strategies that contribute to an improvement in the quality of life and overall social economic development as anticipated by the sector plan.

k) Purpose and Scope of the National Research Fund (NRF) Guidelines

The manual provides details of the policies and procedures adopted by the National Research Fund to fund and manage research activities in Kenya. The main purpose of this manual is to provide guidance and awareness of the funding policy requirements, considerations, guidelines/procedures and leading practices to the employees and stakeholders to enhance their efficiency and effectiveness in the NRF operations. The manual will help NRF auditors, reviewers and other stakeholders to appreciate the NRF's management philosophy of its research funding in Kenya. The manual provides guidance in the following areas:

- Categories and thematic areas of the NRF
- Funding Mechanisms and Eligibility
- Key Stakeholders for the NRF
- Guidelines for Accessing the NRF
- Research Grant Administration and Financial Management
- Post Research Activities
- Appendices

l) Overview of NRF's Operations

In line with global trends and consistent with the African Union (AU) positions, around 2005/2006 the Ministry of Education, Science and Technology initiated discussions to formulate Science, Technology and Innovation (ST&I) Policy and Strategy to elevate science and Technology as part of the foundation for national transformation embodied in the country's development blue print Kenya Vision 2030. A key goal of the ST&I policy was to secure adequate and sustainable funding for various Science, Technology and Innovation components that would facilitate cost effective implementation of the policy. To achieve this goal, the following initiatives were necessary:

- Development of mechanisms to mobilize financial resources from both public and private sector for ST&I;

- Development and promotion of a robust institutional framework for mobilization and management of ST&I resources for strategic national priorities;
- Support for establishment of a mechanism for regular review of the funding mechanisms in science, technology and innovation; and
- Review of administrative and financial procedures for ST&I funding to enhance realization of set targets.

While the development of science and technology is a prime responsibility of the Government and user organizations in centres of economic activities, it is necessary that a proper institutional framework be established with the role of harnessing and directing funds towards meeting the national ST&I goals. This need led to enactment of the Science Technology and Innovation (ST&I) Act of 2013. The ST&I Act No. 28, Section 32, of 2013 led to the establishment of a National Research Fund (NRF) with a mandate to mobilize, allocate and manage financial resources to facilitate an effective national innovation system that would create required knowledge and innovation in all fields of Science and Technology for the growing economy.

The Cabinet Secretary for Education, Science and Technology formally published a Legal Notice No. 129 in the Special Issue of Kenya Gazette Supplement No. 144 dated 19th November 2014 announcing the commencement of the establishment of NRF as provided in the ST&I Act of 2013. This led to the appointment of NRF Board of Trustees constituting of 9 members (Gazette dated 24th July, 2015). The Board was subsequently inaugurated on 10th November, 2015. The NRF secretariat of three officers was appointed in December, 2015. As established in Part VII of the ST&I Act, 2013, NRF will constitute money provided by Treasury amounting to 2% of the country's Gross Domestic Product every year, other money as may be designated by Parliament and other sums of money as may be received as donations, endowment or grants.

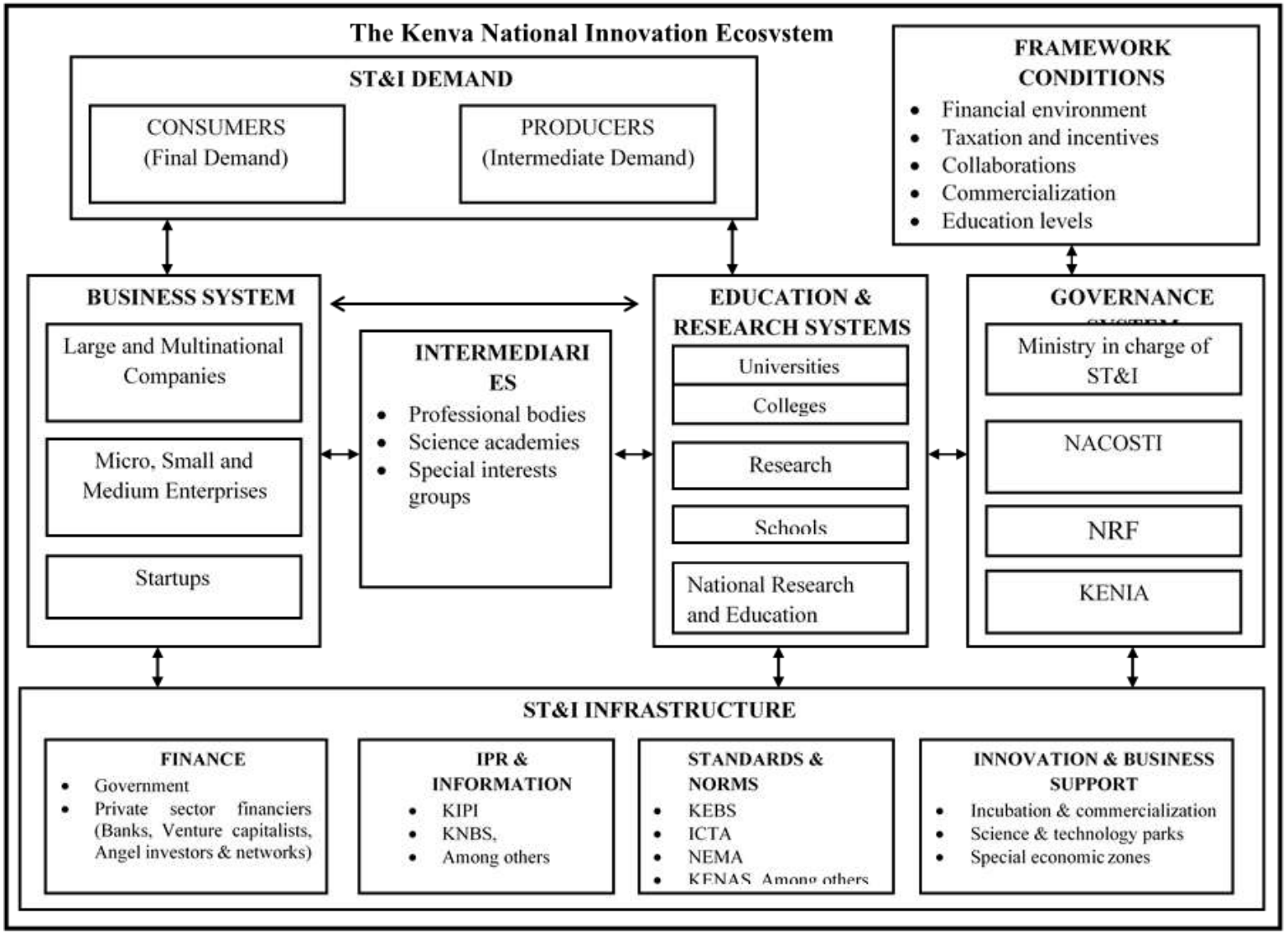
Since its inception, NRF has funded numerous researches in the following categories:

- Postgraduate Category (PhDs and Masters)
- Multidisciplinary Category (Collaborative Projects)
- Infrastructural Support Category

m) Amendments to the NRF Funding Guidelines and Criteria

All amendments to the NRF funding guidelines and criteria shall be subject to review and approval by the NRF Board of Trustees. Such amendments may involve a change or deletion to existing procedures or additions of new or previously omitted procedures. The amendments can be initiated internally by the NRF or externally by other stakeholders.

Structure of the Kenya National Innovation Ecosystem



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