Assessment of Knowledge Society Development in Kenya
June 2017

African Leadership in ICT (ALICT)

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Introduction

The Global E-Schools and Communities Initiative (Gesci), in collaboration with the African Union Commission (AUC) and other partners, developed an African Leaders in ICT (ALICT) capacity-building programme. The first phase of the programme ran from 2012-2013, focusing on leadership capacity-building in twelve countries (Botswana, Ethiopia, Kenya, Malawi, Mauritius, Mozambique, Namibia, Rwanda, South Africa, Tanzania, Uganda, and Zambia). A second phase of the programme ran between 2014 and 2016 and included four countries (Ghana, Ivory Coast, Morocco, and Senegal). ALICT has built the capacities of 487 mid and senior government leaders in 16 Anglophone and Francophone African countries, as well as officials from the AUC between 2012 to 2015. The Francophone version of the ALICT Programme is referred to as the Leadership Africain pour les TIC et le développement de la société du savoir (LATIC).

The course presented a multi-stakeholder approach for awareness-raising and capacity-building of African leaders around issues of Knowledge Society (KS), Information, Communication Technologies (ICT), Education, and Science Technology and Innovation (STI) in support of the AUC Action Plan and the EU-AU P8. Courses comprised of contextualized, modular content, founded upon country research and reflecting the identified needs of country governments.

The programme is currently under review to integrate leadership for sustainable development components in line with international frameworks and AU continental strategies for achieving 2030 sustainable development goals and objectives. The focus is on a continent-wide expansion of the programme through a wider access model.

Aims and Objectives of the study

To inform future development of the ALICT programme, it is important to understand where the participating countries are at in terms of developing a KS. Thus, Gesci commissioned Neil Butcher and Associates to prepare updates on the status of the KS in the 16 participating countries. Specifically, the focus was to update the situational and needs analysis of each country to keep abreast of developments since 2013 regarding the KS and its pillars of Education, STI, and ICT.

The specific objectives of the study were to:

- Update briefs of country KS pillars for the ALICT-LATIC Database.
- Update the ALICT KS country study database of the KS pillar status in each country, which involved:
  - Desk review of country KS documentation, identifying essential policies, strategies, plans, and papers on KS;
  - Review of KS pillar documentation sets related to Education, ICT, and STI; and
  - Identification of major actors, stakeholders, and partners and their role in KS pillar development.

Methodology

The report methodology involved a desk review of various government policy and strategy documents. Additionally, documents from development partners, research and academic papers, news articles, websites, and publications from various organizations were consulted. Further, data
from the 2013 report were included where relevant. A framework for the country reports was prepared, outlining what the various sections would cover. This was done to ensure uniformity in the type of information collected. The major areas and themes covered included policies and plans in ICT, Education, and STI. Additionally, socio-economic background information and indicators were reviewed to obtain an understanding of the context of each country. After receiving approval from Gesci for this framework, draft reports were prepared for each of the 16 countries. The reports were sent to Gesci for review and, based on feedback received, the reports were then finalized.

**Overview of theoretical model**

Modern economies are transforming from agricultural and industrial economies to information and knowledge-based economies. Such rapid transformation has had significant impact on social, economic, political, and cultural development across the world. For such development and growth, ICT is seen as both a driver and an enabler towards establishing and developing the various sectors in an economy that contribute to stronger, more developed, and richer societies. Africa is on a journey of transformation towards information and knowledge societies. During any such transformational journey, the leaders of a society and policy makers are likely to undergo a paradigm shift that involves developing their capacity and providing tools and direction for accepting relevant changes in mindset.

Dahlman (2011) defines a KS as a society that values the creation, dissemination, and effective use of knowledge, and has the institutions, infrastructure, norms, social interactions, and culture that support this. UNESCO (2005) describes a KS as one that is nurtured by its diversity and its capacities. It further argues that, in the increasingly knowledge-based world, it is critical to embrace knowledge and innovation-related policies to spur competitiveness, growth, and improvements in welfare.

Gesci believes that ICT, education, and innovation are the critical pillars and key elements for development towards a knowledge-based future. Butcher (2010) visually captured the inter-relationship between the three pillars as follows:

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The innovation pillar incorporates the fields of Science, Technology, and Innovation (STI) in a single pillar. The education and innovation pillars are presented as interrelated drivers for development. The ICT pillar is the enabler for Education and Innovation dynamics that will drive Development towards the Knowledge Society.  

ICT is regarded as an engine for growth and a tool for empowerment, which has profound implications for education change and socio-economic development. UNESCO (2007) defines ICT as 

> Forms of technology that are used to transmit, process, store, create, display, share or exchange information by electronic means. This broad definition of ICT includes technologies such as radio, television, video, DVD, telephone (both fixed line and mobile phones), satellite systems, and computer and network hardware and software, as well as the equipment and services associated with these technologies, such as videoconferencing, e-mail and blogs.  

ICT is considered a critical tool in preparing students with the skills required for the global workplace. Thus, technology integration is becoming a key element in almost every plan for the restructuring and re-engineering of education systems. This enables continuous adaptation to a
work world of continuous technological innovations and makes it easier for students to access knowledge.

Challenges of ICT within Africa often relate to lack of human and financial resources, which translate into inadequate and insufficient skills supply, irrelevant or incomplete regulatory frameworks, including policies and legislation, and inadequate infrastructure and communication platforms. To embrace a KS, Gesci believes that there is a requirement to ensure that leaders develop skills to make informed policy and investment decisions to support socio-economic development effectively. This encompasses building both leadership ICT skills and ICT management skills.

Lifelong learning is regarded as a requirement to keep pace with the constantly changing global job markets and technologies. Education contributes to all other sectors by providing required skills and knowledge for economic development. Thus, it is not limited to formal education in traditional structures, but encompasses the broader societal learning necessary for development. Preparation for lifelong learning involves an emphasis, in primary and secondary schools, on learning general skills and competencies (communication, mathematics and science skills, new literacy skills, problem-solving and interpersonal skills, and self-directed learning skills to learn other subjects) and at tertiary level on capacity-building in science and technology, discipline-specific skills, research, and development. Additionally, there is a need for postgraduate programmes to build specific research capacity to handle knowledge-innovation process development – to meet needs and demands for national and regional competitiveness and growth. Education plays critical roles in imparting learning skills.

Innovation is described as a process of creation, exchange, evolution, and application of knowledge to produce new goods. It involves adapting, adopting, or using knowledge to produce new goods and services in local contexts or to advance society in general. The UN Economic Commission for Africa (UNECA) (2010) regards innovation and change as fundamental when developing a KS to drive economic growth and advancement. It has been argued that the basic ingredient for nurturing the innovation dynamic is setting up systems to enable cross-fertilization of ideas between the fields of Science, Engineering, Technology, and Innovation (SETI).

Overview of the ALICT-LATIC programme

The ALICT Programme is conceptualized to model a methodology and multi-stakeholder approach for capacity building and awareness raising of African leaders on the issues of the KS, ICT, Education, and STI. The programme is based on the premise that investments in ICT, Education, and STI contribute to socio-economic development and a shift towards the development of a KS.

The programme’s focus is to build absorptive capacity of current and potential future African leaders to acquire, assimilate, transform, and exploit the benefits of knowledge. It aims to foster dynamic

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12 Ibid
organizational capability through knowledge sharing, collaboration, and exposure to technology. It is hoped that, through participation in the ALICT-LATIC course, future African leaders will demonstrate knowledge, skills, and attitudes that promote their role as change agents. These are expected to translate into positive benefits for their respective countries in pursuit of inclusive knowledge societies.

The core concepts of the programme are as follows:

- **Capacity Building:** The ALICT capacity-building model aims to build and enhance the knowledge, skills, and attitudes of future leaders to manage transformation and change, manage institutional pluralism, enhance coordination, foster communication, and ensure that data and information are shared and used in planning, resource mobilization, implementation, and evaluation processes.

- **Knowledge Society:** The ALICT model focuses on the role all facets of ICT play in building the absorptive capacities of current and potential future African leaders to acquire, assimilate, transform, and exploit the benefits of ICT and knowledge to produce a dynamic organizational capability through peer knowledge sharing and exposure to technology. The ALICT approach to KS development focuses on the interconnection between leadership, policy development, and future-proof planning and how they contribute to KS development through Education, STI, and ICT.

- **Leadership:** A prerequisite for leadership development for knowledge societies is policy coherence between the three pillars (ICT, Education, and STI) that form the basis of any KS. For future African leaders to be able to steer their countries towards that goal, it is essential for them to not only be well versed in management, leadership, project formulation and project management skills, but also to acquire comprehensive knowledge about the interrelationship of the three KS pillars (Education, STI and ICT) and then be able to apply that knowledge in the African context.

- **Policy Coherence:** Policy coherence is the development and implementation of conjointly supportive policy actions across all sectors of the economy and society and, more specifically across government departments and agencies. Policy coherence pursues the creation of synergies across policies that advance the achievement of shared and agreed objectives. Within national governments, policy coherence issues arise between different types of public policies, between different levels of government, between different stakeholders, and at an international level.

- **Futures Thinking:** Futures Thinking was first theorized by Jim Dator (Bezold, 2009). Among its many uses within complex and rapidly shifting economic and social systems is its relevance to policy development and implementation. Futures Thinking requires the revisitation of plans and policies at regular intervals to take into consideration any new signals that appear in the environment that may affect a sector or number of sectors.

### Considering Sustainable Development Goals

The 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development officially came into force in January 2016. These new goals apply to all countries when mobilizing efforts to end all forms of poverty, fight inequalities, and tackle climate change over the next 15 years.

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They recognize that ending poverty must go hand-in-hand with strategies that build economic growth and addresses a range of social needs including education, health, social protection, and job opportunities, while tackling climate change and environmental protection.\textsuperscript{14}

While the SDGs are not legally binding, governments are expected to take ownership of, and establish national frameworks to achieve, the 17 Goals: no poverty; zero hunger; quality education; gender equality; clean water and sanitation; affordable and clean energy; decent work and economic growth; industry, innovation and infrastructure; reduced inequalities; sustainable cities and communities; responsible consumption and production; climate action; life below water; life on land; peace, justice, and strong institutions; and partnerships for the goals.

Primary responsibility for follow-up and review of progress made in implementing the SDGs rests with countries. Implementation and success of the SDGs depends on countries’ own sustainable development policies, plans, and programmes. However, regional follow-up and review will be based on national-level analyses and contribute to follow-up and review at the global level.\textsuperscript{15}

Whilst implementation of SDGs is still in early phases, it provides an opportunity to frame the ALICT programme as a mechanism for countries to address SDGs, due to the programme’s cross-cutting nature. Specifically, KS development relies on the progress made in many of the SDGs.


\textsuperscript{15} Ibid
Knowledge Society Development in Kenya

1. Introduction

Kenya is located transversely on the equator of the East Coast of Africa, bordering the Indian Ocean, Somalia, Tanzania, Ethiopia, South Sudan, and Uganda. Kenya’s surface area is 582,650 Km² with almost 80 percent of the land mass being arid to semi-arid savanna and sparsely inhabited by communities that combine agriculture with pastoralism for their survival. The capital of Kenya is Nairobi.

Figure 2  Map of Kenya

Kenya’s 2010 Constitution establishes County Governments with legislative and executive powers. The country is divided into 47 counties as administrative units in a devolved structure of governance with districts and sub counties forming part of the administrative areas. element in devolution. Although the national and county governments are interdependent, the county governments enjoy a semi-autonomous status.

The main ethnic groups in Kenya are Kikuyu (22%), Luhya (14%), Luo (13%), Kalenjin (12%), Kamba (11%), Kisii (6%), and Meru (6%). English and Kiswahili are the official languages. Data from 2015 indicate that Kenya has a population of 46,050,302. The country has experienced dramatic population growth since the mid-20th century because of its high birth rate and its declining...
mortality rate. More than 40 percent of Kenyans are under the age of 15 because of sustained high fertility, early marriage and childbearing, and an unmet need for family planning. Kenya’s relative stability since its independence in 1963 has attracted hundreds of thousands of refugees escaping violent conflicts in neighbouring countries. Kenya presently shelters nearly 400,000 Somali refugees.20

Kenya is the economic and transport hub of East Africa. Kenya’s GDP is 63,398,041.54,21 and its real GDP growth has averaged over 5 percent for the last seven years. Since 2014 Kenya has been ranked as a lower-middle income country because its per capita GDP crossed a World Bank threshold. While Kenya has a growing entrepreneurial middle class and faster growth, its economic and development trajectory is threatened by weak governance and corruption. The unemployment rate in 2013 was 40 percent, and 43.4 percent of the population live below the poverty line. The backbone of the Kenyan economy is agriculture, contributing 25 percent of GDP. Approximately 75 percent of Kenya’s population work in the agricultural sector, including livestock and pastoral activities. Over 75 percent of agricultural output is from small-scale, rain-fed farming or livestock production.22

The Gross Domestic Product (GDP) is estimated to have expanded by 5.6 percent in 2015 compared to a 5.3 percent growth in 2014. This growth was mainly supported by a stable macroeconomic environment and improvement in outputs of agriculture; construction; finance and insurance; and real estate.

Figure 3 GDP Growth Rate23

![GDP Growth Rate](image)

More than three quarters (78%) of the total population over 15 years of age are literate (81% males; 75% females).24

Kenya Defence Forces are the Kenya Army, Kenya Navy, and Kenya Air Force. Military service is voluntary for male and female Kenyan citizens between 18-26 years of age. Kenya provides shelter to an estimated 580,000 refugees, including Ugandans who f Lee across the border periodically to

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seek protection from Lord’s Resistance Army rebels. Kenya also works to prevent the clan and militia fighting in Somalia from spreading across the border, which has long been open to nomadic pastoralists.  

There have been a few terror activities in Kenya, the latest in 2013 which killed at least 67. Despite these terror activities, Kenya is generally regarded as a politically stable country, with the March 2013 elections being relatively calm. The biggest gain from the August 2010 constitution has been devolution, which ushered in a new political and economic governance system. It is transformative and has strengthened accountability and public service delivery at local levels. The government’s agenda is to deepen implementation of devolution and strengthen governance institutions, while addressing other challenges.

The World Bank’s “Ease of doing business” index, a measure of the relative ease for starting a running a local business, for 2016 ranks Kenya as 92 out of 190 countries. In light of the fact that the Kenyan economy is highly dependent on agriculture, periodic drought has a significant impact on the economy and has threatened GDP growth. In recognition of the serious threats posed by climate change, the Kenyan Government has taken measures to secure the country’s development against the risks and impacts of climate change. The Constitution of Kenya provides for maintenance of at least 10 percent tree cover of the land area. The Kenya Vision 2030 targets the planting of at least seven billion trees to address food, water and energy security. Since 2003, Kenya has been able to restore 6 percent of forest cover. In 2010, the Government launched the National Climate Change Response Strategy which enhanced understanding of the global climate change regime and the impacts of climate change in Kenya. Keny subsequently launched its National Climate Change Action Plan in March 2013. The plan addresses the options for a low-carbon climate resilient development pathway as Kenya adapts to climate impacts and mitigates growing emissions. The plan also addresses the enabling aspects of finance, policy and legislation, knowledge management, capacity development, technology requirements and monitoring and reporting.

In 2015, Kenya ranked 12 out of 54 African countries on the Mo Ibrahim Index which offers a comprehensive assessment of governance that informs and empowers citizens, civil society, parliaments and governments as a tool of measuring progress in governance.

The Global Competitiveness Index (GCI, 2016-17) which assesses the ability of countries to provide high levels of prosperity to their citizens through measuring the set of institutions, policies, and factors that set the sustainable current and medium-term levels of economic prosperity ranks Kenya 96 out of 138 countries with a score of 3.9. The index points to access to corruption, high tax rates, and access to finance as primary limiting factors.

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The World Economic Forum’s Inclusive Development Index is an index that provides a multidimensional assessment of living standards and inclusive growth. In 2017, Kenya was ranked 65th out of 79 developing countries with a score of 3.23. Kenya has comparatively low labour productivity and GDP per capita, as well as a high dependency ratio. Wealth inequality has worsened considerably over the years. On the other hand, it has a larger middle class than most countries in this group.  

Kenya’s carbon emissions stood at 0.3 in 2013. In terms of natural hazards, Kenya faces recurring drought and flooding during rainy seasons. Current environmental issues include water pollution from urban and industrial wastes; degradation of water quality from increased use of pesticides and fertilizers; water hyacinth infestation in Lake Victoria; deforestation; soil erosion; desertification, and poaching. Kenya is party to a number of international agreements relating to the environment. These are: party to: Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Endangered Species, Hazardous Wastes, Law of the Sea, Marine Dumping, Marine Life Conservation, Ozone Layer Protection, Ship Pollution, Wetlands, and Whaling.

Kenya is among the countries with the lowest rate of access to modern energy services in Africa and the world. Other drivers include both energy price vulnerability and the climate vulnerability of electricity production. Droughts have long affected hydro capacity and increased the price of energy. Economic vulnerabilities such as the volatility of oil prices and currency exchange rates provide further incentives to expand renewable energy sources.

Kenya’s economy remains the largest in the East Africa Community (EAC) and is much more dynamic than those of other member countries. This is because it is better linked to other economies in terms of investment flows and trade mainly attributed to the country’s human capital, the diversity in her economy and the role as a leader in ICT. This coupled with relative market friendly policies and political stability has led to a strong private sector making Kenya dominant in the regional economy. Hence, Kenya is perceived as a hub for financial, communication and transport services in the region. This is expected to continue following the promulgation of the constitution 2010 which not only ushered in a new political dispensation but created strong institutions to deal with corruption that had adversely affected economic growth.

With regards to developing a knowledge society, this has been recognized as being of importance since early 2000, as evidenced by the various strategies at that time. For example: The Economic Recovery Strategy for Wealth and Employment Creation (GOK, 2003), pinpointed the critical role that ICT, education and STI will play in the economic recovery process:

• Education is a key determinant of earnings hence important in enabling people exit out of poverty hence the curriculum should be made relevant.
• Every ministry should develop and implement strategies that enhance linkages between researchers and producers and further develop capacity in beneficiary organizations to empower them to make demands from service providers.

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- Invest in adequate ICT education and training, implement a tax incentive regime and develop a master plan for e-government by June 2004 as a way of enhancing the usage of ICT.  

Kenya Vision 2030 is the national long-term development blue-print that aims to transform Kenya into a newly industrialising, middle-income country providing a high quality of life to all its citizens by 2030 in a clean and secure environment. The Vision comprises of three key pillars: Economic; Social; and Political.

The Economic Pillar aims to achieve an average economic growth rate of 10 per cent per annum and sustaining the same until 2030. The Social Pillar seeks to engender just, cohesive and equitable social development in a clean and secure environment, while the Political Pillar aims to realise an issue-based, people-centred, result-oriented and accountable democratic system. The three pillars are anchored on the foundations of macroeconomic stability; infrastructural development; Science, Technology and Innovation (STI); Land Reforms; Human Resources Development; Security and Public Sector Reforms.

Figure 4  Pillars of Kenya Vision 2030

Vision 2030: Three Key Pillars

Transform Kenya into a newly industrializing, middle-income country providing a high quality of life to all its citizens by 2030 in a clean and secure environment

The vision is anchored on three key pillars:

- **Economic**
  - Improve the prosperity of all regions of the country and all Kenyans by achieving 10% Gross Domestic Product (GDP) growth rate per annum

- **Social**
  - Invest in the people of Kenya and improve the quality of life for all Kenyans through human and social welfare projects & programs

- **Political Governance**
  - Move to the future as one nation with a democratic system that is issue-based, people-centered, results-oriented & accountable to the public

Kenya Vision 2030 envisaged Business Process outsourcing (BPO) as a key driver to achieving a 10 percent annual economic growth leading to a substantial investment in ICT infrastructure. It further outlines that achieving 10 percent economic growth depends on enablers such as:

1) Macroeconomic stability for long-term development;
2) Continuity in governance reforms;
3) Enhanced equity and wealth creation opportunities for the poor;
4) Infrastructure;
5) Energy;

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40 Ibid
6) STI;
7) Land reform;
8) Human Resources Development (HRD); and
9) Security.

Kenya Vision 2030 is implemented through five year plans called Medium-Term Plans (MTPs). Currently, Kenya is implementing the second medium plan (MTP2) running from 2013 to 2017. All policies and plans are derived from MTP2; the education Sector is further guided by Sessional paper no 14 of 2012, the ICT sector uses the ICT policy of 2006 and STI sector uses the STI policy developed in 2008 although a new draft STI policy has been developed and is awaiting parliamentary approval. To operationalize these policies and plans, the Education sector is developing the National Education Sector Plan (NESP) with volumes focusing on ECDE, primary and secondary education, completed. The part for TVET, Higher Education as well as STI is still under development. There is a debate for NESP to be separated from the STI plan even through both are spearheaded by the same ministry. The ICT sector is guided by the ICT master plan 2013. To ensure that Ministries achieve the expectations of the MTPs, all performance contracts between the president and the cabinet secretaries must include a Vision 2030 flagship project.
2. Information and Communication Technology (ICT)

2.1 ICT Policy Frameworks


There are several national ICT policies and strategies. The key policy framework for ICT in Kenya is the Kenya National ICT Masterplan 2013/2014-2016/2017. The vision for this masterplan is to make Kenya a regional ICT hub and transition the country into a knowledge economy. The master plan is aligned to the Kenya national constitution, Vision 2030, Jubilee Manifesto; and the new laws enacted in between November 2012 to January 2013 such as Science, Technology and Innovation Act 2013, TIVET Act 2013 and Universities Act 2012. This is in recognition that ICT plays a critical role in driving the economic, social and political development of Kenya as espoused in Vision 2030; and it is a roadmap to a knowledge economy and society that will lead to real socio-economic growth. The plan aims to create an enabling policy, legal and regulatory environment; provide e-government services that are simple to use and convenient for citizens and businesses; increase the productivity, efficiency and effectiveness of critical economic sectors; stimulate the setup and growth of ICT-related businesses to enhance employment creation; enable and scale up ICT innovation; and develop a dynamic and robust ICT sector that will enhance socio-economic growth.

The master plan has three foundations and three pillars. The foundations are the critical things that need to happen in order to lay a basis of Kenya transitioning to a Knowledge Society and positioning the country as a regional ICT hub while the pillars are meant to facilitate the achievement of socio-economic growth and Vision 2030 targets. The foundations are as follows:

1) ICT human capital and workforce development, which aims at developing quality ICT human resources as a pre-requisite to the development of a viable ICT sector. Key to this is ensuring that ICT development, implementation and exploitation are an integral and sustainable component of development.
2) Integrated ICT infrastructure, which seeks to provide the integrated infrastructure backbone required to enable cost effective delivery of ICT products and services to Kenyans.
3) Integrated information infrastructure which aims at improving the quality of e-Government services and enable the country to transition to a knowledge-based society. This is through ensuring maximum access to information held by public authorities by all Kenyans and that public information is readily available through consolidated portals in an affordable and secure way.

The three pillars of the Master Plan are:

1) E-Government services, which aims at ensuring provision of e-Government information and services as key to improving productivity, efficiency, effectiveness and governance in all key sectors.
2) ICT as a Driver of Industry, which aims at transforming key Vision 2030 Second Medium Term Plan (MTP2) economic sectors to significantly enhance productivity, global competitiveness and growth.
3) Developing ICT Businesses that can produce and or provide exportable quality products and services that are comparable to the best in the world.

The objectives of the ICT Masterplan are to
• support the provision of reliable, secure and affordable connectivity across the country to all citizens;
• facilitate efficient and effective government services;
• enhance data access and protection stewardship of public data and information; offer consistent, integrated, e-Government citizen centric services;
• use ICT automated processes in the product and service delivery value chains across various economic sectors;
• work with the relevant State Departments to promote ICT innovations and their commercialization;
• grow the number of Information Technology Enabled Services (ITES) companies and the range of services provided; grow and monitor the local ICT industry;
• strengthen the leadership and ICT human capacity of the ICT Authority;
• increase digital literacy of citizens;
• develop ICT ready workforce; an
• and develop a critical mass of local high-end ICT skills. 44


In this plan, the ministry draws its strategic priorities from the achievements of the past, the lessons learnt, emerging issues and challenges. It also takes cognisance of the Government structure and the general policy direction. The plan has prioritised various programmes and activities for implementation under six broad strategic priorities, namely:

1) Policy, legal, regulatory and institutional reforms;
2) Improvement of universal access to ICT services;
3) Building capacity within the ICT sector;
4) Creating employment and facilitating economic growth;
5) Building a digital economy and Government; and
6) Promoting regional integration through ICT.

The Ministry adopted a participatory approach where senior staff in the Ministry and its Semi-Autonomous Government Agencies (SAGAS), the Kenya Private Sector Alliance (KEPSA), the academia, the physically challenged and the county governments presented their views and proposals on the various issues considered in the Plan. To deliver its planned objectives, the ministry’s institutional structure has been reorganised to include the ICT Authority (ICTA), the Postal Corporation of Kenya (PCK), the Information and Public Communications Directorate, Kenya Broadcasting Corporation (KBC), the Communication Authority of Kenya (CAK), Kenya Institute of Mass Communication (KIMC), the Media Council of Kenya, the Kenya Yearbook Editorial Board (KYEB) and the Brand Kenya Board (BKB). 45

The Ministry of Information, Communications and Technology’s Strategic Plan spells out key policy actions, legal and regulatory frameworks, institutional reforms, programmes and projects that will be implemented in the 2013-2017 medium term plan period. The Plan takes into consideration the requirements of the Kenya Constitution, 2010, and the MTP2 of the Kenya Vision 2030 Long Term Blue Print. The plan promises effective utilisation and application of ICT across multi-faceted service delivery and internal government operations with a view to achieve the goals of Vision 2030. The plan identifies the vision as “Kenya as a globally competitive knowledge-based economy” while the

mission is “To facilitate universal access to ICT infrastructure and services within the country”. The plan spells out the mandate and the goal of the ministry.\textsuperscript{46}

**National ICT Policy (in review)**

The ICT sector is also guided by a National ICT Policy 2006, but it was recognized that the ICT sector is dynamic and that this policy requires revision. In particular, there is need for a comprehensive policy, legal and regulatory framework to help Support ICT development, investment and application, promote competition in the industry where appropriate, ensure affordability and access to ICT nationally as well as address issues of privacy, ICT legislation, cyber-crimes, ethical and moral conduct, copyrights, intellectual property rights and piracy.\textsuperscript{47}

The National Communications Secretariat thus embarked on a process to review the ICT policy that was developed in March 2006 through a multi-stakeholder approach. The review of the policy was inspired by the need to align it with the new constitutional dispensation in Kenya and Vision 2030. This revised policy is expected to provide a clear roadmap to drive social, economic, cultural and political transformation through the effective use of ICT in the years ahead. It is also expected to complement and builds upon vision 2030 and provide many of the key strategies essential for achieving Kenya’s national development targets.\textsuperscript{48} The policy (covering infrastructure, applications and content creation) is expected to provide a framework to guide sustained ICT sector growth in the country over the next five years.\textsuperscript{49} (Note that this the policy still appears to be in draft form and no copy of the policy could be located online).

**Kenya Information and Communications Act**

The Kenya Information and Communications Act Chapter 411A makes mention of electronic transactions and cyber-security. Specifically, it removes barriers to electronic transactions and introduces penalties to cybercrimes with the aim of minimizing fraud in electronic commerce. This Act also makes provision for electronic signature and e-commerce.\textsuperscript{50}

**Cybersecurity Strategy**

In order to address cybersecurity challenges at national level, the Ministry of Information, Communication and Technology in cooperation with the ICT Authority launched the National Cybersecurity Strategy 2014 in June 2014. The Framework incorporates the National Cybersecurity Strategy, National Public Key Infrastructure (PKI) and the Kenya Computer Incidence Response Team, Coordination Centre (KE-CIRT/CC).\textsuperscript{51} The Strategy defines Kenya’s cybersecurity vision, key objectives, and ongoing commitment to support national priorities by encouraging ICT growth and aggressively protecting critical information infrastructures. The strategy has four strategic goals:

1) Enhance Kenya’s cybersecurity in a manner that facilitates the country’s growth, safety, and prosperity.

2) Build national capability by raising cybersecurity awareness and developing Kenya’s workforce to address cybersecurity needs.

\textsuperscript{46} ibid


3) Foster information sharing and collaboration among relevant stakeholders to facilitate an information sharing environment focused on achieving the strategy’s goals and objectives.

4) Provide national leadership by defining the national cybersecurity vision, goals, and objectives and coordinating cybersecurity initiatives at the national level.52

2.2 ICT Infrastructure

The various plans mentioned above, makes provision for the development of ICT infrastructure in Kenya. In recent years, there has been massive investment in both undersea and terrestrial cables and computerization of all governmental departments and processes. The aim was to facilitate Kenya’s social-economic development through provision of efficient and affordable ICT services.

The first MTP and national ICT master plan (2008 - 2012), the focus was on facilitating the provision of equitable and affordable ICT services, with the aim of:

- enhancing economic competitiveness by utilising the abundantly available human resources in BPO;
- developing a Knowledge based society to enhance Kenyans’ quality of life;
- ensuring universal access to ICT for sustainable development by establishing digital villages; and
- strengthening Kenya’s learning opportunities and developing capacity to meet future technological challenges.

This master plan laid the foundation for digital content, ICT hardware, ICT software, connectivity and BPO. The government accelerated the use of ICT to catalyse agriculture, tourism, e-Government, health, education and training, manufacturing, wholesale and retail among other sectors. This was achieved through planned flagship investments mainly in broadband and high bandwidth connectivity and enhanced community uptake initiatives. The following planned projects contributed immensely to the development of KS:

1) National Terrestrial Fibre optic network to ensure maximum utilisation of capacity and connectivity to all districts

2) Government Common Core Network (GCCN) that integrated work processes, information flows and improved inter-ministerial sharing of databases and information in order to eradicate duplication of effort and redundancies.

3) Multimedia Technology parks to uniquely address ICT needs in Kenya. The development of the ICT park is a means of developing ICT products for both local needs and export.

4) KTCIP to generate growth and employment by Public Private Partnership that create IT enabled services industry contributing to improved efficiency and transparency of selected functions through the e-government applications.

Much of the budget went into investment on submarine and National Terrestrial Fibre Optic Network. Based on the concept “build it and they will come” in enhancing broadband capacity, there has been a drastic increase in the competitive environment in both mobile and data subsectors. It has been argued that Kenya’s success in this area is due to:

1) a clear national vision articulated in V2030;

2) strong leadership and direction;

3) a credible regulatory, policy and institutional framework; and

4) leveraging the strength of public and private sectors through PPPs.53


One of the project areas for the ICT Masterplan is to develop the ICT infrastructure, where the objective is to support the provision of reliable, secure and affordable connectivity across the country to all citizens. The key outcomes in this regard are:

1) Increased coverage of national broadband infrastructure:
   a) 35% Households
   b) 100% Schools
   c) 100% Health centres

2) High quality of broadband
   a) 99.99% availability
   b) high reliability
   c) secure (can be trusted)

3) Affordable broadband for citizens (cost as percentage of disposable income is benchmarked against MICs)
   a) Additional 2.5%
   b) contribution to GDP.54

The objective of Integrated ICT Infrastructure is to support the provision of reliable, secure, and affordable connectivity across the country to all citizens. The flagship projects for Integrated ICT Infrastructure are:

- School community network
- Health community network
- Secure ICT infrastructure to all national and County

Another flagship project under Vision 2030 was the development of the National Broadband Strategy. The overall objective of the Strategy is to provide quality broadband services to all citizens. The strategy focuses on five thematic areas that have a direct impact on its implementation and success. These are:

- Infrastructure, Connectivity and Devices
- Content, Applications and Innovations
- Capacity Building and Awareness
- Policy, Legal and Regulatory Environment
- Financing and Investment.55

The strategy expanded coverage of the National Optical Fibre Backbone Infrastructure (NOFBI) under the strategic issue of infrastructure connectivity and devices. As part of phase 2 of NOFBI, over 6,000 Km of NOFBI network had been laid across all the 47 Counties, by June 2016. Additionally, 44 out of 46 OSP and LAN survey in the Counties have been completed. Installation of equipment has been completed in 29 Counties while installation works is in progress in 9 Counties. OSP and LAN has been completed in 29 Counties. Such efforts reduce costs to Kenyans by individual companies who lay their own terrestrial Optical Fibre Cables (OFC) as last mile connectivity solutions. Records at ICT Authority indicate that so far laying of telephone 4G cables has covered 4,300km and 2,100 kms a earmarked to be completed before the end of this year. A total of 57 towns in 35 counties have been reached. The project, initiated about seven years ago will connect all towns.

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county headquarters and most of Government offices with broadband technology.\textsuperscript{56} The Ministry is also working with private sector players to complete the NOFBI project, and thus increase internet penetration and enhance universal access to affordable ICT countrywide.\textsuperscript{57}

Besides massive investment in infrastructure over the past five years, the Kenyan government has taken steps to improve telecommunication services. Among them is the reduction of import duty on both mobile telecommunications terminals and computers in 2005. The following table highlights some key indicators of telecommunication services in Kenya.

Table 1  \textit{Indicators of telecommunication services}\textsuperscript{58}

<table>
<thead>
<tr>
<th>Indicator</th>
<th>July, 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telephones - fixed lines - total subscriptions:</td>
<td>85,496</td>
</tr>
<tr>
<td>Telephones - fixed lines subscriptions per 100 inhabitants</td>
<td>Less than 1</td>
</tr>
<tr>
<td>Telephones - mobile cellular (total)</td>
<td>37.716 million</td>
</tr>
<tr>
<td>Telephones - mobile cellular (subscriptions per 100 inhabitants)</td>
<td>82</td>
</tr>
<tr>
<td>Internet users (total)</td>
<td>20.952 million</td>
</tr>
<tr>
<td>Internet users (percent of population)</td>
<td>45.6%</td>
</tr>
</tbody>
</table>

Other developments in improving ICT infrastructure include digital migration from analogue TV to digital TV broadcast, which has already seen rapid growth in the TV broadcast industry evidenced by the recent development of 65 Free to air TV stations in the country. There is also a migration from Medium Wave to FM radio Transmission, a programme which is now 50 percent complete. The migration to FM radio transmission is expected to contribute to sector development and growth, increased access to information that will lead to improved education and health services and promotion of local cultural heritage.\textsuperscript{59}

Another significant development is that taxes on ICT hardware are largely zero-rated. Zero-rated taxes on ICTs are integral to the Government policy objective of universal access to affordable ICT services.\textsuperscript{60}

2.3 ICT4D Initiatives

\textbf{Presidential Digital Talent Programme (PDTP)}

This project was conceived through the ICT Master plan, and is aimed at growing ICT through leadership and increase the relevance of ICT in business principles in management and public service delivery. The programme aims at achieving workforce development for effective and efficient services delivery leveraging on ICT. It is also aimed at building ICT technical capacity in government for effective service delivery. The programme provides internship to ICT and engineering graduates.


\textsuperscript{60} IST Africa. (no date). Current ICT Initiatives and projects - Republic of Kenya. Op cit
The trainees undergo mentorship in private and public institutions for a period of one year. The first 100 trainees graduated in March 2016 and another group of 400 are currently undergoing training.  

Constituency Digital Innovation Hubs

This project is in its initial stages, and has had its first proof of concept successfully set up in Limuru. The objective of the project is to support entrepreneurs and access to free Wi-Fi in all the 290 constituencies countrywide. It will also enhance awareness and uptake of on-line platforms for employment and business opportunities.  

Business Process Outsourcing (BPO)/IT Enabled Services

Outsourcing has been identified in the Vision 2030 as a key pillar and driver of social and economic improvement through job and wealth creation. The 2006 Kenya ICT Strategy and the Vision 2030 development print created the framework for Kenya to focus on global business process outsourcing as a way of generating jobs for young people and generating wealth for local entrepreneurs and investors. Given the importance of the ICT industry for creating growth and generating opportunities in Kenya, especially among young people, and its growing contribution to GDP, the Government of Kenya is keen to take up a focused enterprise development initiative in close collaboration with the private sector. The aim is for Kenya to use its unique geographical position and its well-developed ICT human resource base to become the preferred destination for outsourcing in Africa.

Konza City

As part of the Vision 2030 Flagship Programmes, the Government of Kenya through the Ministry of Information and Communication aims to set up a technology park at Konza. This project commenced in 2009 with the procurement of a 5,000-acre site in Konza in Makueni County, 60kms south east of Nairobi. Konza City aims to be a world-class Smart City and a prime economic driver for the nation, with a robust mix of businesses, workers, residents, and urban amenities. It will be the country’s heart of innovative solutions for ICTs, business, and health and education.

Thus far, a perimeter wall has been constructed. The 4.1km auto boulevard (main road) and another 8.1km access roads to individual parcels at Konza City have been completed and are in use. Provision of bulk clean water has been completed and the commodity is now available for construction works and residential purpose. Plans are at advance stage to for the provision of power from three power stations to the site. Establishment of trunk fibre connectivity to the Techno city is 70 percent complete. It is expected to generate 16, 000 direct jobs. It is planned that the Tech city will host a BPO park, Science park, Convention centre, mega mall, hotels, international schools, world class hospitals, Championships Golf Course, Financial District, High Speed Mass Transportation and Integrated Infrastructure. The main objective of developing an ICT park is to enable to job creation as well as being an avenue to provide the necessary environment to attract investment. It is part of a wider scheme to position Kenya as the region’s technology hub, using development to entice more companies to set up base in the country. The park also aims to facilitate business activity within and outside the country, reinforce efficient linkages between the private and public sector, promote the acquisition and usage of ICT in the country and promote good ICT governance.

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64 Ibid
Pasha Centres (Digital Villages)

In 2010, the government rolled out an initiative to diffuse ICT know-how to the rural and marginalized areas to address regional disparities. Entrepreneurs, who run Digital Villages, are awarded loans in a competitive process, which they repay over a period of time. Pasha Centre’s as the hubs are called, provide a host of services to the public via computers connected to the internet, or by using and marketing other ICT-enabled applications. The main objective of the centres is to provide Internet access, e-government services and other e-services at the grassroots level via public-private partnerships. The Pasha Centres have been funded through Digital Villages Revolving Fund. So far, 61 Pasha centres are operational and more are expected to be opened to at least cover every constituency.\(^{67}\) However, the rollout is experiencing some challenges. For example, the project has failed to take off as initially expected due to misunderstood nature of the centres by the local authorities, who subject Pasha Centre owners to constant harassment. Additionally, many digital villages have been undergoing difficulties due to little or no support by government. Another reported reason for the failure of the project taking off is unfavourable conditions by the financial institution that disbursed the money from the revolving fund.\(^{68}\)

Tandaa Digital Content Grant

Over 50 percent of Kenyans now have access to the internet, majority of whom access the internet through their mobile phone. As a result of this, the Government embarked on develop services and products to reach these millions of Kenyans through this new media. The Government ran a $4 million three-year grant programme from 2010 - 2013 through the Kenya ICT Authority to support the development of local digital content. Grantees are selected through an Annual Call for Proposals. The Tandaa Local Digital Content Grant was a grant to provide seed funding for companies entering new media and ICT, to support Internet and mobile phone product and service delivery. Applicants were required to be Kenyan citizens over eighteen or companies/organisations registered in Kenya. Solutions could address rural or urban communities and awards can be granted from Private Sector Innovation or Government Data Applications. Under the second round of grants, a new grant type was available for established companies and the top 150 applicants will receive free business plan training in Nairobi.\(^{69}\) It is not clear what the impact of this initiative has been, although there was some controversy surrounding the awarding of tenders for the grant.\(^{70}\)

Kenya open data

Kenya launched an open Government data portal in 2011 as the first country in sub-Saharan Africa and second on the continent after Morocco. The goal of opendata.go.ke is to make core government development, demographic, statistical and expenditure data available in a useful digital format for researchers, policymakers, ICT developers and the general public. The online portal was re-launched in July 2015, with an improved user experience and more timely and diverse data. By November 2015, 31 out of a total of 262 agencies had submitted their data to the portal since inception in 2011. The number of datasets have increased from 680 to 692 since the launch of the new portal.\(^{71}\)

ICT Software

The Government is currently holding negotiations with various ICT software providers with a view to secure bargains to make ICT affordable and accessible. In addition to providing fiscal concessions on

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\(^{67}\) IST Africa. (no date). Current ICT Initiatives and projects - Republic of Kenya. Op cit


\(^{71}\) IST Africa. (no date). Current ICT Initiatives and projects - Republic of Kenya. Op cit
software, the Government will also promote local software development by encouraging a scheme to ensure that at least 50 percent of Government software procurement is sourced from local software developers. The Government will also encourage software multinationals like Microsoft and Oracle to offer special incentives such as free development tools, training, certification and marketing support to local software developers. 72

**eGovernment**

The launch of e-Government services in Kenya is one of the main priorities of the Government of Kenya towards the realization of national development goals and objectives for Wealth and Employment Creation, as outlined in the Kenya Vision 2030. The e-Government Programme was launched in June 2004. It has since committed itself towards achieving an effective and operational e-Government to facilitate better and efficient delivery of information and services to the citizens, promote productivity among public servants, encourage participation of citizens in Government and empower all Kenyans. Some of the key online services available through the e-government initiative include:

- Application of public service jobs online;
- Tacking statutes of ID and passports;
- Exam results and candidate selection;
- Submission of tax returns;
- Custom services;
- Reporting of Corruption; and
- Business licensing e-registry. 73

**Skills Programmes**

In terms of skills programmes, Kenya ICT Authority is working with Carnegie Mellon University in relation to the Chipuka Software Development Certification, which tests the ability of developers to write and execute code based on skills used in IT companies. This project aims to train 500 developers per year.

On 24 January 2013, the Kenya ICT Authority launched the first government supported ICT Incubation Programme on behalf of the Ministry of Information and Communications, with funding of $1.6 million from the International Development Association of the World Bank as part of the Kenya Transparency and Infrastructure Project. The host incubator was selected through a competitive call and was awarded to Nailab. Nailab provides an entrepreneurship programme over three to six months, with mentorship and facilities to support ICT start-ups. During 2014 two batches of ICT start-ups were incubated with a target to incubate at least 30 start-ups across Kenya by 2016. 74

**Kenya Transparency and Communication Infrastructure project (KTCIP)**

This project is to contribute to lower prices for international capacity and extends the geographic reach of broadband networks; and contributes to improved Government efficiency and transparency through e-government applications. Funded by the World Bank and implemented by the Kenya ICT Authority, the project has four components dealing with enabling environment, connectivity, transparency-e-government applications and project management.

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73 Ibid
74 Ibid
2.4 Key Actors and Players

<table>
<thead>
<tr>
<th>Actor/Player</th>
<th>Role and Area of Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Information, Communications and Technology</td>
<td>The Ministry of Information, Communications and Technology (ICT) is responsible for formulating, administering, managing and developing the Information, Broadcasting and Communication policy. In May, 2016, through an Executive Order No. 1/2016, the Ministry was split into two state departments: The State Department of Broadcasting and Telecommunications and The State Department of ICT and Innovation. The vision of the ministry is “to make Kenya a competitive knowledge-based economy”. Its mission is “to facilitate universal access to ICT infrastructure and services all over the country”.</td>
</tr>
</tbody>
</table>
| Communication Authority of Kenya | The Communications Authority of Kenya is the regulatory authority for the communications sector in Kenya. Established in 1999 by the Kenya Information and Communications Act, 1998, the Authority is responsible for facilitating the development of the Information and Communications sectors including; broadcasting, multimedia, telecommunications, electronic commerce, postal and courier services. 
This responsibility entails: 
• Licensing all systems and services in the communications industry, including; telecommunications, postal, courier and broadcasting. 
• Managing the country’s frequency spectrum and numbering resources. 
• Facilitating the development of e-commerce. 
• Type approving and accepting communications equipment meant for use in the country. 
• Protecting consumer rights within the communications environment. 
• Managing competition within the sector to ensure a level playing ground for all players. 
• Regulating retail and wholesale tariffs for communications services. 
• Managing the universal access fund to facilitate access to communications services by all in Kenya. 
• Monitoring the activities of licensees to enforce compliance with the license terms and conditions as well as the law. |
| Kenya ICT Authority | The Information and Communication Technology (ICT) Authority is a State Corporation under the Ministry of Information Communication and Technology. The corporation was established in August 2013. The Authority is tasked with rationalising and streamlining the management of all Government of Kenya ICT functions. Our broad mandate entails enforcing ICT standards in Government and enhancing the supervision of its electronic communication. We also promote ICT literacy, capacity, |

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2.5 Challenges in ICT Development

The Kenyan government has prioritized the development of ICT in Kenya – being a regional economic hub and also aiming to be an ICT hub in the region. It has made significant investment in ICT infrastructure indicating its commitment. However, the sector’s growth slowed to 7.3 percent in 2015 after a robust expansion of 14.6 percent in 2014 on account of resilient expansion in mobile telephony network and increased uptake of internet services. Nevertheless Internet subscriptions
increased significantly from 16.4 million in 2014 to 23.9 million in 2015, and Internet penetration increased from 38.3 percent in 2014 to 54.2 percent in 2015.\textsuperscript{81}

One of the challenges is that current trends show that women’s participation in the field of technology, is lagging behind their male counterparts – women only make up 15 percent of the ICT workforce in Kenya.\textsuperscript{82} It is believed that if the gender dimensions of ICT in terms of access and use, capacity-building opportunities, employment and potential for empowerment are explicitly identified and addressed, ICT can be a powerful catalyst for political and social empowerment of women, and the promotion of gender equality.\textsuperscript{83}

Another challenge is funding. In order for Kenya’s Broadband strategy to be fully implemented, it requires approximately US$ 3 billion. This poses a dilemma of whether the current contribution of 0.5 percent of the Gross Turn Over from all commercial licensees, will facilitate the Fund to meet its objective.\textsuperscript{84}


\textsuperscript{83} Ibid

3 Education

The goal of the Vision 2030 is to transform the country into a globally competitive and a prosperous nation by the year 2030. The vision is founded on the social, economic and political pillars. Within the social pillar, education sector plays a critical role in facilitating the process of inculcating knowledge, attitudes and skills necessary for catapulting Kenya to a globally competitive country and acquiring new knowledge in a systematic way with a view to improving products and processes. The sector therefore has a major responsibility of facilitating the process of developing manpower necessary for transforming Kenya into a globally competitive country.

The education system in Kenya is also changing as a result of Vision 2030. Kenya’s current formal education system comprised Early Childhood Development and Education, eight years of primary education, four years of secondary education and a minimum of four years University education. Widely referred to as the 8-4-4 system, it has been operational since 1985. Part of the structure is Technical and Vocational Education and Training (TVET), Special Needs Education, Adult and non-formal Education.

The education system has been widely criticised for being expansive, heavily loaded with content and too examinations-oriented, which puts undue pressure on learners. The argument is that the system, as is currently structured, does a poor job of producing students that can thrive in the current highly competitive global marketplace.

The new education system is said to be piloted from May 2017 at 470 schools. The new system replaces the current Standard One to Form Four with Grade 1 to Grade 12. It has been categorised into three phases: Early Years Education covering nursery education to Grade 3, Middle School Education covering Grade 4 to Grade 9 and Senior School covering grades 10 to 12. It instead recommended a 2-6-3-3 system aimed at “ensuring learners acquire competencies and skills to meet the human resource aspirations of the Vision 2030 blueprint”. In the early years’ category, students will spend two years in pre-primary and six years in primary. This is followed by three years of junior secondary education and three years of senior secondary education.

The system, which places emphasis on continuous assessment tests (CATs) over one-off examinations, will then be rolled out in phases, beginning in January 2018 covering Early Years education. In 2019, the system is expected to be rolled out in Grade Four to Six and in 2020 it will cover Grades Seven to Nine. In 2021, the system will be extended to Grade Ten and in the following year it will cover Grade Eleven. In 2023, it will be rolled out in Grade 12.

The National Basic Education Curriculum Framework (NBECF) implementation plan was developed by the Kenya Institute of Curriculum Development (KICD). The KICD is involved in developing learning materials and teaching guides for pre-primary and Grade 1 to Grade 6. Kenya National Examinations Council (KNEC) is tasked with implementation of policy document, and they are required to recommend on pupil assessment plans.

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In the current system, early Childhood Development and Education (ECDE), also known as pre-primary education, caters for children between 0-6 years. It is undertaken by county governments following the ushering in of the new governance dispensation in 2013. Primary Education caters for children between 6 and 14 years of age, while secondary education caters for learners between 14 and 17 years of age. University Education caters for students mainly above 18 years of age and is regulated by the Universities (Act 2012) where all universities are accredited and charters granted by the Commission for University Education (CUE). Public universities are overseen by the Ministry of Education, Science and Technology (MOEST). Public universities receive funding from GOK for development projects, salaries of staff and subsidized training costs. Private universities do not receive any funding from GOK but have to comply with and measure up according to standards as set out by CUE. There is a Central Placement Service whose role is to admit students to universities and tertiary colleges including TVET institutions. There is Higher Education Loans Board (HELB) to provide loan, bursaries and scholarships to needy students in universities and TVET institutions under MoEST.

The following figures highlight some selected indicators of education in Kenya.

**Figure 5  Selected Indicators on Education**

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2014</th>
<th>2015</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of primary schools</td>
<td>25,460</td>
<td>21,333</td>
<td>6.6</td>
</tr>
<tr>
<td>No. of Secondary schools</td>
<td>8,747</td>
<td>9,440</td>
<td>7.5</td>
</tr>
<tr>
<td>Total enrolment in Primary</td>
<td>100 mn</td>
<td>101 mn</td>
<td>1.0</td>
</tr>
<tr>
<td>Total enrolment in Secondary</td>
<td>2.3 mn</td>
<td>2.6 mn</td>
<td>9.7</td>
</tr>
<tr>
<td>Gross enrollment rate, Primary</td>
<td>101.5%</td>
<td>103.5%</td>
<td></td>
</tr>
<tr>
<td>Gross enrollment rate, Secondary</td>
<td>56.7%</td>
<td>42.9%</td>
<td></td>
</tr>
<tr>
<td>No. of public Primary school teachers</td>
<td>200,697</td>
<td>210,991</td>
<td>5.1</td>
</tr>
<tr>
<td>Pupil/teacher ratio - Public Primary</td>
<td>43:1</td>
<td>41:1</td>
<td></td>
</tr>
</tbody>
</table>

Primary education was made free to all students in 2003, a policy that increased attendance. The figures below highlight that enrolment rates have increased/remained relatively the same over the past five years for primary, secondary and higher education.

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The total number of educational institutions increased by 4.6 percent from 79,641 in 2014 to 83,336 in 2015. The number of pre-primary schools increased by 1.4 percent while the number of primary and secondary schools each grew by 7.9 percent in 2015. The number of Teacher Training Colleges increased by 1.5 percent while that of public Technical Vocational Educational Training (TVET) institutions rose by 15.8 percent, mainly due to the increase in the number of Youth Polytechnics and Technical and Vocational Colleges. The total number of public universities increased to 23 in 2015. Total enrolment in universities increased by 15.6 percent to 512,924 in 2015. Total enrolment in pre-primary schools increased by 6.7 percent to 3.2 million while total enrolment in primary

91 Ibid
schools grew from 10.0 million in 2014 to 10.1 million in 2015. Total enrolment in secondary schools rose by 13.0 percent to 2.6 million in 2015. 92

In Kenya, the higher education sector is regulated through the Commission for University Education and the Universities Act (2011). In higher education, entry to public universities is coordinated by the Kenya Universities and Colleges Placement Service, established in 2014 to replace the Joint Admissions Board. Recently, there has been a huge expansion of the higher education sector in Kenya. Where there were just five public universities in the country in 2005, by 2015 there were 22 universities with plans for as many as 20 new universities. Growth in the university sector has largely come about through the upgrade of already existing colleges. In addition, there are 17 private universities and 14 public and private university constituent colleges. An additional 14 institutions have letters of interim authority to operate. All of the above have the authority to award academic degrees. 93

Figure 8 Educational Institutions by Category 2011-201594

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In the non-university sector, students attend public and private technical and vocational polytechnics, colleges (teacher and medical colleges), and other tertiary-level TVET institutions (technical training institutes, institutes of technology, and technical and professional colleges). Typically, programmes offered at these institutions are two to three years in length, leading to certificates, diplomas and higher national diplomas. However, lecturer shortages continue to hinder growth in quality standards and lead to ever growing student to faculty ratios.  

The total number of teachers in public primary schools grew by 5.1 percent from 200,697 in 2014 to 210,991 in 2015 partly due to engagement of teachers on contract. The number of graduate and S1/diploma teachers increased by 9.6 percent and 8.5 percent, respectively, in 2015, due to the upgrading of teachers with relevant qualifications. The number of P1 teachers rose by 2.8 percent to 98,149 in 2015. The public primary school pupil teacher ratio improved from 43:1 in 2014 to 41:1 in 2015.  

Vision 2030 places great emphasis on STI in general and Technical and Vocational Education and Training (TVET) in particular as the vehicle for socio-economic and technological transformation. Previously, the TVET sector catered for primary and secondary graduates who for one reason or another dropped out of the formal education system and consequently did not transit to universities. GOK is revitalizing and rebranding TVET to be a system of choice and not to be seen to be for those who may have failed in one way or another. This strategy involves increasing access to training for the youth, reforming the curriculum to be modularized competency based, improving training delivery and assessment by equipping TVET institutions, creating centres of excellence and starting competency testing centres to assess competencies for all. Although TVET institutions run across various Ministries, Department and Agencies (MDAs), Technical Vocational Colleges (TVC), two National polytechnics and the Kenya Technical Trainers College (K TTC) are under the purview of MoEST. Two national polytechnics were upgraded to Technical University status in 2013 and offer degree courses in technological fields as requisite technologies for V2030. Plans are underway to upgrade three more institutions to technical universities. Through support by ADB, 8 new technical and vocational colleges are being established, and a further 8 are planned for upgrading to National
Polytechnic status. GOK has planned to establish 253 TVCs to ensure that each constituency has at least one TVC with the first 135 TVCs to be established in the next five years following a financing agreement between the GOK and the Government of the People's Republic of China. GOK is shopping for a development partner to help finance the remaining 118 TVCs.

TVET institutions under other MDAs like Agriculture, Transport and Communication, Health, and Youth Affairs etc. are managed under the TVET Act 2013. The Act ensures that managing TVET under various MDAs doesn't lead to disparities in the training standards. TVET institutions offer training at artisan, certificate and diploma levels in courses such as Construction, Engineering, Business Studies, Textiles, Agriculture for either primary school or secondary school graduates. The Vocational Training Centres (Youth Polytechnics) cater for the primary graduates while TVCs and National Polytechnics admit trainees with secondary level qualifications. There are also private colleges accredited to offer TVET courses.

Vision 2030’s flagship projects for the education sector:

- Build at least one boarding school in each constituency in the pastoral regions.
- Build and fully equip 560 new secondary schools.
- Implement a computer supply programme.
- Roll out a voucher system in five poorest districts.
- Create centres of Excellence for key Vision 2030 sectors.
- Undertake a teacher recruitment programme.

3.1 ICT in Education


ICT was a key priority area of KESSP and is also prioritized in the National Education Sector Plan (NESP). It includes 1) EGovernment which aims at mainstreaming ICT in all government operations and service delivery; 2) Education Management Information Systems (EMIS) which aims at facilitating education managers and administrators with accurate and timely data for better and informed decision-making; and E-Learning which aims to mainstream ICTs in the teaching and learning process (ICT as a tool).

In 2006, Kenya finalized its National ICT policy that aims to improve the livelihoods of Kenyans by ensuring the availability of accessible, efficient, reliable and affordable ICT services. A key element of the government’s 2006 National ICT Policy is the use of ICT in schools, colleges, university and other educational institutions in Kenya to improve quality of teaching and learning. The National ICT policy emphasizes the use of ICT to modernize and improve education and training system by expanding access to training resources, accelerating the spread of science and technology, improving the quality of training and the level of ICT literacy as well as responsiveness to societal requirements in Kenya. The Policy identifies the following strategies to achieve the stated goal:

- Provide e-Learning platforms to facilitate dissemination of knowledge and skills;

101 Ibid
• Promote development of content to address the educational needs at all levels;
• Create awareness of the opportunities offered by ICT as an educational tool;
• Facilitate sharing of e-Learning resources between institutions;
• Promote centres of excellence to host, develop, maintain and provide leadership of better learning resources and implementation strategy;
• Exploit e-Learning opportunities to offer education programmes for export; and
• Integrate e-Learning resources with other existing resources.

In 2006, the Ministry of Education introduced the National ICT strategy for Education and Training.\textsuperscript{102} The strategy was developed to guide implementation of the National ICT Policy. The strategy addresses connectivity and infrastructure, digital equipment and content, harnessing emerging technologies, integration of ICT in education, training and research and development. The Ministry of Education (chaired by the Permanent Secretary and supported by the ICT unit) leads in terms of the ICT and Education strategy. The strategy advocates for the promotion of e-learning and capacity building and support for the training for ICT implementers and policy makers. NESP has proposed an ICT in Education programme that will cumulatively cost KSh.140 billion for the period 2013 - 2018.\textsuperscript{103}

The ministry is expected to work with stakeholders in the implementation of new partnership for Development e-School Initiative under NEPAD e-Africa Commission. Plans are underway to facilitate countrywide access to ICT infrastructure.\textsuperscript{104}

Under the economic recovery strategy and grants to schools Towards realization of Vision 2030, the government came up with Economic Stimulus Programme (ESP) through which Centres of Excellence Secondary Schools was initiated to offer quality education and contribute to national development. Special grants have been provided for expansion of educational opportunities for construction and equipping of schools including establishment of computer labs, Internet connectivity and ICT teacher training.\textsuperscript{105}

\textsuperscript{103} Ministry of Education Science and Technology. (2014). Education for All – the 2015 National Review. Op cit
\textsuperscript{104} Softkenya. (no date). Education policy in Kenya. Op cit
\textsuperscript{105} Ministry of Education Science and Technology. (2014). Education for All – the 2015 National Review. Op cit
Kenya has been implementing a number of ICT programmes and partnerships. Examples of these are highlighted below:

**Digital Learning Programme/Digital Literacy Programme**

The Digital Learning Programme (DLP) was initiated by the Government of Kenya in 2013. The overall objective of the DLP is to prepare children for the 21st skills needed in today’s globally competitive environment. The DLP is a government flagship project for Vision 2030’s social pillar. The programme targets learners in all public primary schools and is aimed at integrating the use of digital technologies in learning. The Ministry of ICT is the main driver of the programme with the implementing body being ICT Authority. The belief is that technology has the power to bring about systemic change in basic and higher education by transforming teaching and learning through integrating technology in the learning environment. The key components of the programme are:

- Provision of digital devices for both learners and teachers.
- Capacity development for teacher and implementers
- Broadband connectivity devices
- Provision of content for digital learning.
- Establishment of local assembly for digital devices and related accessories.  

The learners are entitled to a luminous green tablet while the teachers receive a blue laptop. The Digital Learning Programme covers over 23,000 public primary schools, targeting nearly a million class one pupils. This programme started with installation of pilot devices in 150 selected schools across the country in June 2016 and the rest of the devices arrived from August and are currently being installed nationally. The aim was to install devices to all the schools by December 2016. In order to ensure smooth implementation, ICT skills have been introduced in all the schools. According to the Information and Communication Technology Authority (ICTA), more than 60,000 teachers (three per school, categorized as Trainer of Trainers) were trained to ensure smooth ICT implementation, who are then required to train other teachers. In the end ICT capacity will increase

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across the education landscape. With full implementation of the DLP project, the government expects increased national digital literacy levels and revolution of the countries digital economy. In its entirety, the project will be implemented in all 23,951 public primary schools in the country, with over 1.2 million devices expected by March 2017 at a cost of KES29 billion (US$286 million). To facilitate this, the Government has also connected the schools to mains electricity, with the more remote areas receiving solar power kits and other off-grid power solutions.

Kenya Education Network (KENET)

KENET was established in 1999 as a membership institution for educational and research institutions to provide the National Research and Educational Network (NREN) in Kenya and its vision was enacted in 2001. KENET is licensed by the Communications Authority of Kenya (CA) as a not-for-profit operator serving the education and research institutions. It has seven registered Trustees (five Vice Chancellors, PS Education, DG CCK) and is governed by a Board of Trustees assisted by a Management Board. It has 86 full Members and is the largest NREN in Africa after TENET in South Africa. It is currently housed within the Library of the University of Nairobi, with a data centre in the University of Nairobi and a mirror data centre in the United States International University. It provides cost-effective Internet connectivity to its member institutions. There are currently six points of presence - Nairobi (hosted by University of Nairobi), Mombasa (hosted by Mombasa Polytechnic University), Meru (hosted by Kenya Methodist University), Nakuru (hosted by Egerton University), Eldoret (hosted by Moi University) and Kisumu (hosted by Maseno University). It purchases connectivity in bulk based on a mixture of lease lines from commercial service providers as well as dark fibre, which it lights up. KENET provides hands on training for one year and can also provide certification. There is an equipment node in each University and KENET has empowered technical staff within each university to take responsibility for maintenance of the local area network. KENET manages the link to Amsterdam/London, the circuit and the data centres. It is currently working with the campuses to enable Wireless Infrastructure. It is estimated that there are currently 250,000 students across the country. The wireless networks in the campuses are being designed to support up to 5,000 concurrent users. Each member institution pays a fee for connectivity based on the capacity required.

KENET provides affordable, cost-effective and low-congestion Internet bandwidth services to member institution campuses in Kenya. It has set up a gateway to the advanced e-infrastructures for research that are available exclusively within the Research and Education Community anywhere in the world. It also provides shared services such as; co-location of servers, dedicated Virtual servers for e-learning systems, video and web conferencing, and capacity building for technical staff.

KENET has a small infrastructure grant from Google and works with the Google Cash community aggregating traffic. Google Apps supporting Programmes (GASP) is available to universities in Kenya, Ghana, Nigeria, Senegal, South Africa and Uganda. Google is working with Kenyan Universities to provide ubiquitous Internet access and improve the experience of users. Google will match the university's investment on a 1:1 basis up to a predetermined limit for qualifying campus infrastructure projects that improve connectivity for staff and students.

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KENET promotes collaboration in STEM research (Health, Agriculture, Education, ICT, Engineering) and ICT-based Research Collaboration opportunities. KENET supports research and innovation champions through sponsorships to participate in international conferences and workshops and collaboration research through mini-grants.\footnote{Ibid}

KENET has set up a Shibboleth Identity provider with the support of the ei4Africa FP7 eInfrastructures research team. Shibboleth is a standard based, open source software package for web single sign-on across or within organisational boundaries. The Shibboleth Identity provider integrates with an LDAP. The Identity Provider will be used for Access to the Africa Science gateway by users in KENET network - KENET will be the Registration Authority (RA) for the research community in Kenya. KENET has benefited from the ei4Africa FP7 project's arrangement with CoMoDo (a provider of globally recognised certificates) with fee access to one certificate for KENET and KENET member institutions as part of the project. KENET is using this free CoMoDo wildcard certificate for all of its other applications (Websites, monitoring tools and email). KENET will now promote the use of official certificates by connected member institutions, not only for research but also for their ERPs and Cloud-based applications. Through UbuntuNet Alliance, KENET is a beneficiary under Africa Connect and Africa Connect 2 project.\footnote{Ibid}

\textbf{Wezesha Initiative}

The Kenya Government, through a project funded by the World Bank and implemented by the Kenya ICT Board, is offering an opportunity to registered students to purchase a laptop at a reduced cost in all universities countrywide. A voucher worth $120 (about KSH. 9,600) is provided and the remaining portion of the laptop purchase then met by the student purchaser at the point of sale.\footnote{Kenya Methodist University. (2011). Wezesha Student Laptop Initiative. Retrieved March 13, 2017 from http://www.kemu.ac.ke/nyeri/wezesha-student-laptop-initiative/} This laptop initiative is known as ‘ Wezesha’; a Swahili word that means ‘ to enable’. Successful applicants receive discount vouchers for the purchase of laptops from specified dealers.\footnote{BizTech Africa. (2010). Register now for Wezesha Laptops. Retrieved March 13, 2017 from http://www.biztechfrica.com/article/register-now-wezesha-laptops/356/}

\textbf{Access to Kenya National Examinations through mobile phones and internet}


\subsection*{3.2Curriculum}

The Kenya Institute of Curriculum Development (KICD) is responsible for curriculum development in Kenya. Its mission is: ‘To provide research based curricula and curriculum support materials responsive to the needs of the society’.\footnote{Kenya Institute of Curriculum Development. (no date). About KICD. Retrieved March 12, 2017 from https://www.kicd.ac.ke/about-us.html#} KICD advises the Government on matters pertaining to curriculum development, and Implement the policies relating to curriculum development in basic and tertiary education and training. It also promotes the appropriate utilisation of technology to
enhance innovations and achievement of a knowledge based economy.\textsuperscript{120} The ICT section at the KICD is responsible for digitizing and editing e-content. It is also involved in ICT formulation and implementation.\textsuperscript{121} KICD has embarked on a digital content design and development project, whose terms of reference (TOR) are to design, develop and produce digital content for use in schools in line with the Kenya national curriculum.\textsuperscript{122}

Computer Studies is offered as part of the official Kenya Certificate of Secondary School Examination (KCSE) curriculum defined by the KICD. In this curriculum, students are expected to learn and develop practical ICT skills with the main focus being general IT awareness and software development. In the final year of study, candidates are expected to develop a complete software project using a recommended set of tools and programming languages. The Communications Commission of Kenya (CCK) has initiated a number of universal access projects including the digitisation of the secondary school curriculum. The CCK has collaborated with KICD and provided KES 15 million (US$ 180,500) of funding to support the acquisition of software and hardware, and provide capacity building, to digitise 11 subjects for the Form 1 KCSE curriculum. The digitised subjects were piloted in 20 schools of which 16 are the beneficiaries of the CCK’s school-based ICT centre initiative.\textsuperscript{123}

KICD in close collaboration with Microsoft and Intel setup a Curriculum Innovation Centre to spearhead the integration of information communication technology (ICT) in its entire programmes. The Kenya Curriculum Innovation Centre (CIC) is a member of the Schools Technology Information Centre (STIC). STIC is a global programme which promotes and supports innovative use of Information and Communication Technology (ICT) in the education sector. CIC is a centre for showcasing best practices and innovations in ICT. The Innovation Centre aims to promote the innovative use of ICT to enhance modern teaching and learning in the classroom through curriculum research, implementation, utilization and sharing of different ICT innovations.\textsuperscript{124}

### 3.3 Professional Development

In Kenya, there are five teacher education programmes:

1) The Early Childhood Development and Education (ECDE) teacher education programme -in which teachers are trained through in-service courses in District Centres for Early Childhood Education (DICECEEs). The National Centre for Early Childhood Education (NACECE) develops the curriculum, trains trainers and supervisors, and conducts monitoring and evaluation.

2) Primary teacher education (PTE) which is provided in 18 certificate level colleges through a two-year, residential programme.

3) Secondary teacher education which is provided at the diploma and degree levels in diploma teacher training colleges and universities respectively. At diploma colleges, student teachers are trained for two years and are also required to specialize in two subjects. Universities offer Bachelor of Education degrees in Arts and Sciences as well as post-graduate training for secondary school teachers. In this four-year training, trainee teachers are required to specialize in two subjects they can effectively teach once deployed to schools. There are student teachers

\textsuperscript{120} Kenya Institute of Curriculum Development. (no date). KICD Functions. Retrieved March 12, 2017 from \url{https://www.kicd.ac.ke/about-us/kicd-functions.html}  
\textsuperscript{121} Kenya Institute of Curriculum Development. (no date). ICT Section. Retrieved March 12, 2017 from \url{http://kicd.ac.ke/93-departments/157-ict-section.html}  
\textsuperscript{123} Msimang, M. (2011). Build it and they will come. InfoDev and World Bank. Op cit  
who take ICT as one of their specialization subjects. However, ICT integration in the teaching process is yet to be fully implemented even though the universities offer e-learning.

4) Technical teacher education is offered at the Kenya Technical Teachers College in Nairobi which trains diploma level teachers for secondary schools, technical training institutes, primary teachers’ colleges, institutes of technology and vocational polytechnics

5) Special needs education teacher education is provided to professionally qualified practising teachers through a two-year diploma programme at the Kenya Institute of Special Education (KISE).125

The Institute for Capacity Development of Teachers in Africa (ICADETA) has a mandate to provide continuous professional development (CPD) for teachers. It builds teachers’ capacities to enable them cope with the pedagogy-related challenges they face in the process of curriculum delivery of mathematics, science and technology education.126

There have been numerous programmes running in Kenya to support teacher development. For example, the Teacher Education and Professional Development programme was a partnership between USAID, the Ministry of Education and the private sector, which ran between 2007 and 2013. The programme supported public teacher training colleges in strengthening the skills and expertise of educators, so they are prepared to deliver quality education. Technology was provided to supplement teacher training and enhance the classroom experience. The programme provided teacher training colleges with the tools and training necessary to effectively prepare the next generation of teachers. A Teacher Competency Framework was developed and adopted by the Ministry of Education to promote common standards in teaching skills, knowledge, professional values, behaviour and evaluation. Teacher education materials were provided to prepare student-teachers for actual school conditions. The materials were distributed to all teacher training colleges and to teacher advisory centres in some regions.127

Another programme was an innovative partnership involving USAID, the Government of Kenya, Intel, Microsoft and Cisco launched an extensive pilot programme ICT and training to 20 primary schools, three secondary schools and three teacher training colleges. The Permanent Secretary of Education spent several days visiting the pilot sites and evaluating the programme to inform the Government strategy to roll out integration of technology in classrooms throughout Kenya.128

The result of these two initiatives is that over 8,000 tutors and educators and 32,000 current and future teachers were trained on various aspects of improving educational quality. Twenty colleges launched Professional Development Centres that use action research to continually improve teachers’ skills. More than 290 teachers use information technology tools in the classroom. Teacher support teams were formed in North Eastern, Coast and Central Provinces to support teachers in integrating this new technology into lessons and teaching methods. Additionally, more than 4,600 primary and 270 secondary school learners benefitted from the computer and communications equipment.129

128 Ibid
129 Ibid
With the new education system, teachers from pre-primary to grade 6 will be trained in the competence-based curriculum content, competencies, instruction, and assessment in 2017. The in-service training will also be implemented in a phased approach to re-train teachers on the new system’s demands and requirements.\textsuperscript{130}

Successful implementation of the Digital Literacy Programme will depend upon the capacity of primary school teachers and education managers to fully harness the power of technology to enhance student learning. Therefore, in light of the Framework Agreement signed by the Government of Kenya and UNESCO on cooperation in the implementation of the Digital Literacy Programme, UNESCO is assisting the MoEST in developing capacities of over 22,000 teachers and 22,000 head teachers in all public primary schools, 1,000 field officers, as well as fostering the use of accessible ICTs in Kenya.

The Kenya UNESCO ICT Competency Framework for Teachers (KICT-CFT) online course has been developed and piloted nationwide in two groups of selected teachers. The second cohort of 59 teachers drawn from 47 counties received face-to-face and online trainings from January to May 2016. In June 2016, Unesco organized a two-day workshop on revision of the KICT-CFT. The objective of the workshop was to improve the KICT-CFT online course in preparation for the training of teachers within the national roll-out of the Digital Literacy Programme.\textsuperscript{131}

In general, the terms and conditions of service for teachers are not sufficiently attractive and competitive enough when compared to those provided for professionals in other professions. Consequently, these have demoralized the serving school teachers, put off potential aspirants to teaching profession and affected the image of this profession and that of school teachers.\textsuperscript{132} It is not clear whether there are any incentives provided to teachers to use ICT in their teaching.

### 3.4 Key Actors and Players

<table>
<thead>
<tr>
<th>Actor/Player</th>
<th>Role and Area of Development</th>
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<tbody>
<tr>
<td>Ministry of Education Science and Technology</td>
<td>The Ministry of Education, Science and Technology is responsible for national policies and programmes that help Kenyans access quality and affordable, school education, post-school, higher education and academic research.\textsuperscript{133}</td>
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</table>
| The Teachers Service Commission (TSC) | Under Article 237(2) of the Constitution, the Commission is mandated to perform the following functions:  
• register trained teachers;  
• recruit and employ registered teachers;  
• assign teachers employed by the commission for service in any public school or institution;  
• promote and transfer teachers;  
• exercise disciplinary control over teachers;  
• terminate the employment of teachers; |

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| **Kenya National Examinations Council (KNEC)** | The core functions of KNEC are to:  
- develop national examination tests;  
- register candidates for the KNEC examinations;  
- conduct examinations and process the results;  
- award certificates and diplomas to successful candidates;  
- issue replacement certificates and diplomas;  
- conduct educational assessment research;  
- carry out equation of certificates and diplomas issued by other credible examining boards; and  
- conduct examinations on behalf of foreign examination boards.  

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| **Kenya Institute of Curriculum Development (KICD)** | KICD plays the following roles:  
- Advise the Government on matters pertaining to curriculum development  
- Evaluate, vet and approve, for application in Kenya, any local and foreign curricula and curriculum support materials in relation to the levels of education and training referred to in bullet (4)  
- Implement the policies relating to curriculum development in basic and tertiary education and training;  
- Develop, review and approve programmes, curricula and curriculum support materials that meet international standards for— (i) early childhood care, development and education; (ii) pre-primary education; (iii) primary education; (iv) secondary education; (v) adult, continuing and non-formal education; (vi) teacher education and training; (vii) special needs education; and (viii) technical and vocational education and training.  
- Initiate and conduct research to inform curriculum policies, review and development.  
- Collect document and catalogue information on curricula, curriculum support materials and innovations to create a data bank and disseminate the information to educational institutions, learners and other relevant organisations  
- Print, publish and disseminate information relating to curricula for basic and tertiary education and training  
- Collaborate with other individuals and institutions in organizing and conducting professional development programmes for teachers, teacher trainers, quality assurance and standards officers and other officers involved in education and training on curriculum programmes and materials  
- Develop disseminate and transmit programmes and curriculum support materials through mass media, electronic learning.  

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<td>distance learning and any other mode of delivering education and training programmes and materials</td>
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<tr>
<td>• Promote equity and access to quality curricula and curriculum support materials</td>
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<tr>
<td>• Promote appropriate utilisation of technology to enhance innovations and achievement of a knowledge based economy</td>
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<tr>
<td>• Offer consultancy services in basic and tertiary education and training</td>
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<tr>
<td>• Incorporate national values, talent development and leadership values in curriculum development</td>
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<tr>
<td>• Receive, consider, develop and review curriculum proposals</td>
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<tr>
<td>• Perform such other function as may be assigned to it under the KICD Act No.4 of 2013 or any other written law.</td>
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Kenya Education Network

Kenya Education Network, (KENET), is the National Research and Education Network (NREN) of Kenya. KENET is licensed by the Communications Authority of Kenya (CA) as a not-for-profit operator serving the education and research institutions. KENET provides affordable, cost-effective and low-congestion Internet bandwidth services to member institution campuses in Kenya. It has set up a gateway to the advanced e-infrastructures for research that are available exclusively within the Research and Education Community anywhere in the world. It also provides shared services such as; co-location of servers, dedicated Virtual servers for e-learning systems, video and web conferencing, and capacity building for technical staff. KENET is the Computer Emergency Response Team (CERT) for the academic community.\textsuperscript{136}

Kenya Education Management Institute (KEMI)

KEMI was established in April 1981 with funds from the World Bank and the Government of Kenya (GoK). The purpose of establishing KEMI was to build the capacity of education personnel to enable them deliver education services efficiently and effectively. In February 2010, this legal notice was revoked and replaced with Legal Notice No. 19 of 2010 which recreated KEMI as a body corporate with the broad mandate of generally promoting and carrying on the work of a Management Development Institute.\textsuperscript{137} KEMI is involved in capacity building of education managers through training, research and consultancy services.\textsuperscript{139}

Kenya Institute of Special Education (KISE)

KISE is a semi-autonomous government agency of the Ministry of Education, mandated to carry out the following core functions:

| conduct teacher training courses for teachers of children with special needs and disabilities; |
| conduct in-service courses for personnel working in all fields of special needs education; |
| prepare and conduct correspondence courses for personnel in the field of special needs education; |

\textsuperscript{136} Kenya Institute of Curriculum Development. (no date). KICD Functions. Op cit
\textsuperscript{137} Kenya Education Network. (no date). Home Page. Op cit
### Actor/Player | Role and Area of Development
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Institute for Capacity Development of Teachers in Africa (ICDTA) | • run an educational and psychological assessment centre for the training of teachers of children with special needs and disabilities;  
• run an orientation and mobility centre for training and demonstration purposes;  
• run a model training unit for the integration and inclusion of children with special needs and disabilities into the regular school schools;  
• run a pre-school department where training and the stimulation of young children with special needs and disabilities can be carried out for the purpose of teacher training;  
• function as a resource centre for the production and dissemination of information to the general public on special needs and disabilities;  
• run a documentation and resource centre on special needs and disabilities;  
• conduct research in special needs education; and  
• maintain, repair, design, produce and assemble special materials and equipment for persons with special needs and disabilities.\(^{140}\)

ICDTA is responsible for building teachers’ capacities to enable them cope with the pedagogy-related challenges they face in the process of curriculum delivery of mathematics, science and technology education as foundational subjects for ST&I which supports Vision 2030. ICDTA coordinates INSET activities for teachers geared towards Strengthening of Teaching in Mathematics and Science Education (SMASSE) in Primary, Secondary, Teacher Training Colleges, and TVET institutions.\(^{141}\)

Higher Education Loans Board (HELB) | The mandate of HELB is to disburse loans, bursaries and scholarships to Kenyan students pursuing higher education in recognized institution, to recover loaned funds, and to establish a revolving fund.\(^{142}\)

CUE was established under the Universities Act 2012 to replace the Commission for Higher Education. Its core mandate is to accredit and quality assure university education in both public and private universities. The Commission mainstreams quality assurance practices in higher education and encourages continuous improvement in the management of quality university education. This is mainly accomplished through a peer process of audits and reviews.\(^{143}\)

This Board was established under the Universities Act 2012 to mobilize and manage financial resources for the purposes of university education. The aim is to reduce universities’ dependence on tuition fees, and to consider alternative models of funding universities.\(^{144}\)

The Kenya Universities and colleges Placement Service (KUCCPS) is a corporate body established under the Universities Act 2012 to succeed


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<td>Service (KUCPS):</td>
<td>the Joint Admissions Board (JAB). In the performance of its functions, the Placement Board seeks to promote equity and access to university and college education, by among other things, developing criteria for affirmative action, for the marginalized, the minorities and persons with disabilities. The placement Board also seeks to establish criteria to enable students access the courses for which they applied taking into account the students’ qualifications and listed priorities.</td>
</tr>
<tr>
<td>TVET Authority (TVETA)</td>
<td>The mandate of the TVET Authority is to regulate TVET sector through Licensing, Registration and Accreditation of institutions, programmes and trainers.</td>
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<tr>
<td>TVET Funding Board</td>
<td>The Technical and Vocational Education and Training (TVET) Funding Board was established under section 48 (l) of the TVET Act No. 29 of 2013. The main function of the Board is to manage the TVET Fund whose object and purpose is to finance technical and vocation education institutions. The TVET Funding Board will raise money for post-secondary education in public institutions.</td>
</tr>
<tr>
<td>TVET Curriculum Development, Assessment and Certification Council</td>
<td>The Technical and Vocational Education and Training Curriculum Development, Assessment and Certification Council (TVET CDACC) is a body corporate established under the Technical and Vocational Education and Training (TVET) Act, No. 29 of 2013. The Council is mandated to undertake design and development of Curricula for the training institutions’ examination, assessment and competence certification and advise the Government on matters related thereto.</td>
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3.5 Challenges facing the education sector

Kenya’s education sector has had challenges of governance, management and administration leading to gaps in: service delivery, learning outcomes, teacher management, competence and performance levels hindering the meeting of education sector targets. Other challenges include: inadequate strategies for teacher development and inefficient management; inadequate provision of holistic early childhood care and education, including nutrition for ECDE and primary education children; inequalities in schooling provision; ineffective and uncoordinated monitoring and evaluation of education outcomes and programmes; weak linkage between education and the labour market, including low progression from secondary to tertiary education; inadequate integration of ICT into the education system; and lack of adequate guidelines to address cross cutting issues that affect learning outcomes such as poverty; hunger; conflict and emergencies; integration of national social values and inadequate access to schooling by the children with special needs. The education sector in Kenya has also experienced massive expansion in enrolment and number of institutions over time. The increase has been accelerated by the introduction of Free

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Primary Education (FPE) and Free Day Secondary Education (FDSE) programmes in 2003 and 2008, respectively.  

Kenya’s education system is thus currently being completely overhauled. This move is particularly in recognition of the challenges facing the education system in the past and the recognition that a new skills set is required for 21st century learners. The Government has developed the National Education Sector Plan (NESP) 2013-2018, a five-year Department of Education’s programme for delivering the reforms. The NESP Implementation Plan focuses on the urgent need to enrol all students in basic education, raise literacy and numeracy levels, reduce existing disparities, and improve the quality of education with a focus on teacher quality, school level leadership, more effective applications of teacher training in the classroom, increasing resources to the education sector, and targeting improvements and monitoring key results. 

In order to make the curriculum specifically relevant to Vision 2030, the government emphasizes the important role played by technology, innovation and entrepreneurship, talent development, and the need for schooling to be more closely related to the world of work. Because technology relies heavily on the use of ICT, the provision of ICT facilities across the education sector has become a government spending priority. However, challenges with the procurement of the devices have led to several postponements, but these appear to have been overcome with the completion of a successful pilot project and awarding of tenders for supply and maintenance of the devices. At the school level, research reports indicate that there are many challenges that hamper efficient implementation including cost of infrastructure, electricity, teachers’ skills and leadership. 

Tertiary and university sub-sectors are also experiencing challenges with regard to poor and limited facilities, resulting in unsatisfactory transition rates from secondary to tertiary and higher education. These issues produce challenges of relevance, quality and equity for Kenya’s education sector. Recently, many efforts have been made to improve access to higher education. Kenya increased its number of universities to 67 in 2014. While valuable, highly educated human resources are generated, many—a percentage as high as 50 percent in Kenya, for instance—are reported to be unemployed. This indicates a mismatch between higher education programmes and the skills needed in the productive sector.

4 Science, Technology, and Innovation (STI)

4.1 STI Policies and Objectives

In 2008, Kenya Vision 2030 was launched, with STI as a key basis for economic, political and social advancement. Vision 2030 outlines the need to integrate STI in national production processes as being central to the success of government policy priorities and programmes.

*Figure 11 STI in Kenya Vision 2030*

Kenya’s STI Policy and Strategy (2009) underscores the mainstreaming and application of STI in all sectors of the economy. The key components of policies and strategies pertaining to STI are:

1) Establishing an institutional and regulatory framework to promote, coordinate, and manage STI, and to mobilize resources.
2) Leveraging STI to transform the economy through the national priority areas.
3) Allocating resources, mobilizing and motivating stakeholder to participate in the sector.
4) Funding to at least 2 percent of GDP annually
5) Facilitating the acquisition of intellectual property rights by scientists, researchers, and innovators
6) Promoting STI knowledge sharing and creating awareness
7) Developing human resource capital in STI to meet the demands of the economy
8) Developing STI infrastructure to support STI programmes in identified priority areas.

According to the Vision 2030 website, two STI initiatives are in the process of being implemented:

- Formulation and enactment of three bills: Universities, TVET and STI – thus far, draft strategies and bills have been finalized and draft Cabinet Memorandum to take the documents to the

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155 Ibid
Cabinet has been completed. The MTP target is to finalise and forward the STI Strategy and Bill, University Education Strategy and Bill and TIVET Strategy and Bill to Cabinet.\footnote{156} To mainstream science, technology and innovation in all sectors of the economy hence create a strong base for enhanced efficiency, sustained growth and promotion of value addition in goods and services. It is not clear what the progress has been with this target although the website indicates that this project is on schedule.\footnote{157}

In 2013, the Science and Technology Innovation Act (revised in 2014) was adopted. The Act focuses on the promotion, co-ordination and regulation of the progress of STI; assigns priority to the development of STI; and entrenches STI into the national production system.\footnote{158}

The Act establishes key institutions to promote STI. These include National Commission for STI (NACOSTI) which was launched to drive Kenya’s Science and Technology Policy; the Kenya National Research Fund; and Kenya National Innovation Agency (KENIA) under the Ministry of Education, Science and Technology. In 2015, the State Department of ICT and Innovation was established under the Ministry of Information, Communications and Technology.\footnote{159}

The mandate of NACOSTI is to enhance co-ordination of national STI. NACOSTI advises, promotes, coordinates and regulates issues of ST&I by collaborating with all MDAs and non-governmental organizations (NGOs) on all matters relating to scientific and technological advice and policy. It will ensure timely and relevant advice to the Government on matters of STI in addressing national priorities.\footnote{160}

KENIA institutionalizes linkages between universities, research institutions, the private sector, the Government and other actors in the innovation system. Section 29(1) of the STI Act outline KENIA’s functions. Some key ones are to:

- scout for and nurture innovative ideas from individuals, training institutions, the private sector and similar institutions;
- increase awareness of intellectual property rights among innovators;
- develop the national capacity and infrastructure to protect and exploit intellectual property derived from research or financed by the Agency; and
- facilitate the application for grant or revocation of patents and institution of legal action for infringement of any intellectual property rights.

Section 32 of the STI Act establishes The National Research Fund. The mandate of the NRF is to mobilize and manage financial resources in order to create knowledge, innovation and development in all fields of science and technology, including indigenous knowledge.\footnote{161} The Fund will be managed by a Board of Trustees. In section 32(2), it is stated that the Fund shall consist of ‘an initial sum of money amounting to two percent of the country’s gross domestic product, provided by the

\footnote{157} Kenya Vision 2030. (no date). Improved ST & I capacities and capabilities to support the key national transformation areas. Retrieved June 14, 2017 from http://www.vision2030.go.ke/projects/?pj=81
\footnote{161} Ibid
4.2 Research and Innovation

At the MoEST, the Directorate of Research Management and Development has a mandate which includes: formulation of policy for research, science, technology and innovation; knowledge management; facilitating and guiding the national research system through policies that rationalize the integration of research and development into overall national economic development; and integrating research into national development. 163

Kenya climbed up the rankings in the Global Innovation Index (GII), rising from 99th position in 2013 to 80th in 2016. 164 These improvements can be attributed to innovative applications of ICTs in various sectors. There are numerous initiatives to drive research and innovation in Kenya. Presented below is a summary of some initiatives (institutes as well as projects):

Chandaria Business Innovation & Incubation Centre

Located at Kenyatta University, Chandaria Business Innovation and Incubation Centre was launched in July 2011 to support new and innovative ideas from Kenyans. The centre accommodates both KU students and other Kenyans in need of support. In line with Kenya's Vision 2030 and Kenyatta University's current Strategic and Vision Plan, the centre focuses on supporting up to 120 Start-ups per year (70 percent Kenyatta University students and 30 percent Non- KU). It aims to blend applied research with innovation and establishment of start-ups as well as predispose Kenyatta University students and Kenyans in general towards being job creators rather than job seekers. It also promotes a culture of innovation among Kenyan youth through various programmes and a platform to provide solutions to challenges facing various industries. 165

@iLab Africa

@iLabAfrica is a Centre of Excellence in ICT innovation and Development based at Strathmore University. It was established to address the Millennium Development Goals (MDGs) and to contribute toward Kenya’s Vision 2030. The research centre is involved in interdisciplinary research, students’ engagement, collaboration with government, industry and other funding agencies. 166

Kenya Industrial Research and Development Institute

The Kenya Industrial Research and Development Institute (KIRDI) is the National Industrial Research, Technology and Innovation Institution under the Ministry of Industrialization and Enterprise Development. It was established in 1979 under the Science and Technology Act Cap.250, Laws of Kenya (which has since been repealed by the Science, Technology and Innovation Act, 2013), as a multidisciplinary Institution to conduct Research and Development in Industrial and Allied Technologies. Its mission is to undertake Industrial Research, Technology and Innovation and disseminate findings that will have positive impact on National Development. The Institute has three

(3) Commercial and Service Centres that provide support to both its core programmes and to industry. The client base of these centres is mainly comprised of micro, small and medium size industries. The institute’s Research Technology and Innovation (RTI) outputs are disseminated through the KIRDI Enterprises Services. Technologies for transfer include those developed in-house through RTI, adopted and adapted technologies, technologies developed through reverse engineering and those identified through mining of patents, among others. It also provides Business Incubation service.\(^{167}\)

**Enterprise Kenya**

Enterprise Kenya is a national accelerator to catalyse innovations and provide entrepreneurs with needed support in their innovation journey. Its role is that of a connector, investor, service provider, regulator and industry catalyst to the entrepreneurs in their pursuit to grow and scale their businesses. The initiative is intended to drive the agenda of “Buy Kenya IT, Build Kenya IT, To Build Kenya.”\(^{168}\)

**Kenya National Academy of Sciences**

The Kenya National Academy of Sciences (KNAS) is a non-political, non-sectarian and non-profit making body founded in 1983. Its aim is to cooperate and collaborate with the Government of Kenya, other scientific organizations and the general public in the mobilization of the scientific community in Kenya for the promotion of the scholarly application of all aspects of science and technology for national development. Its objectives are:

- To promote the advancement of scientific and technological knowledge to establish and enhance standards of scientific and technological endeavour and achievement in Kenya and to recognize outstanding contributions in the fields of science and technology.
- To establish and maintain association and relations between Kenyan scientists and the international scientific community.
- To administer or help in administering funds for purposes of scientific and technological research or projects.
- To organize participate or collaborate in the organization of scientific meetings inside and outside Kenya; to hold symposia; and to arrange visits for scientists from other countries to Kenya and vice versa.
- To provide guidance to sources of scientific information.
- To suggest ways in which scientific projects in Kenya may be instituted, carried out or revised.
- To publish or assist in the publication of scientific knowledge.
- To promote the creation of scientific bodies in Kenya and provide professional guidance in their activities.
- To cooperate with the NCST in the formulation of policies and programmes designed to encourage the development and application of science and technology for national development.
- To undertake all such other activities as may be consistent with the objectives of The National Academy.\(^{169}\)

**Kenya Agricultural and Livestock Research Organization**

Kenya Agricultural and Livestock Research Organization (KALRO) is a corporate body created under the Kenya Agricultural and Livestock Research Act of 2013 to establish suitable legal and institutional framework for coordination of agricultural research in Kenya with the following goals:

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• Promote, streamline, co-ordinate and regulate research in crops, livestock, genetic resources and biotechnology in Kenya.

• Expedite equitable access to research information, resources and technology and promote the application of research findings and technology in the field of agriculture.

KALRO is responsible for the following:
1) Formulate policy and make policy recommendations to the Cabinet Secretary on agricultural research.
2) Prioritize areas for, and co-ordinate, agricultural research in Kenya in line with the national policy on agriculture.
3) Determine and advise the Government on the resource requirements for agricultural research in Kenya both at the national and county level.
4) Regulate, monitor and ensure that all agricultural research undertaken by research institutes and other institutions or persons undertaking agricultural research is consistent with the national priorities specified in the relevant policy documents.
5) Establish and exercise control over the research institutes, committees and research centres established pursuant to this Act.
6) Formulate or approve medium and long term research plans, strategies and budgets of research institutes, committees and organization's established pursuant to this Act.
7) Provide grants to research institutes and persons desirous of carrying out research and training programmes which are consistent with the national research priorities and plans of the Organization.
8) Support and promote the training and capacity building in relation to agricultural research.
9) Promote the dissemination and application of research findings in the field of agriculture and the establishment of a Science Park.
10) Liaise with and ensure the co-ordination of institutions, agencies and persons involved in agricultural research.
11) Establish platforms for the purposes sharing of research information, advancing research and transfer of technology and dissemination of information relating to advancements made in agricultural research.
12) Ensure continuance of performance improvement in the field of agricultural research.\(^\text{170}\)

**iCow**

iCow is the world’s first mobile phone based agricultural information platform for small holder farmers. It is designed to be simple, cost effective and reliable, and works on every phone. It was developed to solve the problem of permanent access to verified valuable agricultural content. Farmers using iCow improve their skills through enhanced knowledge and in so doing reduce their risks. Farmers can either subscribe to iCow services or they can access the content they require 24/7. The information farmers receive is in SMS format in their language of choice. Content is easily retained and shared between farmers. iCow is purposed to help small holder farmers across Africa become climate resilient and food secure.\(^\text{171}\) The application won the Apps4Africa competition because of its innovative approach revolutionizing the interaction with small-scale farmers.

**iHub**

The iHub catalyses the growth of the Kenyan tech community by connecting people, supporting startups, and surfacing information. Established in 2010, the iHub provides an open community space, a part vector for investors and VCs, and part incubator. It is a vibrant and collaborative


environment for innovators and startups to think through their ideas, and develop their solutions, lowering the barriers to entry for many young would-be entrepreneurs.

Our commitment to spurring a vibrant community of innovators and entrepreneurs to build “best in the world” companies tailored to solving the myriad of problems in Africa and across the developing world motivates us. This community includes individual developers, designers, creatives, researchers, scientists, engineers, technologists, as well non-tech people looking to launch startups.  

iHub’s goal is to continuously fuel an ecosystem of innovation and technology, allowing people to develop enterprises that creatively solve problems around them using technology, while shaping the way African innovation is viewed by the world. It supports startups, and connects them with opportunities through its initiatives. iHub Research conducts qualitative and quantitative studies on technology innovation and entrepreneurship, and the intersection between governance and technology in Africa. It also offers consultancy services and trainings on the innovative use of data, hardware research and design, as well as User Experience (UX) and market research.  

MFarm  

MFarm connect buyers and farmers to sell produce. For many low-volume Kenyan farmers, the only source of information about the market rate for crops comes from buyers. The lack of pricing transparency means that farmers don’t always get the best deal. MFarm seeks to solve this by providing up-to-date market prices via an app or SMS, direct to farmers. It also connects farmers with buyers directly, cutting out the middlemen. MFarm thus enable farmers to inquire current market prices of different crops from different regions and/or specific markets. It also aggregates farmers needs/orders and connects them with farm input suppliers. It also enables farmers to sell collectively and connect them with a ready market.  

MPesa  

M-Pesa (M for mobile, pesa is Swahili for money) is a mobile phone-based money transfer, financing and microfinancing service M-Pesa was launched in 2007 by Safaricom, the country’s largest mobile-network operator, and is used by over 17 million Kenyans, equivalent to more than two-thirds of the adult population; around 25 percent of the country’s gross national product flows through it. M-PESA lets people transfer cash using their phones, and is by far the most successful scheme of its type on earth. M-Pesa allows users to deposit, withdraw, transfer money and pay for goods and services (Lipa na M-Pesa) easily with a mobile device. The service allows users to deposit money into an account stored on their cell phones, to send balances using PIN-secured SMS text messages to other users, including sellers of goods and services, and to redeem deposits for regular money. Users are charged a small fee for sending and withdrawing money using the service. M-Pesa is a branchless banking service; M-Pesa customers can deposit and withdraw money from a network of agents that includes airtime resellers and retail outlets acting as banking agents. M-Pesa has spread quickly, and by 2010 had become the most successful mobile-phone-based financial service in the developing world. The service has been lauded for giving millions of people access to the formal financial system and for reducing crime in an otherwise largely cash-based society.

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UShahidi

Ushahidi, which translates to “testimony” in Swahili, was developed to map reports of violence in Kenya after the post-election violence in 2008. It creates custom-built crowdsourcing, mapping, and data visualisation software. One of Ushahidi’s initiatives is the Resilience Network Initiative, which supports and trains community based organizations to engage with local government using open-source tools. This work is in partnership with The Rockefeller Foundation’s 100 Resilient Cities.177

IBM Research -Africa

IBM Research – Africa is the first industrial research facility on the continent, with facilities in Kenya and South Africa. It is driving innovation by developing commercially-viable solutions to transform lives and spark new business opportunities in key areas such as water, agriculture, transportation, healthcare, financial inclusion, education, energy, security and e-government. It is also engaging with Africa’s innovation ecosystem to kick start new business opportunities and ensure the full commercial viability of its solutions and services.178

Kenya Medical Research Institute

Kenya Medical Research Institute (KEMRI) is a State Corporation established through the Science and Technology (Amendment) Act of 1979, which has since been amended to Science, Technology and Innovation Act 2013. The 1979 Act established KEMRI as a National body responsible for carrying out health research in Kenya. It is thus the Medical Research arm of the Government and provides advice to the Ministry on various aspects of healthcare and delivery. Its mission is to improve human health and quality of life through research, capacity building, innovation and service delivery. KEMRI has six main research programmes, aligned to the KEMRI Strategic Master Plan and the Vision 2030: Biotechnology, Natural Products Research & Drug Development (NAPREDA), Infectious and Parasitic Diseases, Public Health & Health Research Systems, Non-Communicable Diseases, and Sexual, Reproductive, Adolescent & Child Health. It also has several Research and Training Centres.179

4.3 Human Resource Development

Education and human capital development have been at the centre of Kenya’s economic development thinking for many decades. Kenya’s first National Development Plan 1964-1970 (Kenya, 1964) attached significant political and economic importance to promoting education and made recommendations for substantial public funding. More recently, and as already highlighted above, Vision 2030 strongly emphasizes the importance of building local capacity for STI and integrating knowledge production and utilization into the overall national development strategy in order to achieve rapid economic growth, poverty reduction, and Millennium Development Goals.180 Specifically, one of the strategic policy issues for STI under Vision 2030 is Human Resource Development: “Provide an enabling environment for building a critical mass of human resource, to harness and effectively participate in the application of STI.”181

STI strategies in education include mainstreaming STI into the curriculum; establishing and equipping science laboratories in all secondary schools; establishing centres of specialisation for key sectors; and, promoting e-learning at TIVET and university levels. The Government aims to equip the workforce in the 17-23 age group with skills in targeted industries like ICT, biotechnology, Halal industry, petrochemicals, education, and tourism, including health and eco-tourism. The MoEST has outlined strategies to enhance the effectiveness of, and harmonise, international science and technology cooperation and collaborations. These strategies are expected to increase involvement of Kenyan scientists and researchers in international STI programmes and projects as stimulus to attract Kenyan researchers and scientists – who study and work in developed countries – in the participation of domestic STI initiatives; enhance activities in the adoption of advanced foreign technologies and increase foreign aid and support in implementing STI priorities.\footnote{182}

In order to address the lack of adequate and skilled labour force, Kenya aims to take measures that improve the national pool of skills and talent through training. The Government intends to favour the transition from secondary level education to university and strengthen the postgraduate training, particularly in science and technology. The Ministry of Higher Education, Science and Technology also aims to develop a mechanism to retain the highly talented Kenyans from the education system and attract the best from the diaspora, and to promote innovative in-house research and development. It further aims to identifying successful policy measures for increasing participation, in particular of women, in scientific and technological education and careers.\footnote{183}

In strengthening the capacity of micro-, small- and medium-scale enterprises (MSMEs), the Government intends to implement various programmes to upgrade the skills and technical competencies of both workers and owners of MSMEs, and increase their productivity and level of technology utilization. The GoK also emphasizes the need to enhance the capacity to effectively leverage indigenous resources and knowledge.\footnote{184}

Furthermore, to intensify innovation the Government intends to increase funding for basic and applied research at higher institutions of learning and for research and development in collaboration with industries. Kenya aims also to adopt strategies to coordinate research activities among the various institutions in order to ensure synergy and avoid duplication.\footnote{185}

The Government implemented the following initiatives to increase the ICT talent pool in order to meet the demand for ICT skilled human capital:

**Kenya Institute of Mass Communication Graduates**

In line with Kenya Vision 2030 objective of increasing the ICT talent pool, the Kenya Institute of Mass Communication (KIMC) empowered 1,000 Youths through provision of hands on skills in Mass Communication. It is worth noting that majority if not all the 1000 graduates have already secured employment in the ICT sector following the Digital TV Migration.\footnote{186}

\footnote{183}{Ibid}
\footnote{184}{Ibid}
\footnote{185}{Ibid}
Training in Telecommunication
The ministry offered internships to over 1,000 youths enabling them to gain practical experience in various fields as well as facilitating 20 youths who are trainees in Telecommunication Engineering to undergo specialized training abroad.  

Presidential Digital Talent
The government launched the Presidential Digital Talent programme targeting over 500 Youths to train in good corporate and public governance. Thus far, 100 young graduates have been identified and have started training in various Government and private organizations. The programme is expected to inspire Kenyan youths with the required skills in management and service excellence in both public and private sector. This programme is been implemented in partnership with renowned international ICT Companies.

Nuclear Energy Power Programme
Kenya aims to build a 1,000MW nuclear power plant with 4,000 MW of power from nuclear electricity by 2030, with the first nuclear power plant of 1000MW targeted for completion in 2027. The Government of Kenya through the Kenya Nuclear Energy Board, has sponsored 15 students from various parastatals in the Ministry of Energy for Masters of science in Nuclear Science degree course at the University of Nairobi, institute of nuclear science and technology. Other 11 Kenyan students pursuing a two-year Masters degree programme in nuclear engineering, are currently studying at the Korea Electric Power Corporation (KEPCO) International Nuclear graduate school sponsored by both the Government of Kenya and the Government of Korea and 11 more scholarships are being offered for Kenyan students to study nuclear operations in Slovakia in Europe, to improve the local capability to run all aspects of nuclear power generation.

Encouraging girls and women to take up science and technology programmes
There is recognition of the importance to encourage girls and women to take up science, technology and engineering based subjects, and courses to enable them participate in developing innovative engineering solutions. Currently, only 30 percent of college-going students doing Science, Technology, Engineering and mathematics are women, a situation which requires addressing. The government is taking measures to address the disparities between male and female students studying science and technology based programme by providing incentives and mentorship programmes to women. For example, through the Presidential Digital Talent programme, the government takes newly graduated girls on board for internship in the Public and Private sectors for one year where they learn work place experience and innovative solutions under mentorship.

Ndemo (2015) argues that perhaps the most important development in research and innovation is the fact that all universities now have a senior staff member, at the level of deputy vice-chancellor, who is in charge of research. This has resulted in the development of supporting infrastructure. For example, Jomo Kenyatta University of Agriculture and Technology has put up an Industrial Technology Park for research output. Kenyatta University has its Manu Chandaria Incubation Centre; the University of Nairobi started C4D Lab (a software incubation centre) and will soon start its own science park, which will focus more on its fab lab, in conjunction with the Massachusetts Institute of Technology (MIT). Konza City Technology Park and will harmonize university research activity with

187 Ibid
188 Ibid
189 Ibid


industry and government. Most universities are collaborating with international partners to enhance knowledge transfer while, at the same time, providing new solutions.  

4.4 Key Actors and Players

<table>
<thead>
<tr>
<th>Actor/Player</th>
<th>Role and Area of Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Commission for STI (NACOSTI)</td>
<td>To enhance co-ordination of national STI. Provides timely and relevant advice to the Government on matters of STI in addressing national priorities.</td>
</tr>
<tr>
<td>Kenya National Research Fund</td>
<td>The mandate of the NRF is to mobilize and manage financial resources in order to create knowledge, innovation and development in all fields of science and technology, including indigenous knowledge.</td>
</tr>
<tr>
<td>Kenya National Innovation Agency (KENIA)</td>
<td>KENIA institutionalizes linkages between universities, research institutions, the private sector, the Government and other actors in the innovation system.</td>
</tr>
<tr>
<td>Kenya National Academy of Science (KNAS)</td>
<td>Collaborates with the Government of Kenya, other scientific organizations and the general public in the mobilization of the scientific community in Kenya for the promotion of the scholarly application of all aspects of science and technology for national development.</td>
</tr>
<tr>
<td>Kenya Institute Public Policy Research and Analysis (KIPPRA)</td>
<td>Established in May 1997, it is an autonomous think tank to provide quality public policy advice to GOK and other stakeholders.</td>
</tr>
<tr>
<td>The Kenya Industrial Research and Development Institute (KIRDI)</td>
<td>KIRDI is the National Industrial Research, Technology and Innovation Institution under the Ministry of Industrialization and Enterprise Development. Its mission is to undertake Industrial Research, Technology and Innovation and disseminate findings that will have positive impact on National Development.</td>
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4.5 Challenges facing the STI sector

It has been argued that the innovation in Kenya was already taking place before the creation of official innovation policy. Policies were created after some sectors had already begun considerable innovation efforts, and is thus ‘catching up’ to what is already a work in progress. Several research institutions such as Kenya Agricultural Research Institute, the Kenya Industrial Research and Development Institute, and the Kenya Medical Research Institute already have a long history of research and development.

Nevertheless, the government policy and strategies regarding STI provide a positive framework to develop STI and propel Kenya towards a knowledge society. While there are numerous policy goals, implementation appears to still be in its infancy and it is thus unclear how these goals will be applied. For example, with the higher education sector facing funding shortages, it is not clear how human resources in STI will be developed at the tertiary level. A significant gap in the policies is the lack of an effective intellectual property rights (IPR) system, which is an important incentive to innovation.  

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193 Ibid
194 Ibid
Furthermore, despite the existence of a policy framework, challenges hindering adoption of STI as a key driver for economic growth still exist. In the period 2007–12, resource allocation to research and development (R&D) was prioritized as a basis for achieving Vision 2030. However, that momentum has since dissipated as a result of the lack of a national commitment to leverage innovation for greater economic expansion. Resource allocation to R&D is often not guaranteed, and the little that is allocated to research institutions is spent on recurrent expenditures. Another challenge is that there is a lack both of central coordination of R&D and of advocacy for multidisciplinary research. Even within the government, research is undertaken largely in silos, leading to capacity underutilization. This lack of coordination means that SMEs do not have the R&D support necessary to bring new products to market. The situation is further complicated by the fact that the number of TIVETS are declining, as some have been converted into universities. There is now, however, a policy initiative to create a TIVET Authority and build new institutions.\(^\text{195}\)

At the operational level, the disconnect between industry and institutions undermines STI. While industry complains that graduates from local universities are not ready for industry, universities complain that they are not getting enough feedback from industry. Some leading firms, especially in the ICT sector, are filling the ICT skills gap of workers by providing bridging courses and offering internships. Some universities have also begun incubation centres to nurture emerging entrepreneurs.

Other challenges faced include addressing a fragmented STI sector which is not reaping the benefits of synergy and networking; poor linkages between the research base and industry; inadequate funding with over-reliance on external resources; and lack of advocacy for STI at high political and policy levels. However, Kenya is making progress towards overcoming these barriers through its clear and targeted policy interventions.\(^\text{196}\)


5 Conclusion and Recommendations

The Government of Kenya is moving away from a “factor driven” model of economic development to one that is knowledge-based and “innovation driven”, wherein, the creation, adaptation and use of knowledge will be among the most critical factors for rapid economic growth. The large and growing body of major recent policy blueprints in Kenya appears unanimous that the science-technology-innovation triad is critical for promoting economic growth, stimulating productivity, and improving people’s livelihoods. Kenya’s Vision 2030 and the STI policy and strategy provide the framework for creating a knowledge-based economy. The Vision 2030 discourse centres on institutional reforms, human resource development, and enhanced research and development, as well as improved science and technology infrastructure. An emphasis is also placed on pursuing more and better collaborations and partnerships. The MoEST is spearheading capacity building and innovation, and several institutions that support innovation have been created.197

Since the progress that has been made in both policy and institutions, research and innovation have begun to advance in Kenya. Universities are competing to set up software and hardware incubation centres that would link them to industry. The University of Nairobi and Strathmore University have track records of successful incubation programmes that have led to the commercialization of their research outputs. Innovations, especially in the agricultural sector, have also led to greater productivity and contributed to the country’s growth. A recent rebasing of the economy established that the size of Kenya’s economy was 25 percent larger than previously believed, making it the 5th largest economy in Sub-Saharan Africa—behind only Nigeria, South Africa, Angola, and Sudan. Some studies attribute Kenya’s growing economy largely to ICTs.198

The country is working towards improving access to social services such as education and healthcare for both urban and rural populations, as a way of combating inequality. The current restructuring of the education system and the implementation of the digital learning programme also shows promise in gearing the country’s direction towards ICT and STI. The National ICT and Education Policies re-affirm the Government commitment to ensuring ICT is integrated in all education and training programmes. The policies indicate the importance of ICT in addressing access and equity, quality and relevance, governance and efficiency challenges in education and training as well as other cross cutting issues and the need for 21st century skills required in a KS. The integration and application of ICT within the learning process in the education sector in Kenya is still in its infancy. However, new initiatives are still dominated by technical aspects. In order to appropriately integrate ICT for an improved education quality, technology and pedagogy need to be developed closely together, with pedagogical considerations becoming the key guiding and driving force.

Relative to other African countries, some of Kenya’s strengths lie in its current expenditure on education, relatively easy access to credit for individuals, increasing R&D spending, and intensity of local competition (Kenya is a free market economy where competition is encouraged). With devolved governance, continuity in government reforms, and a fairly stable political environment, Kenya is in a good position to leverage innovation.

All these initiatives clearly demonstrate, at least on paper, that Kenya is firmly committed to nurturing a knowledge-driven development agenda. However, the issue of whether there is sufficient capacity and financial commitment to these goals remains debatable.199 Relative to other countries in Africa, Kenya is making good progress in ICT, Education and STI. It has developed

199 Ibid
comprehensive policy frameworks, but the relationships between research institutions and industry remain disjointed. The government has played an important role in creating an effective triple helix that will eventually harmonize innovation programmes for greater economic growth, but the communication of policy to innovation actors must be enhanced. There is also a need to encourage the establishment of more TIVETs and business-friendly educational programmes, and to foster greater collaboration between industry (specifically SMEs) and research institutions. 200 Thus, to take advantage of the progress it has already made, Kenya needs to improve institutions, build human capital, invest more in innovation infrastructure, create an enabling environment for knowledge and technical and creative output, and continue to embrace a free market economy to encourage greater market and business sophistication.

6. References


About GESCI

The Global e-Schools and Communities Initiative (GESCI) is an international non-profit organisation founded on the recommendation of the United Nations Task Force on Information Communication Technology (ICT). GESCI was established in 2003 at the first World Summit on the Information Society.

The United Nations ICT Task Force identified education as an area in critical need of development, and one where ICT has the potential to make a positive impact. Initially GESCI was headquartered in Dublin, Ireland, and in 2011 moved its headquarters to Nairobi, Kenya.

GESCI’s mandate is to assist governments in the socio-economic development of their countries through the widespread integration of technology for inclusive and sustainable knowledge society development.
Assessment of Knowledge Society Development in Kenya June 2017

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