Assessment of Knowledge Society Development in Zambia
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

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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.⁷ 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.⁸ 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.⁹

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.¹⁰ 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).¹¹

### 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.¹² 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 jointly 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 Zambia

1. Introduction

Zambia is a land-locked country of 752,614 square kilometres located in the Southern African region bordered by the Democratic Republic of the Congo, Tanzania, Malawi, Mozambique, Zimbabwe, Botswana Namibia, and Angola. The capital city is Lusaka. Zambia is a member of the Southern African Development Community (SADC), the Common Market for Eastern and Southern Africa (COMESA) and the African Union.

Figure 2 Map of Zambia

According to the World Bank, Zambia’s population in 2015 stood at 16,211,767 with an annual population growth rate of 3.072. Zambia has one of the world’s youngest populations with 46.08% of the population under the age of 14 and 48% of the population between the ages of 15 and 54.

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English is the official language, but there are 72 vernacular languages, of which seven are officially recognised, namely: Bemba, Nyanja, Lozi, Tonga, Kaonde, Luvale, and Lunda.

Zambia achieved independence from Britain in 1964. In 1991, the Movement for Multiparty Democracy brought an end to one-party rule and Zambia has been a multi-party democracy ever since. Power is currently in the hands of the Patriotic Front under President Edgar Lungu. The current Patriotic Front government is pushing decentralization to bring administration nearer to people, and created 32 new administrative districts bringing the total to 105.

Economically, Zambia is considered a lower-middle income country and has had one of the fastest growing economies in the world in the past decade. However, according to the World Bank, Zambia’s growth rate in 2015 was 2.92%. This is down from an average of over 5% since 2000. The current slow-down is mostly attributable to a fall in the international copper price, reduced power generation and a fall in the value of the official currency, the kwacha. In spite of this impressive long-term growth record, 60% of Zambians still live in poverty.

According to the CIA World Fact Book, “widespread and extreme rural poverty and high unemployment levels remain significant problems, made worse by a high birth rate, a relatively high HIV/AIDS burden, and by market-distorting agricultural and energy policies.” In addition, relatively

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21 The kwacha was Africa’s worst performing currency in 2015
poor water management, contributing to a shortage in power generation has hampered industrial productivity and contributed to an increase in the official inflation rate of 23% in 2016. Indeed, in 2012, only 22% of the population had access to electricity and the country was ranked 120 out of 138 countries for the quality of its electricity supply in the World Economic Forum’s Global Competitiveness Index in 2016 with a strong downward trend.

According to the Zambia Development Agency as of 2012 the different sectors contributed to GDP as follows: Agriculture – 12.2%, Manufacturing – 11.2%, Construction – 13.0%, Mining – 8.0%, and Communications – 4%.

The government has done well in reducing inflation, bringing down the deficit, however success in diversifying the economy has been rather more mixed. Institutional weakness, inefficient policy frameworks, corruption, and weak protection of property rights are some of the reasons for this.

Other important socio-economic indicators are summarised below.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Socio-economic indicators for Zambia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Socio-economic indicator</strong></td>
<td><strong>Value</strong></td>
</tr>
<tr>
<td>Human Development Index (2015)</td>
<td>0.586 (Rank = 139)</td>
</tr>
<tr>
<td>Life expectancy at birth (2015)</td>
<td>60.047 years</td>
</tr>
<tr>
<td>Infant Mortality (2015)</td>
<td>43.3 deaths/1,000 live births</td>
</tr>
<tr>
<td>GDP per Capita PPP (2015)</td>
<td>US$3,835</td>
</tr>
<tr>
<td>Unemployment Rate (2014)</td>
<td>13.3</td>
</tr>
<tr>
<td>Adult Literacy (2015)</td>
<td>85.117%</td>
</tr>
</tbody>
</table>

Policy in Zambia is guided primarily by Vision 2030, the government’s long term plan. Vision 2030 aims to transform the country into a “prosperous middle income nation by the year 2030”. Vision 2030 is primarily being implemented through a series of five-year national plans which are aligned to

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the political tenure of governance. The current national plan is the Revised Sixth National Development Plan (RSNDP 2013 – 2016) whose theme is "Sustained economic growth and poverty reduction".\(^{36}\) The revision arose as a result of aligning the national plans to political tenure of office. The RSNDP was to be achieved through accelerated infrastructure and human development, enhanced economic growth and diversification, and promotion of rural development. The Seventh National Development Plan is currently being developed.

The Zambia Telecommunications Act of 1994, initiated Zambia’s progressions towards being a knowledge society with the liberalisation of the telecommunications sector. It was subsequently repealed in 2009 when, in November, the Zambian government enacted new legislation to enforce the principles and objectives of the National ICT Policy to establish a new institutional, legal and regulatory environment. The new legislation consists of the following:

1) The Information and Communication Technologies (ICT) Act of 2009, which provides for the economic and technical regulation of information and communication technology; facilitates access to ICTs; “protects the rights and interests of service providers and consumers”; and regulates and manages radio spectrum. The ICT Act also renamed the Communications Authority of Zambia (CAZ) to the Zambia ICT Authority (ZICTA).

2) The Postal Services Act of 2009, which provides for the regulation of the postal and courier services by ZICTA. Previously, the Ministry of Communications and Transport regulated the postal and courier services.

3) Though the new legislation recognises the trends towards convergence, the licensing regime is yet to embrace the concept of unified licensing.

4) The Electronic Communications and Transactions (ECT) Act No. 21 of 2009, which provides for the development of a safe, secure and effective environment for the consumer, business sector and the Government to conduct and use electronic communications; promotes legal certainty and confidence, and encourages investment and innovation in the electronic communications industry; facilitates the creation of secure communication systems and networks; and allows the legal interception of electronic communications and admissibility of intercepted communications.

In addition, the Zambia National Policy recognizes ICT to be a crosscutting tool for economic development in general, and for the attainment of the United Nations’ Millennium Development Goals (MDGs) in particular.

The Fifth National Development Plan (FNDP) from 2006 to 2010 proposed and initiated the installation of provincial and district optical fibre cables and the establishment of rural community multi-purpose tele-centres. The Revised Sixth National Development Plan 2013 – 2016 (RSNDP) articulated the need to “accelerate growth further and promote viable livelihoods of the Zambian people, especially in the rural areas.”\(^{37}\) The Plan, therefore, focused on “investing in a few selected sectors that will have the greatest impact on job creation, rural development and inclusive growth.”\(^{38}\)

In line with this focus the RSNDP has the following goals:

1) To promote employment and job creation through targeted and strategic investments in selected sectors;


\(^{37}\) Ibid

\(^{38}\) Ibid
2) To promote rural development by promoting agricultural development, rural enterprises and providing support infrastructure in rural areas;
3) To enhance human development by investing in the social sectors; and
4) To accelerate infrastructure development to enhance the growth potential of the economy.

A strong emphasis was to be placed on Science and Technology, Agriculture, Energy, Infrastructure Development, Health, Education and Water and Sanitation. It noted that, while agriculture is the major employer in the country, reliable and efficient infrastructure and well developed human capital were essential to promote inclusive growth, productivity and a reduction in poverty.

As noted above, inadequate power generation has emerged as a key constraint of economic growth. It is instructive to note, therefore, that in 2012, only 22% of the population had access to electricity and that almost all of the country’s electricity production came from renewable sources (99.696 of supply) (primarily from hydroelectric). It remains to be seen whether Zambia can overcome its water management issues to both rapidly increase the amount of electricity generated and its accessibility to more of the population while still ensuring that almost all of this increase in generation capacity comes from renewable sources. An estimated potential 6,000MW of hydroelectric generation capacity exists in the country.

As noted above, a lack of electricity generation capacity, combined with a fall in the global copper price, has recently negatively impacted Zambia’s economy. Ninety-five percent of Zambia’s electricity is generated from hydropower and so is classified as renewable. However, this generation capacity has been severely limited by recent prolonged drought conditions, the result of global climate changes. Power generation at Lake Kariba, for example, is 25% of capacity and Lake Kariba accounts for 40% of the country’s generation capacity.

That the recent drought period is the result of global climate change does not appear to be in doubt. Average rainfall in Zambia has, from 1960, been decreasing at a rate of 1.9mm per month per decade, resulting in observably shorter growing seasons. In addition, surface temperatures over most of Africa have risen by half a degree Celsius through the 20th century and the 15 year period from 1995 experienced significantly higher temperature anomalies than the previous 15 year period. This warming has been particularly acute in many parts of Zambia with average temperatures rising by 1.3 degrees Celsius between 1960 and 2003. Further, Africa is expected to continue warming faster than the global average over the next few decades. Over the next 40 years, Zambia is expected to receive less precipitation but receive it more erratically leading to more periods of drought and flooding.

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43 Ibid
Besides the effects on electricity generation, these events pose risks to health and agriculture and therefore the safety and security of large proportions of the Zambian population living in the flood plains of the Zambezi river. Seventy percent of the Zambian population rely directly on agriculture.\(^{49}\)

In response, Zambia is in the process of adopting a comprehensive National Policy on Climate Change to facilitate and support coordinated responses to the challenges posed by climate change.\(^{50}\) This follows the development, in 2007, of Zambia’s National Adaptation Programme of Action (NAPA). NAPA identified 39 urgent adaptation needs across ten priority areas including health, agriculture, energy, water, and food security and made mitigation and adaptation recommendations.\(^{51}\)

Besides these policy initiatives, Zambia has also participated in other mitigation processes including:  
1) Implementation of the clean Development Mechanisms (CDM), a flexible mechanism under the Kyoto Protocol;  
2) Piloting of the United Nations Programme on Reducing Emissions from Deforestation and Forest Degradation Programme; and  
3) Promoting of conservation agriculture.\(^{52}\)

To date, however, Zambia has remained a relatively stable and peaceful country and has not been involved in any major armed conflicts in recent decades. Edgar Lungu became the country’s sixth president in January 2015 and his administration appears to be stable. The effects of climate change described above, however, if not adequately mitigated, have the potential to cause civil unrest and dissatisfaction with the government. Although state-run media dominate, there is a growing independent media presence in the country\(^{53}\) although Freedom House did rate Zambia as ‘Partly Free’ in its 2017 survey and reported increases in editorial pressure, harassment and intimidation of private media and journalists as well as unequal media access for opposition parties in the run-up to the 2016 elections.\(^{54}\)

2. Information and Communication Technology (ICT)

Zambia, in 1994 with the passing of the Zambia Telecommunications Act, was one of the first African countries to act in adopting and using ICT as a tool to reduce the development divide thereby increasing the chances of improving the quality of life of its citizens. ICT is an enabler to build an information centred society where everyone can create, access, utilize and share information and knowledge, leading to greater productivity, greater competitiveness, and sustainable economic growth, a precondition for poverty reduction. ICT can also be used as an effective tool in enhancing good governance.55

The broad vision of ICT development in Zambia is reflected in Vision 2030. Zambia aspires to be a nation in which science, technology and innovations are the driving forces in national development and where it is able to complete globally by 2030. Vision 2030 outlines that this will be achieved by (among other things) the following:
1) Being technologically proficient, fully able to adapt, innovate and invest using its human, and natural resources;
2) Deploying a robust and competitive transport and communications network that services the region;
3) Implementing a diversified education curriculum that is responsive to the knowledge, values, attitudes, and practical skill needs of individuals and society at large; and
4) Establishing a knowledge-based economy that is fully competitive, dynamic, robust, and resilient in an integrated global and liberal environment.56

In terms of ICT, Vision 2030 articulates the following specific goals:
1) Increase connectivity to optical fibre (telecommunication infrastructure rollout) and other high capacity transmission technologies (networks) from 7 to 72 districts by 2010;
2) Increase the access to phones per 100 people (tele-density) from 0.9 to 8 by 2015 and to 50 by 2030; and
3) Increase access to ICT services such as Internet users from 35,000 in 2005 to 100,000 by 2015 and to 1,000,000 by 2030.57

ICT in Zambia is regulated by the Zambian Information and Communication Authority (ZICTA) which is mandated to
1) Promote the development of a competitive and efficient ICT sector;
2) Administer the licensing system;
3) Promote universal access, establishment and administration of a universal access and service fund;
4) Regulate tariffs and interconnection rates;
5) Set and monitor standards for regulated services in the ICT and postal sectors;
6) Manage and ensure efficient use of scarce resources i.e. frequency spectrum and numbers;
7) Promote the development and provision of e-service;
8) Protect the interest of consumers; and
9) Promote research and development in ICTs.58

57 Ibid
Zambia was ranked 121 out of 125 countries for the quality of its ICTs in the 2016 Global Innovation Index.\textsuperscript{59} Its overall ranking on the World Economic Forum’s 2016 Networked Readiness Index was 116\textsuperscript{th} out of 139 countries. Particularly weak sub-components include infrastructure and digital content (129\textsuperscript{th}), affordability (129\textsuperscript{th}), individual usage (126\textsuperscript{th}), and economic impacts (115\textsuperscript{th}). This stands in contrast to business usage (77\textsuperscript{th}), political and regulatory environment (61\textsuperscript{st}), and the business and innovation environment (39\textsuperscript{th}).\textsuperscript{60}

\section*{2.1 ICT Policy Frameworks}

Zambia does not appear to have a recent single unifying ICT Infrastructure plan or policy in place. Rather, the most recent details are contained in Vision 2030 and the RSNDP. The most recent available National ICT policy is the National Information and Communication Technology Policy (NICTP) of April 2006.

The National ICT Policy of 2006, coupled with the Vision 2030 and the RSNDP, guide the national implementation of ICT activities. Together, these documents highlight the need to increase coverage and to increase access to and efficiency in the provision of ICT services.

The broad goals related to ICT contained in Vision 2030 have been outlined above. The NICTP describes itself as an ICT4D policy document designed to fit with the social-economic development agenda of the country rather than as a stand-alone framework.\textsuperscript{61} It notes that all sectors of the country should draw their ICT policies from it. In this way, it stands as a unifying framework for ICT policy in Zambia.

The NICTP outlines 13 key goals as pertain to the role of ICT in developing the country, namely:

1) \textit{Human resource development} – To attain sufficient and world-class human resource capacity in critical and relevant ICT skills required for developing and driving Zambia’s information and knowledge based society and economy.

2) \textit{Education, research and development} – To integrate ICTs in the education system and develop the nation’s Research and Development (R&D) capacity to support, facilitate and contribute to the development of key sectors of the economy including the development of appropriate local ICT products and services.

3) \textit{Public access, content development and cultural heritage} – To promote widespread public access to information through appropriate traditional and new technology solutions based on relevant local content while promoting cultural heritage.

4) \textit{The ICT sector} - To develop a competitive local ICT industry supported by a clear policy roadmap; fair and transparent regulatory framework and pro-investor market conditions resulting in the effective participation of the private sector in value-adding, export-oriented services; serving as the main engine for accelerating the development of the local economy.

5) \textit{Telecommunications and supporting infrastructure} – To increase access and promote widespread deployment of ICT services through the expansion of the nation’s telecommunications backbone infrastructure covering the whole country.

6) \textit{Electronic government} – To improve public sector management as well as efficient and effective delivery of public goods and services through the implementation of E-Government systems.

7) \textit{e-Commerce} - To promote Zambia’s full and effective participation in national, regional and global trade through E-Commerce services and facilities.

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8) **Agriculture** – To improve productivity as well as competitiveness of the agricultural sector through the use of ICTs in the planning, implementation, monitoring and the information delivery process.

9) **Health** – To improve access to quality healthcare as close to the family as possible through the deployment and exploitation of ICTs and other modern technologies.

10) **Tourism and natural resource management** – To integrate ICTs in the development of the tourism industry and facilitate the conservation of Zambia’s natural resources & heritage as well as to protect the environment.

11) **Women and youth** – To use ICTs as an instrument to mainstream youth and women issues in all activities of the economy and society as well as empower youths and women through opportunities created by the implementation of ICT projects and programmes in the country.

12) **Regulatory frameworks** – To develop appropriate institutional, legal and regulatory system in order to support the development of a competitive local ICT sector based on convergence principles; supported by fair, predictable, and transparent legal and regulatory framework.

13) **Security** – To safeguard national, institutional and individual security concerns to support the development, deployment and effective use of ICTs within the Zambian economy and society at large.

The RSNDP goes further to list the following broad challenges that need to be overcome.

1) High cost of service provision;
2) Limited broadband infrastructure across the country;
3) Lack of content development facilities such as film production studios and incubation centres for ICTs;
4) Poor utilisation of ICTs in public service delivery;
5) Lack of weather data capture and processing facilities; and
6) Limited utilisation of ICTs for commerce by private sector.

The RSNDP outlines specific sectors of the economy to which ICT will continue to be applied. These are:

1) **Commerce** – reduce the cost of doing business; increase access to local and international markets; support improvement in business productivity and efficiency.
2) **Agriculture** – support access to pricing information; support improved market access; increase production and production efficiency; improve disease management and meteorological forecasting.
3) **Health** – implement tele-medicine to improve coverage, access and quality.
4) **Education** – implement ICT to improve delivery and accessibility as well as quality.
5) **Local Government** – improve transparency and efficiency.

The following table, from the RSNDP, outlines the key strategic objectives as these relate to ICT.

**Table 1 Key Strategic Objectives of the Revised Sixth National Development Plan 2013 - 2016**

<table>
<thead>
<tr>
<th>No.</th>
<th>Objectives</th>
<th>Strategies</th>
<th>Programmes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>To develop and maintain ICT and Meteorology infrastructure</td>
<td>a) Develop a national infrastructure development policy on ICT; b) Promote Public Private Partnerships (PPP) in the provision and maintenance of infrastructure; c) Expand National optical fibre networks and Met stations; d) Establish ICT and climate change</td>
<td>Infrastructure Development with Climate Change consideration</td>
</tr>
</tbody>
</table>

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62 Ibid
64 Ibid
With reference, particularly to the e-Government, the E-government Strategic Plan for the period 2012-2015 was developed based on the ICT Policy of 2007, the RSNDP and Government’s development agenda. The following six priorities were identified in the plan.

1) Integrated National Registration Information System comprising various components - National Registration, Births and Deaths Registration, Marriage Registration, Adoptions Registration, Village Registration, Citizenship Registration, and Passport issuance;

2) Land Management Information System to track and manage all land records, issuance of title deeds and processing;

3) e-Education through improved education management via an Education Management Information System, Human Resources Management Information System and Bursary Management Information;

4) e-Health through improved medical training accessibility;

5) Electronic Zambia Transport and Information System to support broader and easier access to services provided by the Ministry of Transport and Communication and the Transport Authority e.g. Driver’s License and the Registration of Motor Vehicles; and

6) e-Municipalities to facilitate the delivery of local municipal services.

Other e-government initiatives planned and/or implemented include:

1) The Zambia Data Portal65 – a publicly accessible store of data collected and collated by the Zambian Central Statistical Office

2) Business Licensing Portal66 – online registry of Zambian businesses and new business registrations

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3) e-Visa\textsuperscript{67} – online visa applications  
4) e-Tax and e-filing\textsuperscript{68} - online tax filing

The National Assembly’s ICT Master Plan of 2010 is an important addition to the ICT policy and planning mix in this its focus is on improving the National Assembly’s ability to contribute to and monitor the development of ICT capabilities in other sectors. It rests on five broad pillars namely,

1) Strengthening the Assembly’s own ICT institutional and governance framework including the development of Parliamentary Information Systems Operations Policy;
2) Strengthening the Assembly’s own ICT infrastructure including the hardware, software, and human capital required to publicly broadcast all proceedings;
3) Strengthening the Assembly’s oversight, legislative, and representative functions especially as these relate to ICT and broader knowledge society issues;
4) Strengthening the Assembly’s oversight over ICT policy and strategies by giving members of the Assembly clearer insights into the role of ICTs; and
5) Strengthening the Assembly’s community development and inter-parliamentary cooperation so as to enable members to learn from best practices and experiences in other jurisdictions.\textsuperscript{69}

The Ministry of Information and Broadcasting Service (MIBS) is responsible for policy and oversight over the sector. The key legislation that governs the regulatory framework for the broadcasting sector in Zambia consists of the Zambia National Broadcasting Corporation (ZNBC) Act of 1987 and the Zambia National Broadcasting (ZNBC) (Licensing) Regulations of 1993.

In 2003, the Government provided further stimulus for the liberalisation of the broadcasting industry through the enactment of the Independent Broadcasting Authority Act No 17 of 2002 and the ZNBC Amendment Act of 2002.

2.2 ICT Infrastructure

ICT infrastructure in Zambia tends to be relatively undeveloped with many parts of the country only able to access very basic infrastructure and although there has been progress in the provision of ICT services, the sector still faces challenges which include high cost of service provision, limited access to information especially in rural areas and poor infrastructure. For example, only 93% of the country has access to a 2G mobile network while only just over half the country (53%) has access to a 3G mobile network.\textsuperscript{70} Fourth generation networks were launched in the country in 2012\textsuperscript{71} but still only cover the major metropolitan areas.

Mobile phone subscriptions, as in many other parts of the continent, have increased exponentially over the past decade. In 2015, Zambia had a mobile phone penetration of 74 subscriptions per 100 people (up from 41 in 2010)\textsuperscript{72} and fixed telephone subscriptions of 0.75 (down from 0.9 in 2010).\textsuperscript{73}


\textsuperscript{73} Ibid
While mobile phone subscriptions are in line with the rest of sub-Saharan Africa, fixed line subscriptions are only 75% of the average for the region.

In terms of internet users, Zambia is slightly below the sub-Saharan average. In 2015, 21% of the population used the internet (up from 10% in 2010)\(^\text{74}\) as compared to 22.4% in the region. Fixed line broadband subscriptions per 100 people stood at 0.145 in 2015 (0.078 in 2010) but only 27% of the sub-Saharan average\(^\text{75}\) indicating that a majority of those with fixed lines do not have broadband internet access (only 7% of households have a computer)\(^\text{76}\) and that, by far, the majority of internet access in the country is via mobile phone. In 2016, 32% of the population had broadband internet access via mobile.\(^\text{77}\)

The following table, provides a useful summary of internet usage growth over the past 15 years.


\(^{75}\) Ibid


\(^{77}\) Ibid
Most internet access is from home (73\%), followed by work (33\%), educational institution (16\%) and internet café (3\%). More than half (54\%) of individuals access the internet at least once a day. Zambia has three mobile network providers (Airtel Zambia, MTN Zambia and Zamtel) and 16 internet service providers (ISPs). The fixed telephone network offered by the state owned Zamtel remains extremely limited in range and usage because the service is largely confined to the main urban areas such as provincial capitals.

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80 Ibid
81 Ibid
Zambia’s international bandwidth in 2011 stood at 2.297Mbps,\(^83\) below the sub-Saharan average. International connections tend to be implemented and managed by the private sector. For example, MTN has invested heavily in backhaul connections to both EASSy and WACS. Also, non-traditional communication companies, especially those in the energy sector, like the Copperbelt Energy Company, have also been leaders in building out the country’s optical fibre as they have been able to leverage existing infrastructure and rights of way.

The state-owned power utility company, ZESCO, has laid optical fibre cable along the earth wire of its pylon infrastructure on the main grid linking Sesheke in the south (on the border with Namibia), to Lumwana/Solwezi in the north (near the Democratic republic of Congo or DRC) through Lusaka and the Copperbelt at an estimated cost of US$ 13 million.\(^84\) In 2009, ZESCO partnered with PCCW Global to create an international fibre route to Europe via Namibia and South Africa to provide backhaul services.

Similarly, the Copperbelt Energy Corporation (CEC) has built a 540-kilometre optical fibre network linking all the towns in the Copperbelt province at an estimated cost of US$9 million.\(^85\) CEC is expanding its optical fibre network into the DRC with the construction of a new power transmission line into Katanga.

Being a landlocked country does make connecting to the global cable systems expensive and difficult. As a result, bandwidth costs in Zambia are high. Though such connections are not cheap, it is much less expensive than satellite connectivity and it has begun to undercut and erode Zamtel's previously protected international revenues. For example, Zamtel has been forced to reduce its voice interconnection rate from ZMK265 in 2010 to ZMK0.15 in 2016 and revenue has dropped from ZMK113million (in 2010) to ZMK106 million (in 2016).\(^86\)

\(^85\) Ibid
\(^86\) ZICTA. (2017). ICT Indicators. Op cit
The media industry has continued to grow attested to by the number of radio and television stations now operating in the country. In 2012 the Zambia National Broadcasting Corporation increased coverage into rural areas with the installation of an additional 25 FM transmitters as well as the introduction of a second television channel, TV2. An additional private television stations and 30 radio stations are operational in Zambia.

Significant progress has also been made in infrastructure development and rehabilitation associated with research facilities. Three biotechnology laboratories at National Institute for Scientific and Industrial Research (NISIR), Zambia Agricultural Research Institute (ZARI) and Seed Control and Certification Institute (SCCI) were established. In addition, various laboratories at NISIR, Tropical Diseases Research Centre (TDRC), ZARI, University Teaching Hospital (UTH), Cancer Diseases Hospital, Central Veterinary Research Institute (CVRI), Chest Diseases Laboratory, Zambia Bureau of Standards and the public universities were rehabilitated and re-equipped. Furthermore, a National Remote Sensing Centre, a key Science, Technology and Innovation (STI) infrastructure, was established.

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2.3 ICT4D Initiatives

ZICTA was mandated to establish and administer a Universal Access and Service Fund, which shall be used for the financing of a universal access and service Programme. In this regard, ZICTA has commissioned a Universal Access Programme (UAP) to ensure that ICT are deployed to rural and underserved areas of the country using public funds. ZICTA’s UAP consists of the following components, namely: construction of shared passive infrastructure (i.e. communication towers) in rural and underserved areas; establishment of multi-purpose community tele-centres (MPCTs), and Internet Points of Presence (PoPs). The implementation of MPCTs is complemented by a project to extend internet service provision to under-served and un-served (rural) areas of Zambia through establishment of PoPs for Internet Service Providers (ISPs). The overall aim of ZICTA UAP is to provide and expand communication and information facilities in order to improve people’s quality of life in rural and underserved areas. As a result, the Sector commenced the development of a National Addressing and Postcode System with a view of promoting universal access to postal and courier services to the citizenry. Duty on importation of telecommunications equipment was waived during the 2011 fiscal year and this resulted in the installation of mobile communication towers in over 200 un-served areas across the country.

Universal access and service (to provide and expand communication and information facilities in order to improve people’s quality of life in rural and underserved areas) is one the goals outlined by the NICTP. To give effect to this, the ICT ACT of 2009 mandates ZICTA clear functions and responsibilities in the design, implementation and financing of universal service programmes by providing for the establishment of the Universal Access and Service Fund.

In identifying the unserved or under-served areas, ZICTA considers the level of competition and availability of services provided by the market, as well as the commercial viability of providing electronic communications services in particular areas or places. ZICTA’s UAP consists of the:

- Construction of shared passive infrastructure (i.e. communication towers) in rural and underserved areas;
- Establishing multi-purpose community tele-centres (MPCTs); and
- Establishing Internet Points of Presence (PoPs) in under-served areas.

To date, most MPCT projects have not had a sustained impact beyond a few people in each area.\(^\text{90}\)

ZICTA is also involved in a number of initiatives and projects to build out and enhance the ICT infrastructure in Zambia.

**Smart Zambia:** In partnership with Huawei, The Smart Zambia Project Phase 1 is focussed on the development of a national data centre, public IT facilities, including the establishment of an ICT Talent Training Centre in Ndola, and teleconferencing facilities for government. The objective of the ICT Talent Training Centre is to provide quality ICT talent training delivered in a modern and well-equipped ICT laboratory environment as well as a Learning Management System for certification.

**Computers for MoE:** ZICTA is offering technical and financial assistance to the Ministry of Education, Science, Vocational Training and Early Education in the acquisition of computing devices to assist in the administration of ICT based courses and examinations across the country. The Project has targeted to start with 190 centres across the country.

**Computer Assembly Plant:** The Computer Assembly Plant Project envisages to design, construct, install, commission and operate a computer assembly factory plant in the Lusaka Multi-Facility Economic Zone. Once operational, the factory is expected to produce at least 250,000 devices (laptops, desk top computers and tablets) annually mainly for the education sector but will also have capability to produce medium to high end computers for the retail and other government ministries.

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Standards Laboratory: ZICTA has acquired land for the construction a standards laboratory and computer assembly plant at the Lusaka Multi-Facility Economic Zone (LMFEZ).91

The Zambia Research and Development Centre is currently engaged in a number of e-government projects including the following:

1) **Public Service Management System** (PSM): The PSM is a web-based tool to provide a central repository for public service information processes and management including recruitment, payslips, registration, online training and online access to circulars and civil service policy and practice handbooks.

2) **Government Knowledge Management System** (KMS): The KMS is a web-based tool to provide a central repository for online data services in government departments, and ensure that civil servants develop, share, combine and consolidate knowledge, and take advantage of the electronically networked global knowledge systems.

3) **Council Management System**: This is a tool to enable local authorities to efficiently and effectively manage information at local level including communicating with citizens through the SMS/internet channel. This system will also be used to deliver information about community activities which need prompt action by the local people such as reminder of a tax due date etc.

4) **School Information Management System** (SIMS): The SIMS will enable more effective and efficient administration and management of information in schools by streamlining internal administrative procedures including finance, enrolments, skills management and performance management. It will also help schools to manage and use data to drive instructional practices, improve pupil achievement, and optimize learning results.

5) **Registrar of Societies Management System** (RoS): RoS will enable monitoring, tracking and management of information about organizations that are registered under the Registrar of Societies. The system will facilitate ease of entry, storage and accessing of information on organizations registered under the Registrar of Societies. It will provide an online interface to enable prospective organizations to apply for registration online, and also enable online verification, search and confirmation of registered organizations. It will also be able to track, store and management records of registered organization.

6) **Police Criminal Record Tracking System** (PCRTS): PCRTS is an ICT solution for crime management and security that enables the police achieve a fully ICT enabled crime management information system to bring about increased institutional capacity to develop, share, combine and consolidate knowledge on crime.

7) **Police Public Complaints Authority Information Management System** (PPCA): The PPCA enables receipt, storage and management of information on complaints from members of the general public on the conduct of police officers in the execution of their duties as lodged at the Police Public Complaints Authority. This system enables citizens in remote areas to fill-in and remotely lodge their complaints via the three-level access system via internet or SMS using their mobile phones.92

### 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 and Broadcast Services</td>
<td>Ministry overseeing ICT and Broadcasting</td>
</tr>
<tr>
<td>ZICTA</td>
<td>National ICT Regulator regulating Internet Service Providers (ISPs),</td>
</tr>
</tbody>
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### Actor/Player | Role and Area of Development
---|---
Ministry of Communications and Transport | Responsible for formulating and administering policies in the ICTs, transport and meteorological sectors to enhance sustainable socio-economic development.
Airtel Zambia, MTN Zambia and Zamtel | Mobile Network Providers
Zambia Research and Development Centre | Has the overall goal of contributing to national development through capacity building and community development. It aims to address poverty and underdevelopment through institutional and capacity building, human empowerment and gender participation in all established decision-making frameworks.

## 2.5 Challenges in ICT Development

The ICT sector in Zambia faces several challenges, namely, connectivity and infrastructure issues (including electricity provision), ICT governance, privacy, ICT security, intellectual property protection and management and resource mobilisation for sustained investments in infrastructure and skills capacity.  

A policy briefing document developed by Panos (2010) notes that a significant challenge to the advancement of ICT4D in Zambia has been the fact that there has been too little consistent high-level championing for ICT4D in the Zambian government. It notes, specifically, that the "Ministry of Communications and Transport has lacked capacity, and it has failed to progress the national ICT Policy in a timely manner. An enabling national climate for ICT investment and adoption is crucial, but this will require closer cooperation between different government departments and between government and the private sector, including public–private partnerships."  

According to the Panos policy brief, there are also a number of other regulatory issues that remain unaddressed:

1) The implementation of universal access, including the development of broadband access;
2) The lack of regulation on the sharing of communications resources between operators;
3) The absence of performance monitoring;
4) Uncertainties concerning the regulation of internet content
5) Inadequate power infrastructure to support ICT services; and
6) The implications of convergence between telecommunications and other communications sectors in terms of regulation and licensing.

The biggest challenge facing consumers is the high cost of equipment and broadband services. For a country with a per capita GDP of only US$1,304, ICT equipment is already expensive. High rates of taxation and import duties make the cost even less affordable. Added to this, broadband service costs of around US$80 per month in 2014, the 27th most expensive globally. As a result, only the

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94 Ibid
95 Ibid
wealthy have access to the internet in their homes and offices, while most consumers rely on telecentres and cybercafés.

Consumers also have little awareness of quality of service issues and there is little protection against unsatisfactory performance by operators and ISPs.

A lack of access to international infrastructure, leading to high broadband prices and relatively little available bandwidth, is the biggest challenge facing communications service providers in Zambia. Although new undersea cables have increased capacity and reduce costs, as a landlocked country, Zambia needs to access these through overland links and so this introduces risk and uncertainty for providers.

A relatively inflexible regulatory regime is also a challenge with the time taken for new technologies to be approved delaying recent technology implementations such as Voice over Internet Protocol (VoIP). This can have the effect of slowing or retarding adoption of more effective and efficient services.

Current internet service providers may not all be sustainable businesses. It is not clear that an internet market the size of Zambia is large enough to support 16 ISPs.
3 Education

The Ministry of Education, Science, Vocational Training and Early Education (MESVTEE) has overall responsibility for the education sector in Zambia. In 2011, the ministry was created through the merger of the Ministry of Education and the Ministry of Science, Technology and Vocational Training for the purpose of:

1) Harmonising the planning of education delivery from the lowest to the highest level as previously the levels were not “speaking” to each other as they were under different portfolios and ministries;
2) Improved budgeting of educational activities, thereby removing duplications; and
3) Improved monitoring, evaluation and reporting as this will be done under one umbrella.

Zambia has a 7-5-3/4 education structure. Children enter primary school at age seven. The primary phase is seven years (grade 1 – 7). Secondary school is divided into two phases: lower secondary (grade 8 – 9) and upper secondary (grade 10 – 12) with tertiary education being three or four years for most degree programmes.

In principle, there is universal access to primary and secondary school (free and compulsory). Learners sit for the Primary School Leaving Certificate Examination at the end of grade 7. At the end of grade 9 they sit an exam to enter upper secondary and write a final School Certificate Examination at the end of grade 12.

Estimates of Zambia’s 2016 population are 15.933 million. Zambia has a very young population with a median age of 16.7 years. Given these population statistics, it makes sense that Zambia continues to invest heavily in education as an area of primary strategic importance for continue socio-economic development. Between 2002 and 2014, spending on education as a percentage of GDP rose 1% to 5.2%. However, average expenditure per child is still estimated at US$5.4/year.

In principle, Zambia has recognised the need for development of human resource capacity to facilitate the development of an information society. The government has acknowledged that Zambia’s ability to seize the opportunities of the emerging information society will largely depend on the country’s capacity to develop and mobilise its human resources.

Comparing data between 2000 and 2014, the overall indication is that Zambia’s education sector has experienced noticeable improvements. Since 2002, when the government announced the Free Primary Education (FPE) Policy, the Ministry of Education, Science, Vocational Training and Early Education (MESVTEE) has registered over 1.2 million more learners, growing Zambia’s net enrolment from 71% in 1999 to over 97% in 2013.

The FPE policy requires heads of primary schools not to charge any kind of fees in recognition of various economic challenges facing the general population especially in rural areas. These economic challenges were exacerbated by the rising numbers of orphans due to HIV/AIDS related deaths. The policy directive also barred schools from denying children from attending school on account of not

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101 Ibid
having a uniform. For children that had dropped out of the education system, the FPE required that schools invite them back. This requirement is also fully articulated under the MESVTEE’s Re-Entry Policy which encourages girls especially, to return to school in the event of falling pregnant.

A comparison between 2000 and 2010 data also shows strong positive trends in participation rates for both sexes and for urban and rural populations.

*Figure 6  Participation rate differences for 2000 and 2010*¹⁰⁴

Between 2000 and 2013, primary (grade 1-7) enrolments increased from 1,589,544 to 2,847,045 (79%) and basic education (grade 1 – 9) enrolments increased from 1,756,210 to 3,267,652 (86%).¹⁰⁵ This means that enrolment in upper basic education rose from 234,059 in 2004 to 451,163 in 2013 representing an increase of 93%.

The Gross Enrolment Ratio (GER) in primary education in 2013 was 103.64%¹⁰⁶ down from 114% in 2007. Together with the above improvement in enrolment rates, this indicates that there has been some improvement also in throughput rates in primary education over this period with fewer under and over-age learners. Indeed, the grade 1 – 7 repetition rate fell from 66% in 2004 to 7.5% in 2014 while the primary completion rate was measured as 99.04% in 2014.¹⁰⁷ The transition rate to lower secondary education was 89.36% in 2014 and has mostly been in-line with projections.¹⁰⁸

¹⁰⁵ Ibid
¹⁰⁸ Ibid
However, while universal education has almost been achieved at primary school level, progression rates at Grade 10 level remain low (under 40%). Out of 345,565 candidates that entered Grade 9 examinations in 2012, only 100,824 proceeded to Grade 10 in 2013, implying that the education system is dropping over 245,000 children who are below employment age and do not possess high value skills.\footnote{Government of Zambia. (2014). Revised Sixth National Development Plan 2013 - 2016. Op cit}
Completion rates at Grade 12 are also low at 30%, with the completion rate for female learners was at 27% in 2012 meaning that only 27 out of every 100 girls entering grade 1 exist successfully after grade 12.\textsuperscript{112}

\textbf{Figure 9  Major primary Education For All indicators for Zambia}\textsuperscript{113}

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<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>Net Intake Rate (NIR) Primary (Grd. 1 – 7)</td>
<td>42.1%</td>
<td>100%</td>
<td>56.9%</td>
</tr>
<tr>
<td>Gross Enrolment Ratio (GER)</td>
<td>105.3%</td>
<td>102%\textsuperscript{2}</td>
<td>127.1%</td>
</tr>
<tr>
<td>Primary (Grd. 1 – 7)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net Enrolment Ratio (NER) Primary (Grd. 1-7)</td>
<td>85.1%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Repetition Rate (RR) by grade – Primary (Gld. 1 – 7)</td>
<td>66%</td>
<td>0%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Dropout Rate (DR) by grade (Grd 1 – 7)</td>
<td>28%</td>
<td>0%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Primary Cohort Completion Rate</td>
<td>72%</td>
<td>100%</td>
<td>99.04%</td>
</tr>
<tr>
<td>Transition Rate (TR) from primary to secondary education</td>
<td>53.5%</td>
<td>100%</td>
<td>89.36%</td>
</tr>
<tr>
<td>Percentage of Trained Teachers in Primary Education</td>
<td>98%</td>
<td>100%</td>
<td>81%</td>
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<tr>
<td>Pupil/Teacher Ratio (PTR) in Primary Education</td>
<td>62</td>
<td>41</td>
<td>48.1</td>
</tr>
<tr>
<td>Public Expenditure on Primary Education as % of Total Public Expenditure on Education</td>
<td>40%</td>
<td>60%</td>
<td>56.5%</td>
</tr>
</tbody>
</table>

Zambia has made progress in achieving gender parity in basic education. As of 2014, 49.2% of all learners enrolled in basic education were female.\textsuperscript{114}

The government has also been investing in Early Childhood Care Development and Education (ECCDE) as a split mandate between the MESVTEE and the Ministry of Community Development Mother and Child Health (MCDMCH) with the MESVTEE responsible children aged between 3-6 years.

\textsuperscript{112} Ibid
\textsuperscript{114} Ibid
In 2014, 1,000 new ECD teachers were employed and a new ECD curriculum was developed and in 2014 and 2015, 80 new model ECD centres were constructed as part of a global push by Zambia to improve school infrastructure. Despite these investments, however, by 2013, only 14.8% of grade 1 entrants had any ECD exposure.\textsuperscript{115}

The literacy rate for adult population (15 years and older) has, increased from 67.2% in 2000 to 83% in 2010.\textsuperscript{116} By 2010, among people 25 years and older that ever attended school, 47.8% had completed primary level only, 37.3% had completed secondary and 14.5% had completed tertiary.\textsuperscript{117} In 2014, Zambia reported an overall adult illiteracy rate of 13.07% exceeding Education for All (EFA) targets.

Public expenditure on primary education as a proportion of all education spending was 56.2% in 2014. This was partly responsible for Zambia being able to bring the pupil: teacher ratio down from 62:1 in 2004 to 48:1 in 2014.\textsuperscript{118} This is still high but the trend is positive and this figure does hide regional disparities. For example, the Copperbelt Province reported a pupil teacher ratio of 44.7:1 contrasted to that of Luapula Province which was 92.3:1 in 2013. With respect to pupil/teacher contact hours, this still remains a huge challenge and averages only 3.6 hours per day for Grades 1 to 4 and 5.1 hours per day for Grades 5 to 7. In respect of class sizes for the year 2013, the average for grade 1 to 9 was 37.3 learners and that for 10 to 12 was 50.7 learners.

On average 5,000 new teachers are deployed to the system annually and there are currently approximately 93,000 teachers in the system with about 57,000 of these in primary schools. However, of the 18,638 teachers teaching in secondary schools in 2012, only 16.4% had degree qualifications with most teachers only having diplomas.\textsuperscript{119}

In 2012, there were 8,360 basic education schools. Of these, 701 offered Grade 1 – 4 only, 4,136 offered grade 1 – 7 only and 3,515 offered grade 1 – 9.\textsuperscript{120} The majority of primary schools (83.2%) were found in rural areas. One of the notable challenges remains inadequate staff accommodation which has compromised the quality of education provision especially in rural areas as this acts as a demotivating factor for teachers serving in rural areas. In 2012, there were 72,967 basic school teachers against 16,149 permanent staff houses. This meant that only about 22.0% of the teachers in basic schools countrywide had decent accommodation.\textsuperscript{121}

At upper secondary level (grade 8 – 12), there were 663 secondary schools in 2012. Of these schools, 455 were public (Government of the Republic of Zambia - GRZ), 77 Grant Aided, 117 private and seven community schools.\textsuperscript{122}

In terms of quality, results over the past few years have been mixed. Regionally, the Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) shows that Zambian learners are performing at levels far lower than their regional counterparts. For example, mean scores in 2012 national assessments at grade five level\textsuperscript{123} indicated that only 35.3% of learners scored above the minimum performance level of 40% in reading in English. The results for

\textsuperscript{115} Ibid
\textsuperscript{116} Ibid
\textsuperscript{117} Ibid
\textsuperscript{118} Ibid
\textsuperscript{120} Ibid
\textsuperscript{121} Ibid
\textsuperscript{122} Ibid
\textsuperscript{123} National Assessment results for Grade 5 are of particular importance because poor performance during the middle stage of primary education indicates that learners are not grasping key foundational skills in the early grades.
Mathematics and Life Skills were 39.4% and 40.2% respectively. This pattern of results has persisted over the past decade. In 2007, for example, Zambia’s learners scored an average of 434 in reading and 435 in mathematics on the SACMEQ assessment, well below the international mean of 500.  

There has been some progress achieved in the proportions of learners attaining the defined minimum level of competencies in both Reading in English and Mathematics. Specifically, the proportion of learners reaching the minimum level of proficiency for Reading in English rose from 23.1% in 1999 to 35.8 percent in 2012 while in Mathematics, this rose from 26.2% to 44.6% in 2008 and dropped to 35.8% by 2012. The country still faces serious challenges with quality provision of primary education given the low proportion of learners achieving the desirable level of mastery in both Reading in English and Mathematics.

The RSNDP recognizes that tertiary education is of central importance to economic and social development and that the activities of institutions of higher education and the recipients of higher education advance and progress society intellectually, scientifically, culturally and artistically.

There is a variety of tertiary education institutions in Zambia, designed to meet the special needs of various sectors of the economy. These include: universities, colleges of education and Technical Education, Vocational and Entrepreneurship Training (TEVET) institutions.

In 2016, there were 36 universities registered with the Higher Education Authority, three of which are public universities. In addition, in 2015 there are colleges of education. In order to increase access to public universities, the government has been developing and expending the infrastructure at the three public universities and is in the process of upgrading some teacher training colleges into universities. The construction of new public universities at Lubwa and Mulakupikwa in Muchinga Province started in 2011 as part of plans to have at least one public university in each province. In addition, the Government has created an enabling regulatory environment to encourage the development and expansion of private universities.

Only 8% of school leavers accessed public universities with enrolments in 2012 at 27,925. Despite the rapid expansion of the tertiary sub-sector, public universities faced major challenges such as critical shortages of teaching staff, inadequate physical facilities, equipment and training materials resulting in the compromised quality of the university education offered. To ensure inclusiveness of entry into the education system for all Zambians, Government commenced a review of the student financing system.

In light of the prevailing challenges in Zambia’s labour markets, skills development plays a critical role in socio-economic development as it provides opportunities for economic and income growth, poverty reduction, employment, productivity and human development. In 2012, there were 300 registered TEVET institutions of which 87 were public institutions. The total annual enrolment in TEVET institutions reached 33,569 in 2012 from 33,234 in 2011 with annual enrolment being about 14,000 students. This is in comparison to about 300,000 youth leave the school system each year at both Grades 9 and 12.

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127 Ibid
128 Ibid
Other challenges noted by the RSNDP include:
1) Inadequate number of appropriately trained lecturers in special skills for training persons with disabilities;
2) High prevalence of lower level enrolment among female students in engineering and technical programmes;
3) Inadequate bursary support for gifted learners who may not be able to pay fees;
4) Unfriendly physical infrastructure for persons with disabilities; and
5) Inadequate appropriate TEVET equipment, and teaching and learning materials.

3.1 ICT in Education

As with the ICT sector in general, there is no specific current ICT in educational policy and strategy for Zambia. Most of the direction for the sector is contained in Vision 2030, the RSNDP and the NICTP but even here, direct references to ICT in education are sparse.

The MESVTEE did, with the support of the International Institute for Communication and Development (IICD), the Commonwealth of Learning (COL), and the United States Agency for International Development (USAID), produce a draft ICT policy for education in 2006 which represented an extension of Zambia’s national education and national ICT policies.\(^\text{129}\)

No copy of the policy is available, however, according to Isaacs, the guiding principles of the policy included:
1) That it fit into national policies on education and ICTs;
2) That there be a commitment to establishing strategic partnership with stakeholders;
3) That there be a combined effort with government, the private sector, and NGOs;
4) That the policy reflects general standards that the Ministry of Education wishes to uphold; and
5) That there be an integrated approach to all aspects of the value chain in the education process.\(^\text{130}\)

The policy also provided an overview of goals, objectives in the key programmatic areas of ICT infrastructure, content development, curriculum integration, teacher training, distance education, administration and support services, and finance.

The MESVTEE National Implementation Framework III: 2011 – 2015 (NIF3) possibly represents the government’s most recent policy statement regarding education. It has as its primary objectives
1) A review the language of instruction policy so as to promote the teaching of local languages at primary level;
2) The provision of Early Childhood Education centres and teachers;
3) The creation of two secondary schooling paths for Grade 8 pupils based on their Grade 7 performance - an academic path and a technical path;
4) The re-orientation of the curriculum for primary and secondary schools to put emphasis on life skills subjects to enable learners cope with the demands of self-employment and the labour market;
5) An upgrading of teachers’ qualifications to meet the minimum required standards through in-service training (reintroduce the apprenticeship system);
6) The promotion of inclusive education by integrating children with mild to moderate learning disabilities in the mainstream schools and the offer of special education to those who cannot be integrated;
7) The prioritisation of science subjects in educational institutions at all levels;
8) The promotion of collaboration between industry and research institutions; and
9) The establishment of a national research centre to coordinate research activities.\textsuperscript{131}

While the NIF3 does not include ICT as a top-level objective it does mention the need to deploy ICTs at all levels of the Zambian educational system in order to improve and expand access to education, training and research facilities as well as strengthening the administration and decision-making capacity in the educational system through the effective usage of timely collected, analysed and disseminated Education Management Information Systems (EMIS) data.

Specific objectives included the provision of computer facilities and Internet access to:
1) The ministry headquarters, provincial offices and districts;
2) The 14 colleges of education;
3) The nine provinces;
4) 78 district resource centres;
5) 400 zonal resource centres;
6) 350 high schools; and
7) 460 basic schools.\textsuperscript{132}

It is unclear how much of this has been achieved. Computers are not the only ICT solution available. For example, in 2007 the proportion of Zambian schools that had access to radios stood at 64% (even though only 8% and 14% has access to televisions and computers respectively).\textsuperscript{133} Despite such a relatively high prevalence of radio in Zambian schools, no education policies or plans mention this or strategize ways to leverage this capability.

\textit{Figure 10 Proportion of Grade 6 pupils in primary school with access to radio, television or computers in 2007}\textsuperscript{134}

\textsuperscript{132} Ibid
\textsuperscript{134} Ibid
It is clear from the above figure that access to computers is very limited in Zambian primary schools. This is reinforced when one looks directly at the ratio of pupils to computers in Zambian schools. In 2013, this ratio was greater than 500:1 in primary schools and 145:1 in lower secondary schools (data for upper secondary schools was missing).135 However, when one looks at the proportion of schools with an internet connection, the fact that approximately five times as many secondary schools as primary schools had an internet connection in 2013, does suggest that the number of secondary schools with computers could be as much as five times as many as primary schools.136

Figure 11 Learner to computer ratios in 2013137

The reasons for these high ratios make sense, considering the number of schools with reliable electricity supply. The following figure indicates that Zambian primary schools, in particular, lack access to electricity. However, secondary schools do generally have access to electricity.

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There are, however, a number of past and present ICT for education projects in Zambia.

Computers for Zambian Schools (http://cfzs.org.zm/) is a non-profit organization established by local educational and ICT specialists, representatives from the British Council, the MESVTEE, and the Beit Trust. It operates in partnership with Computers for African Schools, a UK-based registered charity, the British Council, HSBC, the British High Commission, the Beit Trust, SchoolNet Zambia, MTN, ZamNet, and the MESVTEE. The British Council has facilitated the import of duty-free equipment to Zambia and, according to partner IT Schools Africa, the organization has distributed more than 11,000 low cost and refurbished computers to over 500 schools. Additionally, the organization trains teachers in the use of ICTs, the provision of technical support to schools, and recycling computer components.

SchoolNET Zambia (http://www.schoolnetzambia.edu.zm) is a Non-Governmental Organization (NGO) promoting information and communication technology (ICT) in Zambian schools by partnering with educational institutions (public or private, primary, upper basic, high school or tertiary) to establish ICT facilities and to develop technical and pedagogical capacity necessary to use ICT to enhance teaching and learning. The organization lists its specific goals as follows:

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138 Ibid
1) To work in partnership with educational institutions to develop their ICT facilities, Internet connectivity options;
2) To create awareness of the use of ICT in education through press articles, education ICT demonstrations, word of mouth, conferences, seminars and exhibitions;
3) To lobby and advocate for the utilization ICT in education, government, business and civil society;
4) To develop ICT skills and facilitate skills-transfer through a phased professional training programme. To outsource cheaper, innovative and adaptive hardware;
5) To nurture ICT talents through ICT holiday camps. website development competitions and participation in international competitions like Think Quest;
6) To encourage and facilitate the generation of local connect Zambian educators and students to their counterparts worldwide for collaborative projects-based learning (in areas of sustainable development, environment, HIV AIDS etc) and for the promotion of cross cultural understanding;
7) To provide on-going pedagogical technical and business plan development;
8) To monitor and evaluate the pedagogical impact of ICT on the Zambian education system. To expand to schools in rural areas and basic and primary schools after urban high schools and colleges. To establish computer refurbishment and assembling; and
9) To develop SMART partnerships with national and international organizations interested in using ICT to enhance teaching and learning and to promote community responsibility of schools.  

A number of educational institutions provide ICT training programmes ranging from certificate to degree courses offering specialised subjects including Computer Science, Telecommunications/ Electronics Engineering, Media training/information sciences, Vocational ICT programmes and skills development. These institutions include the University of Zambia, Copperbelt University, ZAMCOM, ZAMTEL Staff Training College and Evelyn Hone College.

AfriConnect, in partnership with the MESVTEE, has been piloting a project aimed at bringing web-based eLearning to schools in different parts of the country. So far 20 schools have been provided with free or low-cost connectivity, plus teacher training and support. A large website of free curriculum aligned learning materials has also been developed. The objective is to move from the traditional chalk-and-talk pedagogy to enquiry-based learning, while at the same time bringing the option of lifelong learning to people who have already left school. The project collaborates with Intel, Cambridge University and the University of Zambia/

Empowering rural communities through ICTs Linknet is an innovative project run by the international organization Macha Works. It provides isolated rural communities with access to the internet. The required technology is installed in shipping containers which can then be transported to remote areas. These are connected to a satellite dish. Local ICT specialists are trained to set up the equipment and infrastructure is provided so that they can exchange knowledge and experience. In rural Macha, for example, the project provides local internet access and helps local people learn ICT skills that relate to their interests, concerns and to rural development. Macha Works has built up a broad coalition of partnerships in Zambia, Southern Africa, Europe and the USA to help it provide innovative ICT solutions. It has received requests for Linknet Resource Containers from other rural communities in Zambia and has plans to expand the project to more areas.  


3.2 Curriculum

The Zambian Curriculum Development Centre is responsible for the development of the country’s primary and secondary school curriculum. In 2013, it released a revised Educational Curriculum Framework\textsuperscript{142} in order to drive and guide an extensive curriculum review process.

The framework makes explicit reference to the need to include ICT skills as one of the key competencies for learners through primary education. It also introduced Technology Studies as a subject at both the lower and upper primary levels. Computer Studies was introduced as a subject at both junior and senior secondary levels in order to equip learners with essential skills necessary for them to have basic knowledge of ICTs and to stimulate creative and analytical skills in ICT and entrepreneurship so as to be competitive at global level. Finally, the framework introduced ICT as a life skill in all adult literacy programmes.

Since these curriculum changes, the response in Zambia has been ambivalent. Many people have observed that without computer facilities, the likely impact of these new subjects on learners’ actual skill levels is likely to be minimal. For example, education specialist Edward Phiri is quoted as saying that the Ministry of Education had rushed the introduction of the ICT subject in the schools mainly because children did not have hands-on practical experience of computers.

\textit{When you look at this subject of information technology, it is not simply a theory subject but practical, which requires students not only to study the computer but to know how to operate a computer as well. (The) majority of students in different schools, especially those in rural areas, do not have access to such devices for them to better acquaint themselves with the subject.}\textsuperscript{143}

This view is supported by the data. The proportion of primary and secondary schools with computer laboratories or computer-assisted instruction is very low as indicated in Error! Reference source not found..


3.3 Professional Development

There have been relatively few teacher development initiatives in Zambia, likely due, in part, to a lack of clear policy objectives with regard to ICT integration into education and a general lack of ICT initiatives. Nevertheless, there have been a few initiatives to address professional development of teachers in ICT.

The OER4Schools project started with a pilot in August 2009 in partnership with educational researchers, ICT4D NGOs, Government and the ICT private sector, and entered its third and final phase in 2013. It focussed on providing Open Educational resources (OERs) to several schools in Zambia to support more interactive forms of pedagogy, especially in Mathematics education. Important outputs of the project included the development of an OER-Pedagogy-ICT implementation model an OER4Schools Professional Learning Resource (available from http://oer.educ.cam.ac.uk/wiki/OER4Schools) as well as the production of several professional development videos (available at http://sms.cam.ac.uk/collection/1087359) focussing and illustrating interactive teaching methodologies with and without the explicit use of any ICTs.145

The Japan International Cooperation Agency (JICA) implemented a project between 2011 and 2015 in partnership with the MESVTEE and 10 provincial education offices targeting 27,728 teachers with improved pedagogical and classroom management skills.146

VVOB, the Flemish Association for Development Cooperation and Technical Assistance, implemented the Teacher Training Support Programme from 2008 until 2013 to improve the quality of pre-service and in-service teacher training for primary education in Zambia, including distance learning. The programme helped education colleges establish distance learning initiatives to support in-service

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professional development and also provided equipment and technical and pedagogical support to the colleges.\footnote{147}

VVOB is currently partnering with the MESTVEE on three other teacher development projects namely, the Learning Improvements for Teachers and Lecturers in Early Education (LITLE) Programme, The Empowering Community School In-service Teachers through Education (ECSITE) Programme and the Quality Early Education in Community Schools (QEECS) Programme. None of these have any explicit ICT components but are included here to give a broader sense of activities in the country.\footnote{148}

Currently JICA is working with the MESVTEE on a four-year project (January 2016 to December 2019) to improve the pedagogical content knowledge of teacher educators for Mathematics and Science at three colleges of education in the Central Province, the Copperbelt Province and the Southern Province along with selected primary and secondary schools that collaborate with these colleges.

The activities for the project are listed as follows:

1. Conduct training for lecturers at three COEs and teachers at collaborating schools;
2. Conduct intensive Kyoizai-Kenkyu for primary (G5)/secondary (G8) at three targeted COEs;
3. Prepare and revise Lecturers’ Guides and Modules for Students at COEs in mathematics and science contents;
4. Develop sample lesson plans of G5 and G8 to be used at primary/secondary schools based on lesson plans developed through SBCPD;
5. Develop sample textbooks of G5 and G8 to be used at primary/secondary schools based on lesson plans developed through CPD;
6. Support writing and publishing articles on experiences of the Project in journals such as “Zambian Journal of Teacher Professional Growth”;
7. Conduct open school and local and international exchange/workshop to share knowledge and experiences8. Disseminate the sets of sample textbooks/lesson plans (G5 and G8) developed through CPD to neighbouring primary and secondary schools in the area of three COEs;
8. Organize visits of teachers at collaborating schools to non-collaborating schools to mentor their CPD activities; and
9. Develop training package for other COEs and collaborating schools.\footnote{149}

With respect to Technical and Higher Education, there have been three significant professional development interventions over the past few years.

The African Development Bank initiated the \textbf{Support to Science and Technology Education Project (SSTEP)} in 2013. The project is due to complete in 2019 – SSTEP aims to improve the quality and relevance of skills development with a focus on job creation and youth employability with the strategic outcomes of the project being:

1. Improved access to science and technology courses and skills available through Technical, Entrepreneurial, Vocational Education and Training (TEVET) institutions and Higher Education (HE) institutions partly by rehabilitating and renovating facilities including ICT facilities;

\footnote{148} More details on each of these is available from the VVOB Zambia website \url{http://www.vvob.org.zm/cms/?_ga=1.192720362.1388870365.1487084118}.
2) Improved quality and relevance of the teaching and learning practices in the target institutions with particular reference to the use of appropriate ICTs through providing training to lecturers at Masters and PhD level as well as performing details Curricula Review; and

3) Improved quality and relevance of the Science, Technology and entrepreneurship skills received by an estimated 4,000 youths by the close of the project through enhancing work-based technical and entrepreneurship Skills development and catalysing Public Private Partnerships in the sector.

The project will also conduct an impact evaluation with the aim of providing evidence as to the kinds of interventions that are successful in increasing participation of industry and improving youth employment.150

World Bank, in partnership with then Ministry of Science, Technology and Vocational Training, implemented the Technical Education Vocational & Entrepreneurship Training (TEVET) Development Programme Support Project between 2002 and 2008. Broadly, the project aimed to develop the TEVET system to improve the skills necessary for both the formal and informal sectors of the economy.

The project consisted of nine components. Among these were the following that relate to ICT and professional development:

1) Development of managerial capacity to coordinate the operation and financing of the TEVET system, and provide the necessary support to trainers, facilitators and lecturers;

2) Support for curriculum development and improvement initiatives by TEVET institutions;

3) Financial support to TEVET institutions to develop and implement innovative and effective approaches to training;

4) Support in developing decentralized, human resources development plans as a part of a business planning capacity building;

5) Support for the design and implementation of a sector information system;

6) Support for the rehabilitation of facilities and equipment (including ICT facilities).151

The UNESCO TVET Section, in collaboration with the UNESCO Regional Bureau in Harare and the Technical Education, Vocational and Entrepreneurship Training Authority in Zambia implemented the Better Education for Africa’s Rise (BEAR) project in Zambia. BEAR has been implemented in four other countries (Botswana, DR Congo, Malawi and Namibia) with the intention of training and developing the capacity of the staff of institutions and agencies responsible for designing, monitoring and evaluating and implementing TVET policies and programmes. In other words, BEAR aimed at increasing the capacity of the TEVET system to improve access and quality.152

The Netherlands Initiative for Capacity development in Higher Education (NICHE) was implemented between 2010 and 2014 as a partnership between the Embassy of the Kingdom of the Netherlands (EKN) and the Government of the Republic of Zambia (GRZ) with a focus on building the capacity building of universities.


NICHE activities focused on the following specific areas:

1) Providing input to and facilitating the design of a reform programme for improving HE institution governance and regulation
2) Improving the responsiveness of education programmes towards public and private sector developments;
3) Improving the internal and external efficiency of public universities through leadership, management and organizational capacity building;
4) Strengthening organizational capacity of public universities to achieve higher outputs in terms of quantity and quality of graduates (esp. female students), research studies and consultancy services with a special focus on the development of stronger linkages with the labour market and reducing gender imbalances through staff development activities; and
5) Enhancing systems for quality assurance and relevance to assess and upgrade the quality of their education programmes.\(^{153}\)

Finally, the Higher Education Authority (HEA) runs capacity building workshops from time to time. The most recent (in December 2016) effective teaching strategies. The objective of the workshop was to:

> help university and college lecturers to become effective teachers in their fields of expertise.

The workshop will explore student engagement strategies such as blended learning, flipped classroom, eLearning; learning curriculum & objectives; effective lectures, tutorials, practicals, field work & assessment; student evaluation of learning; community of practice; graduate attributes and accreditation; institutional support for teaching & learning; current and future development in teaching and learning technologies.\(^{154}\)

### 3.4 Key Actors and Players

<table>
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<tr>
<th>Actor/Player</th>
<th>Role and Area of Development</th>
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</thead>
<tbody>
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<td><strong>Ministry of Education, Science, Vocational Training and Early Education</strong></td>
<td>Overall responsibility for education and training in Zambia</td>
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<tr>
<td><strong>Zambian Curriculum Development Centre</strong></td>
<td>Curriculum development and guidance for the sector</td>
</tr>
<tr>
<td><strong>Higher Education Authority</strong></td>
<td>Regulation of higher education institutions</td>
</tr>
<tr>
<td><strong>Flemish Association for Development Cooperation and Technical Assistance (VVOB)</strong></td>
<td>Has worked directly with the MESVTEE on pre- and in-service teacher development projects</td>
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<tr>
<td><strong>Japan International Cooperation Agency</strong></td>
<td>Works directly with the MESVTEE on various education development projects in the country.</td>
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<tr>
<td><strong>iSchool Zambia</strong></td>
<td>Works with schools, teachers and learners to introduce effective enquiry based learning methodologies and resources, often through the introduction of tablet devices.</td>
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<tr>
<td><strong>African Development</strong></td>
<td>Project implementation to develop the TEVET and HE sectors.</td>
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### 3.5 Challenges facing the education sector

Despite notable successes in expanding participation, especially in primary education, several significant challenges remain for Zambian education that relate to improving access at higher grades and progression through to technical or university level education, achieving gender parity at higher levels of the education system, and overall quality of the education provided at all levels of the system and its match with market demands.

There is also an overall lack of adequate ICT skills to effectively drive Zambia’s envisioned progress towards a knowledge economy by 2030. Existing educational and learning facilities are inadequate to meet the market demand for ICT skills.

#### Primary

Schools in many areas (both rural and urban) suffer from critical shortages of staff and classrooms with existing classrooms usually in need of major refurbishment. Due to this and over-enrolment, teaching is done in shifts with some schools implementing up to three shifts per day. Despite this, many classes are still overcrowded and shift teaching necessarily limits contact time which exacerbates the quality of education learners receive. The RSNDP estimates that children in lower grades received only three hours of instruction per day.\(^{155}\) In addition, educational resources, such as textbooks and teaching aids, are in short supply and often out of date and it is not unusual for there to be just one text book for the whole class.

Many communities, without access to a school, have started their own community schools. These schools, however, often suffer from even more critical shortages of qualified teachers, infrastructure and materials.

The primary school Gross Enrolment Ratio (GER) of 103.65 has certainly improved in recent years although it still indicates that the country has yet to clear the backlog of over aged learners. The presence of a wide age range in many classes, complicates the provision of high quality education.

As noted above, significant issues of quality remain. In the 2012 grade 5 national assessments only 35.3% of learners scored above the minimum performance level of 40% in reading in English. The results for Mathematics and Life Skills were 39.4% and 40.2% respectively. Besides the national assessment results, the RSNDP notes that there is a growing consensus that children are drifting through the school system without adequately mastering relevant skills. For example, poor reading skills across all grades are particularly of concern.\(^{156}\)

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\(^{156}\) Ibid
Secondary

While gender parity has been achieved at grades 1 - 4, there are more girls than boys dropping out of secondary education, especially at the upper secondary. In 2012, the Gender Parity Index for Grades 10 - 12 was only 0.83, down from 0.82 in 2011.\textsuperscript{157} This disparity is partly explained by the relatively high number of child pregnancies in the country with nearly 2,100 pregnancies recorded in 2012 at senior secondary schools and only about 50% of these learners returning to school.\textsuperscript{158} Completion rates at Grade 12 stand at 30% overall but at 27% for girls.

Many teachers lack the necessary expert content, pedagogical or pedagogical content knowledge required. Only recently did the MESVTEE institute policy requiring all teachers to have the necessary diploma or degree qualifications. The RSNDP notes that of the 18,638 teachers teaching in secondary schools in 2012, only 16.4% possessed degrees. Most of the teachers handling senior classes only had diplomas. The situation was worse for mathematics and science teachers requiring the sector to initiate Fast Track Training initiative especially for teachers of mathematics and science.\textsuperscript{159}

As in the primary sector, school infrastructure is also in short supply and generally of a poor quality.

TEVET

Access to TEVET remains low with restricted institutional capacity and economic affordability acting as major barriers. Of the approximately 300,000 learners who leave grades 9 and 12 each year, the TEVET system is only able to accommodate about 14,000 students (4.6%).\textsuperscript{160}

Other challenges being faced by the sector include the following:
1) A shortage of appropriately trained lecturers and instructors;
2) Low enrolment of females in general, and in particular, to engineering and technical programmes;
3) Inadequate bursary support for poor students;
4) Poor physical infrastructure and facilities; and
5) Shortages of appropriate equipment and teaching and learning materials.

Adult literacy training experiences many of the same challenges as traditional technical and vocational education. Only a small number of people do and are able to access such programmes. The system is poorly funded with a dearth of quality instructional materials and suitable instructors.\textsuperscript{161}

Higher Education

The tertiary education sector has continued to expand but still faces challenges over critical shortages of qualified teaching staff, inadequate and ill-maintained physical facilities and equipment including ICT facilities and a lack of suitable and high quality training materials.\textsuperscript{162}

Poor curriculum and academic standards resulting is poor quality and ill-equipped graduates also remains a challenge although the work of the HEA and its efforts to register institutions and monitor and regulate quality and standards compliance has gone some way to improving this situation.\textsuperscript{163}

\textsuperscript{157} Ibid
\textsuperscript{158} Ibid
\textsuperscript{159} Ibid
\textsuperscript{160} Ibid
\textsuperscript{161} Ibid
\textsuperscript{162} Ibid
\textsuperscript{163} Ibid
4 Science, Technology, and Innovation (STI)

Zambia recognizes that Science, Technology and Innovation (STI) play an important role in national development. Economic advancement of any country depends on innovation, science and technological advancement of its people. Science and Technology should be adaptable for the utilization of locally available resources to capture the large majority of citizens in the fight against poverty and deprivation. It enhances productivity, wealth creation and improved quality of life.\(^{164}\)

STI in Zambia, however, is not very well developed even though macroeconomic conditions have been largely favourable over the past decade as evidenced by sustained positive economic growth, single digit inflation, positive current account balance and a relatively stable exchange rate. Zambia’s global ranking in the Global Innovation Index in 2016 was 125 out of 128 ranked countries.\(^{165}\) Poorer countries, like Uganda, which was ranked 99\(^{th}\), are clearly out competing Zambia in the innovation stakes.

Zambia did have a few strong score components, for example political stability, ease of doing business and ease of paying taxes – the latter two testaments to the efforts the government has made into e-government initiatives. However, overall, Zambia lags competitors in many other key components. Its overall rank for the human capital and research subsection was 128/128, its overall rank for the infrastructure section was 125/128 and its overall rank for its business sophistication was 126/128. All this clearly indicates that Zambia has a great deal of work to do in several areas to make its STI sector regionally competitive.

This conclusion is reinforced when one considers the World Economic Forum’s Global Competitiveness Index. In this index, the quality of Zambia’s institutions is ranked relatively highly, while infrastructure, technological readiness and innovation are ranked quite low. If one unpacks the Innovation component, one sees that spending on R&D and patent applications are particularly weak.\(^ {166}\)

The sector, since 2011, is directed by the MESVTEE.

The first custodian of STI in Zambia was the National Council for Scientific Research (NCSR), established in 1964 to advise Government on matters of science and technology, and to enhance local capacity in science and technology by recommending or undertaking research and development work in national priority areas to promote the application of science and technology in national socio-economic development. It was changed to the National Institute for Scientific and Industrial Research (NISIR) in 1997 after the passage of the Science and Technology Act of 1997.

The Science and Technology Act established the National Science and Technology Council (NSTC) as a statutory body to promote science and technology for the socio-economic advantage of Zambians. The Act outlines the NSTC’s primary functions as to:

1) promote the development of an indigenous and environmentally friendly technological capacity;
2) regulate research in science and technology in Zambia;
3) register institutes and centres;
4) advise the Government on science and technology policies and activities in Zambia;
5) determine broad directions, stimulate co-ordination and initiate special projects in science and technology;

6) promote and publicise board national priorities in science and technology research;
7) liaise with Government, industry and centres and institutes in science and technology;
8) mobilise and distribute financial, human and other resources to management boards for science and technology research;
9) recommend to the Government the establishment of any new research institutes and centres;
10) promote the use of science and technology in industry;
11) ensure that gender concerns are integrated at all levels of science and technology development;
12) collect and disseminate science and technology information including publication of scientific reports, journals and other such documents and literature;
13) establish and maintain a relationship with corresponding scientific organizations in other countries;
14) take all measures that are necessary to popularise science and technology; and
15) identify and determine national research and development priorities in science and technology.167

The Act also gave power to the NSTC to establish various science and technology institutes as well as research and development support centres. The NISIR is the primary such institute in the country.

The NISIR, and its predecessor, has received good political support and has developed research and development capacity in food technology, textile, building and industrial minerals, agriculture, and natural resources, as well as the application of nuclear techniques and technical services to education, medicine, agriculture and mining.

The NISIR has also contributed to the development of indigenous scientific and technological capacity in the country as well as the establishment of several national institutions such as the Zambia Bureau of Standards, Radiation Protection Services Board and the Zambia Environmental Management Agency.

Currently, the NISIR conducts research into the following areas:
1) Livestock and pest research;
2) Plant and agricultural research;
3) Biotechnology;
4) Nuclear energy and radioisotopes;
5) Post-harvest food processing and nutrition technologies;
6) Water;
7) Energy;
8) Environmental protection; and
9) Building and industrial materials.

The NSTC also implements the Science and Technology Innovation Youth Fund (STIYF) and the Strategic Research Fund (SRF). The SRF was established to support basic and applied scientific Research and Development (R&D) in identified national strategic priority areas. The fund is also aimed at enhancing research capacity in Zambia.

Other NSTC partners and stakeholders in the STI sector include the following:
1) The University of Zambia (UNZA);
2) National Remote Sensing Centre (NRSC);
3) The National Technology Business Centre (NTBC);
4) The Copperbelt University (CBU);

5) Zambia Information and Communications Technology Authority (ZICTA);
6) The Zambia Agriculture Research Institute (ZARI);
7) The Technology Development and Advisory Unit (TDAU);
8) Central Veterinary Research Institute (CVRI);
9) The National Malaria Control Centre (NMCC); and
10) The Engineering Institution of Zambia (EIZ).  

4.1 STI Policies and Objectives

The MESVTEE provides the Policy and the Legal Frameworks for the various activities to be undertaken in the sector. Currently, Zambia is operating under the 1996 National Policy on Science and Technology (NPST) and the Science and Technology Act No. 26 of 1997. There are also some subsidiary and sectorial acts, policies and plans such as the Zambia Development Agency (ZDA) 2016 – 2020 Strategic Plan. Overall, however, the specific STI policy environment is underdeveloped and lacks updated focus, detail and specificity.

The NPST states four policy objectives in terms of research and development (R&D), namely:

1) To ensure that research is guided by national development goals and is predominantly in direct support of investment by and in the key sectors;
2) To ensure utilization of applied research in the fields of industry, agriculture, engineering and manufacturing design, medicine and mining;
3) As need arises in specific areas, to conduct basic research to generate knowledge to harness unique resources and opportunities; and
4) To select broad and directors for investment for public Research and Development to focus on key areas and create critical mass.

It also lists various general and specific measures through which to achieve these objectives in the following broad STI areas:

1) Industrial Research;
2) Engineering and Manufacturing Research;
3) Agricultural Research;
4) Health and Medical Research;
5) Social and Cultural Research; and
6) Information Technology Research.

The policy goes on to outline measures for the diffusion, transfer, innovation and commercialization of R&D products and initiative as well as measures for standardization, quality assurance and environmental protection.

During the few year years, policy and legislative reviews have been undertaken to enhance the contribution of science and technology to national productivity and competitiveness. This included the review of the 1996 NPST, consolidation of existing policies on education, science and vocational training (indeed also including the merger of the Ministry of Education with the Ministry of Science, Technology and Vocational Training and the formulation of an Intellectual Property Rights Policy. The Bio-safety Act of 2007 was also enacted.

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The strategic focus of the RSNDP is to raise scientific and technological levels in order to enhance total factor productivity leading to economic development. Further, linkages between research institutions and industry will be strengthened as well as capacity for research and development in science, technology and innovation. The Sector will focus on the adaptation, adoption and development of value addition technologies for agro-products and other local raw materials.

It goes on to state that appropriate sector policies and a legal framework on value addition need to be developed to accelerate technologies that will respond to societal needs and that add value to the nation’s resources and that legislation to govern indigenous knowledge systems are required. Lastly, it notes the need for a comprehensive framework to coordinate public and private R&D activities.

The RSNDP also outlines four pillars of required intervention for the STU sector.
1) Upgrading of STI Institutions: The Sector will upgrade STI institutions such as the National Institute for Scientific and Industrial Research and the National Science and Technology Council by providing appropriate infrastructure, equipment, legal framework and critical mass of relevant personnel;
2) Commercialisation of Research and Development Outputs: This will focus on enhancing value addition to the country’s natural resources. Further, the Sector will promote collaboration with the private sector to increase investment in STI activities;
3) Provision of Relevant Support for Research and Development Activities: This will accelerate the development of STI activities in priority areas such as health, agriculture, energy and manufacturing; and
4) Enhance Coordination: Given the multiplicity of STI programmes in various sectors, the Sector will develop mechanisms to harness linkages with other sectors and put in place appropriate legislation, standards and guidelines.

Most public funding of STI in Zambia is managed by the NSTC. The NSTC’s SRF is a primary mechanism and was established to support basic and applied research and development in identified areas of national priority, and to enhance research capacity in Zambia by supporting:
1) R&D in priority areas including
   a) Industry - Alternative Energy, materials sciences and manufacturing;
   b) Agriculture - Post harvest processing, plant and animal diseases and crops and animal productivity;
   c) Health - HIV/AIDS research, malaria and tuberculosis;
   d) Environment - Water and sanitation, waste to wealth processes and drought and desertification prevention;
   e) ICT - Software development, biometrics and cybersecurity;
2) Research infrastructure development;
3) Housing and community development;
4) Research collaborations;
5) Publications and other dissemination efforts; and
6) Intellectual property protection and patent applications.

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172 Ibid
The SRF targets priority research but also has an open application process, a post-graduate funding mechanism and a bilateral funding mechanism.

The STIYF, also implemented by the NSTC, is directed at people under the age of 36 to promote the development and application of scientific and technological innovations to drive employment and wealth creation. Applications must address one of the following areas:

1) Value addition to raw materials;
2) Renewable & alternative energy;
3) Human and animal health;
4) Agriculture, livestock and fisheries;
5) Environment;
6) Water management; or
7) Construction and building.\textsuperscript{174}

Lastly, the US Millennium Challenge Corporation also provides innovation grants of various sizes under its Innovation Grant Programme, a competitive pro-poor grant programme to engage the private sector in innovative partnership opportunities in water supply, sanitation and drainage.\textsuperscript{175}

4.2 Research and Innovation

There is little easily accessible information regarding R&D activities in Zambia. What follows has been gleaned from the few available sources.

In the health sector, an alternative and simpler malaria diagnostic tool was developed.\textsuperscript{176} Advances and investigations were also made in traditional medicines and occupational respiratory diseases.

In the energy sector, research activities focused on alternative energy sources such as bio fuels (Jatropha, sweet sorghum and ethanol), wind energy and mini-hydro-power generation.\textsuperscript{177}

Significant progress was made in infrastructure development and rehabilitation. Three biotechnology laboratories were established at National Institute for Scientific and Industrial Research (NISIR), Zambia Agricultural Research Institute (ZARI) and Seed Control and Certification Institute (SCCI). In addition, laboratories were rehabilitated and re-equipped at NISIR, Tropical Diseases Research Centre (TDRC), ZARI, University Teaching Hospital (UTH), Cancer Diseases Hospital, Central Veterinary Research Institute (CVRI), Chest Diseases Laboratory, Zambia Bureau of Standards and at public universities. Also established were the National Remote Sensing Centre (NRSC) and a key Science, Technology and Innovation (STI) infrastructure.

The NISIR runs a large number of R&D projects through its various research centres. Some of these and their research activities are listed below.\textsuperscript{178}

\textsuperscript{174} Ibid
1) The Tree Improvement Research Centre (TIRC) (now known as the Sustainable use of Underutilized Genetic Resource Centre) in Kitwe, undertakes research in plants (trees and shrubs) with potential for industrial, medical and household use.

2) The Livestock and Pest Research Centre (LPRC) in Chilanga focusses on the identification of factors that adversely affect livestock and their reproductive health.

3) Water Resources Research Unit’s (WRRU) is involved in monitoring and assessing the Zambian surface and ground water resources especially in the heavily industrialised parts of the country. Hydro-geological studies are also conducted to determine the hydrological properties of different rock formation in drought-prone areas of Kalomo and hydro-geological maps indicating water potential are prepared.

4) Radioisotopes Research Unit (RIRU) promotes the safe and peaceful application of nuclear science and technology in various sectors such as education, health, agriculture and industry, as well as the provision of nuclear analytical and irradiation services to research and other beneficiaries.

5) The Building and Industrial Minerals Research Unit (BIMRU) has embarked on projects researching the use of ceramics in building materials as well as other industrial mineral and energy research programmes.

6) The Food Technology Research Unit’s (FTRU) (now known as the Post-Harvest Food Processing and Nutrition Unit) research includes boosting fruit and vegetable production, cereal, tuber and legume disease resistance and biotechnology and nutrition research (e.g. the fortification of sugar with Vitamin A and the fortification of maize-meal at hammer mill and household level).

7) The Information Services Unit (ISU) that provides scientific and technological information to NISIR research units and other research and development institutions in Zambia.

The NISIR has also been involved in the popularization and use of biogas in schools. To date, four schools – two in Southern Province two in Central Province – are involved.179

The following tertiary institutions and schools also conduct research, especially into agriculture.
1) University of Zambia - School of Agricultural Sciences;
2) University of Zambia - School of Veterinary Medicine;
3) University of Zambia - Institute of Economic and Social Research;
4) University of Zambia - School of Engineering; and
5) Copperbelt University - School of Natural Resources.

The Indaba Agricultural Policy Research Institute (IAPRI) was established in 2011 as a non-profit company with the mandate to use empirical evidence to guide the government and other stakeholders regarding policy matters especially related to agriculture and food security (especially in light of global climate change) by producing high quality policy research and analysis.180

4.3 Human Resource Development

The Zambia Research and Development Centre’s (ZRDC) overall goal is the development of Zambia’s human capital. It engages in activities that foster international collaboration, promotes knowledge sharing, makes research expertise available to decision makers, and engages in a wide range of research projects. It aims to address poverty and underdevelopment through institutional and

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capacity building, human empowerment and gender participation in all established decision-making frameworks.\(^\text{181}\)

The ZRDC offers university scholarships to eligible students intending to become researchers.

### 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>Ministry of Education, Science, Vocational Training and Early Education</td>
<td>Provides overall direction for the STI sector</td>
</tr>
<tr>
<td>National Science and Technology Council</td>
<td>Statutory body to oversee STI activities</td>
</tr>
<tr>
<td>National Institute of Scientific and Industrial Research</td>
<td>Conducts research through various research centres</td>
</tr>
<tr>
<td>University of Zambia</td>
<td>Public University with various research centres.</td>
</tr>
<tr>
<td>Copperbelt University</td>
<td>Public University with various research centres.</td>
</tr>
<tr>
<td>Zambia Research and Development Centre</td>
<td>Fosters international collaboration, promotes knowledge sharing and conducts research projects.</td>
</tr>
<tr>
<td>The National Technology Business Centre</td>
<td>Supports the commercialization and transfer of technology by linking developed and proven technologies from local and international sources with local technology seekers.</td>
</tr>
</tbody>
</table>

### 4.5 Challenges facing the STI sector

Spending on R&D in Zambia remains below the African Union recommendation of 1% of GDP. In 2008, investment was measured at only 0.278% of GDP, well below this threshold and far behind other countries in the region.\(^\text{182}\) The number of researchers in R&D also remains low and was last measured at 40 per 1 million people in 2008 down from 52 in 1998.

The RSNDP notes that the general performance of the sector, in 2011 and 2012, was unsatisfactory due to weaknesses in coordination, inadequate policy and legal framework, human resource constraints, inadequate modern equipment and insufficient infrastructure.\(^\text{183}\) For instance, basic laboratory equipment for research was inadequate and obsolete in many institutions. Also, while two laboratories units were earmarked for rehabilitation, work on only one had started and was only 25% complete. In addition, out of the ten scientists who were supposed to be trained up to PhD level in priority areas, only one had started training.

As a result of the limited training of scientific officers, research and development activities in such priority areas as health and climate change continue to be constrained. Further, research and development institutions continue to operate without adequate staffing due to attrition and a lack of new trained and qualified personnel.\(^\text{184}\)

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\(^{184}\) Ibid
The commercialisation of research and development products is hampered by weak linkages between research institutions and industry and inadequate mechanisms for the dissemination of research findings and protection of intellectual property.\footnote{Ibid}
5 Conclusion

Zambia requires massive and consistent investment in all of the areas required for the development of a knowledge society, including education and human development at all levels, research and development especially in STI, ICT infrastructure and the policy and regulatory frameworks that direct, enable and link these sectors.

Vision 2030 is clear in its aspirations of Zambia becoming a middle-income country by 2030 and it is widely recognized as the guiding document for many plans and policies. The RSNDP, has gone some way towards identifying various specific sector issues and defining the strategic goals for each but tends to be relatively weak in terms of actionable means of reaching or achieving these goals and implementing these strategies. While budget frameworks have been prepared and specific targets defined, the RSNDP leaves it to each sector to construct their own detailed implementation plans. While this approach appears promising, and the decentralization of planning and decision-making is a productive strategy and in line with the current government’s preferred approach, sector specific plans, where they exist tend to be out of date and/or lacking in the necessary detailed implementation strategies necessary to realize Zambia’s ambitious planning objectives.

There have been gains made in the implementation of ICTs in Zambia, particularly in mobile phone penetration. However, these gains are tempered by relatively low levels of internet adoption and usage, a moderately constrained bandwidth environment and the high costs of both ICT equipment and access. It is striking that a landlocked country like Zambia does not have a specific broadband implementation plan to ensure that it is able to more fully transition away from expensive satellite links to far cheaper optical fibre connections to the continent’s submarine cable network. It is also worth noting that, although the government has indicated its intention to review the National ICT policy of 2006, no such reviewed or revised policy seems to be publicly available as yet.

Coming off a low base, Zambia has made excellent progress in terms of Universal Primary Education. The major increase in enrolments has, however, put tremendous strain on the education system and quality is being severely affected as a result. The TEVET and tertiary sub-sectors both require large investments to increase their capacity, accessibility and quality.

There is also no coherent and cogent policy on the role that ICTs can and should be making in addressing both issues of access and quality and not just in the primary and secondary sub-sectors. Due to the current sizes of the TEVET and tertiary sub-sectors, it can be argued that the positive impact of a carefully considered ICT in education policy could be more immediately felt here.

It is notable that the MESVTEE has included ICT as a subject at both primary and secondary level, such a policy intervention, without the concomitant investments in school infrastructure and teacher development, while well meaning, are essentially of little value. It is important for students to be exposed to ICTs as part of ordinary teaching and learning, fostering the development of ICT skills envisaged by this curriculum development. Nevertheless, the current Fast Track Training initiative especially for teachers of mathematics and science and efforts to strengthen effective school management, through the Education Leadership and Management training programme is promising.

Finally, it has been noted that Zambia’s STI sector is relatively underdeveloped due mainly to a weakness in coordination, an inadequate policy and legal framework, human resource constraints, inadequate modern equipment and insufficient infrastructure. Improving the quality of primary and

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secondary education will also have a positive impact on STI by making the pool of potential research students larger. Strengthening the Intellectual Property framework will enable more open sharing of research results and findings and permit basic research products to be more easily commercialised.
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.
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