

# Assessment of Knowledge Society Development in Tanzania

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.

## 1. 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.

## 2. 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.

### 3. 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.<sup>1</sup> 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.<sup>2</sup>

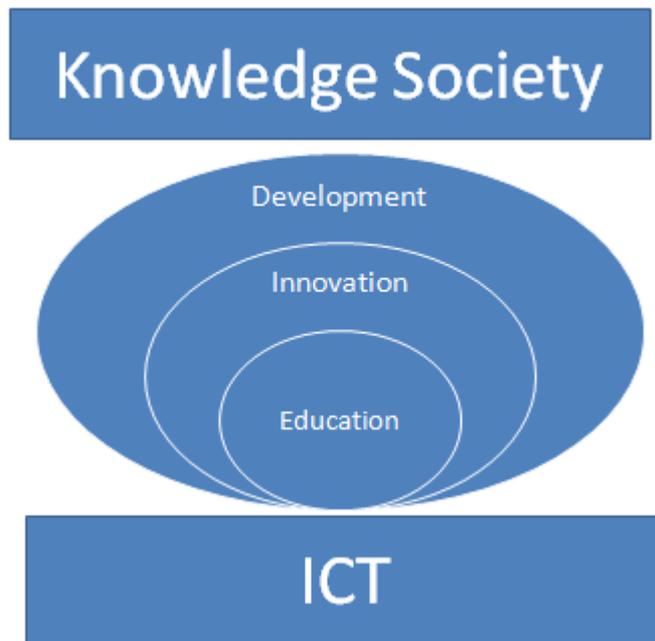
Gesci believes that ICT, education, and innovation are the critical pillars and key elements for development towards a knowledge-based future. Butcher (2010) visually captured the inter-relationship between the three pillars as follows:

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<sup>1</sup> Dahlman, C. J. (2011). What is the Knowledge Economy and Society and How Can it Help Jamaica? Retrieved July 17, 2017 from [http://www.knowledgesocietyfoundation.com/images/Dahlman\\_C\\_2011\\_What\\_is\\_the\\_Knowledge\\_Economy\\_and\\_Society\\_-\\_How\\_can\\_it\\_help\\_Jamaica,\\_Jam\\_KE\\_C\\_Conf,\\_Ssn\\_1-2.pdf](http://www.knowledgesocietyfoundation.com/images/Dahlman_C_2011_What_is_the_Knowledge_Economy_and_Society_-_How_can_it_help_Jamaica,_Jam_KE_C_Conf,_Ssn_1-2.pdf)

<sup>2</sup> UNESCO. (2005). Towards Knowledge Societies. Retrieved July 17, 2017 from <http://unesdoc.unesco.org/images/0014/001418/141843e.pdf>

Figure 1 Framework for reflecting on ICT, Education, Innovation and Development Support of a Knowledge Society<sup>3</sup>



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.<sup>4</sup>

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.*<sup>5</sup>

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.<sup>6</sup> This enables continuous adaptation to a

<sup>3</sup> Neil Butcher and Associates. (2011). Thematic Paper: ICT, Education, Development, and the Knowledge Society. Gesci. Retrieved July 17, 2017 from [http://gesci.org/fileadmin/user\\_upload/4\\_ICT\\_in\\_STEM\\_Education\\_Files/ICT\\_Education\\_Development\\_and\\_the\\_Knowledge\\_Society\\_1\\_1\\_.pdf](http://gesci.org/fileadmin/user_upload/4_ICT_in_STEM_Education_Files/ICT_Education_Development_and_the_Knowledge_Society_1_1_.pdf)

<sup>4</sup> Hooker, M. (2011). African Leadership in ICT and Knowledge Societies: Issues, Tensions and Opportunities for Learning for Gesci. Retrieved July 17, 2017 from [http://gesci.org/fileadmin/user\\_upload/1\\_African\\_Leadership\\_in\\_ICT\\_and\\_Knowledge\\_Society\\_Development\\_Files/2013\\_-\\_african-leadership-knowledge-societies-issues-tensions-opportunities-learning.pdf](http://gesci.org/fileadmin/user_upload/1_African_Leadership_in_ICT_and_Knowledge_Society_Development_Files/2013_-_african-leadership-knowledge-societies-issues-tensions-opportunities-learning.pdf)

<sup>5</sup> UNESCO Bangkok. (2007). The UNESCO ICT in Education Programme. p.1. Retrieved July 17, 2017 from <http://unesdoc.unesco.org/images/0015/001567/156769e.pdf>

<sup>6</sup> Scheffler, F.L., and Logan, J.P. (1999). Computer Technology in Schools: What Teachers Should Know and Be Able to Do. *Journal of Research on Computing in Education*, Vol 31, Issue 3. Available from <http://www.tandfonline.com/doi/abs/10.1080/08886504.1999.10782257>

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.<sup>7</sup> 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.<sup>8</sup> 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.<sup>9</sup>

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.<sup>10</sup> 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).<sup>11</sup>

### 3.1. 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.<sup>12</sup> 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 organizational capability through knowledge sharing, collaboration, and exposure to technology. It is

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<sup>7</sup> Hooker, M. (2011). African Leadership in ICT and Knowledge Societies: Issues, Tensions and Opportunities for Learning for Gesci. Op cit

<sup>8</sup> Neil Butcher and Associates. (2011). Thematic Paper: ICT, Education, Development, and the Knowledge Society. Op cit

<sup>9</sup> Hooker, M. African Leadership in ICT and Knowledge Societies: Issues, Tensions and Opportunities for Learning for Gesci. Op cit

<sup>10</sup> Hooker, M. (2010). Concept note: Building Leadership Capacity for ICT and Knowledge Societies in Africa. Gesci. Retrieved July 17, 2017 from [http://gesci.org/fileadmin/user\\_upload/1\\_African\\_Leadership\\_in\\_ICT\\_and\\_Knowledge\\_Society\\_Development\\_Files/2012\\_-\\_ConceptNoteALICTFinal.pdf](http://gesci.org/fileadmin/user_upload/1_African_Leadership_in_ICT_and_Knowledge_Society_Development_Files/2012_-_ConceptNoteALICTFinal.pdf)

<sup>11</sup> Hooker, M. (2011). African Leadership in ICT and Knowledge Societies: Issues, Tensions and Opportunities for Learning for Gesci. Op cit

<sup>12</sup> *ibid*

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

The core concepts of the programme are as follows:

- **Capacity Building:** The ALICT capacity-building model aims to build and enhance the knowledge, skills, and attitudes of future leaders to manage transformation and change, manage institutional pluralism, enhance coordination, foster communication, and ensure that data and information are shared and used in planning, resource mobilization, implementation, and evaluation processes.
- **Knowledge Society:** The ALICT model focuses on the role all facets of ICT play in building the absorptive capacities of current and potential future African leaders to acquire, assimilate, transform, and exploit the benefits of ICT and knowledge to produce a dynamic organizational capability through peer knowledge sharing and exposure to technology. The ALICT approach to KS development focuses on the interconnection between leadership, policy development, and future-proof planning and how they contribute to KS development through Education, STI, and ICT.
- **Leadership:** A prerequisite for leadership development for knowledge societies is policy coherence between the three pillars (ICT, Education, and STI) that form the basis of any KS. For future African leaders to be able to steer their countries towards that goal, it is essential for them to not only be well versed in management, leadership, project formulation and project management skills, but also to acquire comprehensive knowledge about the interrelationship of the three KS pillars (Education, STI and ICT) and then be able to apply that knowledge in the African context.
- **Policy Coherence:** Policy coherence is the development and implementation of conjointly supportive policy actions across all sectors of the economy and society and, more specifically across government departments and agencies. Policy coherence pursues the creation of synergies across policies that advance the achievement of shared and agreed objectives. Within national governments, policy coherence issues arise between different types of public policies, between different levels of government, between different stakeholders, and at an international level.
- **Futures Thinking:** Futures Thinking was first theorized by Jim Dator (Bezold, 2009). Among its many uses within complex and rapidly shifting economic and social systems is its relevance to policy development and implementation. Futures Thinking requires the revisitation of plans and policies at regular intervals to take into consideration any new signals that appear in the environment that may affect a sector or number of sectors.<sup>13</sup>

### 3.2. 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.

*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*

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<sup>13</sup> Taken verbatim from African Leadership in ICT Model Document 2013 - The Future of African Leadership is here. Retrieved July 17, 2017 from [http://gesci.org/fileadmin/user\\_upload/1\\_African\\_Leadership\\_in\\_ICT\\_and\\_Knowledge\\_Society\\_Development\\_Files/ALICT\\_Model\\_final\\_Juho.pdf](http://gesci.org/fileadmin/user_upload/1_African_Leadership_in_ICT_and_Knowledge_Society_Development_Files/ALICT_Model_final_Juho.pdf)

*protection, and job opportunities, while tackling climate change and environmental protection.*<sup>14</sup>

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.<sup>15</sup>

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.

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<sup>14</sup> United Nations. (no date) Sustainable Development Goals – 17 Goals to Transform our World. Retrieved July 17, 2017 from <http://www.un.org/sustainabledevelopment/development-agenda/>

<sup>15</sup> Ibid

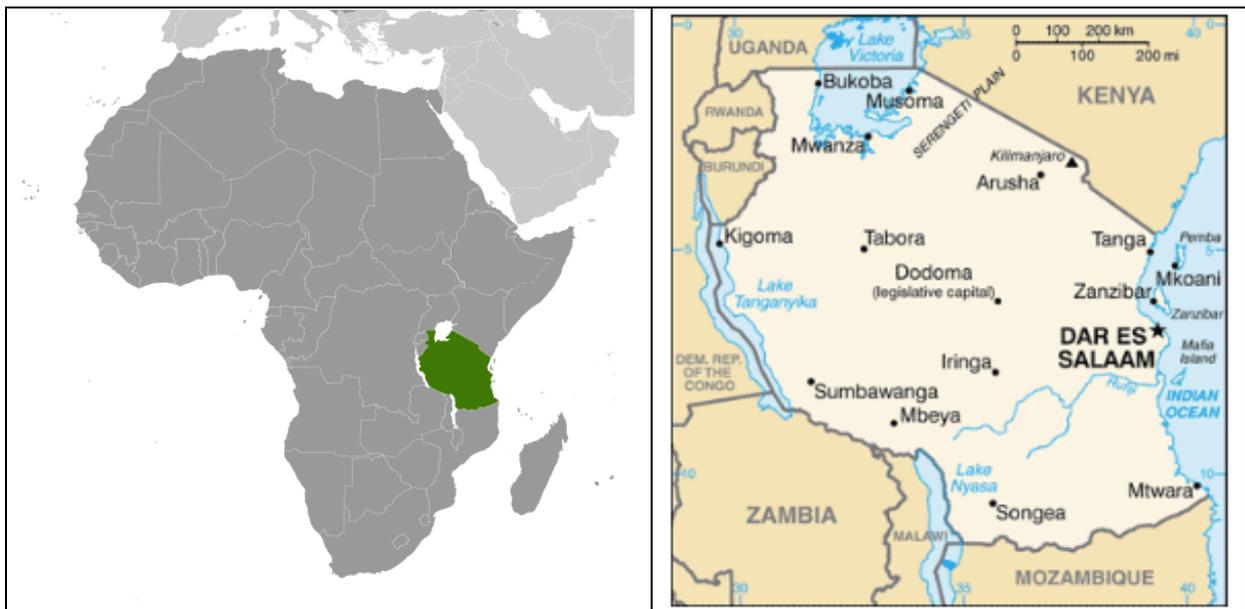
# Knowledge Society Development in Tanzania

## 4. Introduction

Tanzania is in East Africa on the Indian Ocean (1,424km coastline) and borders Kenya and Uganda to the north, Mozambique to the South and Malawi, Zambia, the Democratic Republic of Congo, Burundi and Rwanda on the East. The country shares access to all three major East African lakes – Lake Victoria, Lake Tanganyika and Lake Malawi. Tanzania covers a total of 885,800 km<sup>2</sup> and includes the islands of Mafia, Pemba and Zanzibar. Dar es Salaam is the country's main economic centre with Dodoma being the legislative capital. There are 30 administrative regions.<sup>16</sup>

The United Republic of Tanzania (Tanzania) was formed by the merging of Tanganyika and Zanzibar in 1964, shortly after both areas gained independence from Britain in 1961. The first multi-party democratic elections were held in Tanzania in 1995. In 2015 John Magufuli was elected president with 58.5% of the vote and the country is generally stable and peaceful although long standing tensions with Malawi over a border dispute flared up again in 2012.<sup>17</sup>

Figure 2 Map of Tanzania<sup>18</sup>



The population of Tanzania currently stands at 52,482,726<sup>19</sup>, the largest in the East African region, with an annual growth rate of 3.13%.<sup>20</sup> Tanzania has the lowest population density in the region, with about one third of the population urbanized.

Kiswahili is the official language with English used as a second official language and the dominant language for commerce, administration and higher education. Arabic is widely spoken in Zanzibar.

<sup>16</sup> Central Intelligence Agency. (2017). Tanzania. Retrieved April 17, 2017 from The World Factbook: <https://www.cia.gov/library/publications/the-world-factbook/geos/tz.html>

<sup>17</sup> Ibid

<sup>18</sup> Ibid

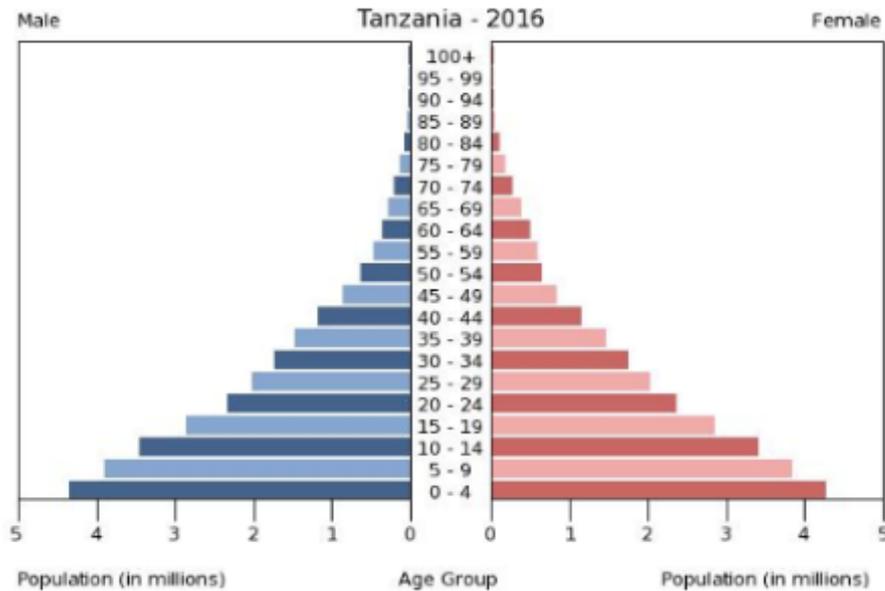
<sup>19</sup> Ibid

<sup>20</sup> World Bank. (2015). Population growth (annual %). Retrieved April 17, 2017 from <http://data.worldbank.org/indicator/SP.POP.GROW?locations=TZ>

The country is predominantly Christian (61.4%) with Muslims forming the next biggest demographic with 35.2%.<sup>21</sup>

Tanzania has a very youthful population. About two-thirds of the population is under 25 and is growing rapidly because of the high total fertility rate of 4.8 children per woman. Approximately 70% of the population is literate (over the age of 15 and able to read and write Kiswahili, English or Arabic); however, female literacy significantly lags male literacy (65% to 76%).<sup>22</sup>

Figure 3 Population pyramid<sup>23</sup>



According to the International Labour Organization, general unemployment in Tanzania in 2014 was low at 2.1%. Youth unemployment (15 – 24) was only marginally higher at 3.9% with a labour force participation rate of 72.4%. The share of youth not in employment, education or training (NEET) stood at 14.9% in 2014.<sup>24</sup>

Tanzania’s GDP in 2015 was US\$45.628 billion<sup>25</sup> (US\$138.732 billion<sup>26</sup> PPP and US\$2,672.51 per capita PPP<sup>27</sup>) and grew at an annual rate of 6.959% in 2015.<sup>28</sup> The economy has almost quadrupled in size since 2005 with a average annual growth rate of 7% making Tanzania one of the consistently

<sup>21</sup> Central Intelligence Agency. (2017). Tanzania. Op cit

<sup>22</sup> Ibid

<sup>23</sup> Ibid

<sup>24</sup> International Labour Organization. (2014). Tanzania Country Profile. Retrieved April 17, 2017 from <https://www.ilo.org/ilostatcp/CPDesktop/?list=true&lang=en&country=TZA>

<sup>25</sup> World Bank. (2015). GDP (current US\$). Retrieved April 17, 2017 from <http://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=TZ>

<sup>26</sup> World Bank. (2015). GDP per capita, PPP (current international \$). Retrieved April 17, 2017 from <http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD?locations=TZ>

<sup>27</sup> World Bank. (2015). GDP, PPP (current international \$). Retrieved April 2017, 2017 from <http://data.worldbank.org/indicator/NY.GDP.MKTP.PP.CD>

<sup>28</sup> World Bank. (2015). GDP growth (annual %). Retrieved April 17, 2017 from <http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=TZ>

fastest growing economies in the past decade. Inflation stood at 5.588% in 2015<sup>29</sup> and Foreign Direct Investment as a percentage of GDP was 4.297 in 2015 (1.6 times the Sub-Saharan Africa average).<sup>30</sup>

Tanzania still remains in the low human development category with a Human Development Index (HDI) score of 0.531 (placing it 155 out of 188 countries in 2016)<sup>31</sup> with approximately 67% of the population still living below the international poverty line.<sup>32</sup> Since 1990, however, Tanzania's index has improved by over 43% currently placing Tanzania above the average for Sub-Sahara and hence showing a strong positive trajectory. These figures do mask a relatively large degree of income and gender inequality, however. When inequality is factored in, Tanzania's HDI falls to 0.396 but this HDI measure and the percentage reduction due to inequality are still better than the average for Sub-Saharan Africa.<sup>33</sup> The country's Gini Coefficient Index (a direct measure of income inequality) was 37.78 in 2011 below those of many of its neighbours.<sup>34</sup>

Tanzania is also above the sub-Saharan average in the Gender Development Index (GDI) which is a measure of the ration of Female: Male HDI's. Values less than 1 indicate a lower female HDI. Currently, Tanzania's GDI is 0.937 (Sub-Saharan Africa average is 0.877).<sup>35</sup>

Tanzania possesses vast mineral wealth that is partly fuelling its impressive economic gains. Still, one quarter of the economy, 85% of exports and 80% of employment relate to agriculture.<sup>36</sup> Major exports include coffee, sisal, tea and cotton.

The Global Competitiveness Index (GCI, 2016-17) which assesses the ability of countries to provide high levels of prosperity to their citizens through measuring the set of institutions, policies, and other enabling factors that set the sustainable current and medium-term levels of economic prosperity, ranks Tanzania 116 out of 138 countries with a score of 3.7.<sup>37</sup> The recent trend is relative flat. Primary education is noted as one of the most significant limiting factors (mainly due to poor primary enrolment rates) with a rating of 3.4 (128/138 countries). Other areas of relative weakness include higher education and training, technological readiness, corruption, high tax rates and infrastructure. Much of the county's core transport and electricity infrastructure has recently been improved, partly due to the massive Millennium Challenge Compact grant (US\$698 billion) which ended in 2014.<sup>38</sup>

The World Economic Forum's Inclusive Development Index is an index that provides a multidimensional assessment of living standards and inclusive growth. In 2017, Tanzania was ranked 51 out of 109 countries overall with a score of 3.59.<sup>39</sup> Tanzania's five-year overall trend, however, is slightly negative, due mainly to weak scores for fiscal transfer (especially related to the tax code) and

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<sup>29</sup> World Bank. (2015). Inflation, consumer prices (annual %). Retrieved April 17, 2017 from <http://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?locations=TZ>

<sup>30</sup> World Bank. (2015). Foreign direct investment, net inflows (% of GDP). Retrieved April 17, 2017 from <http://data.worldbank.org/indicator/BX.KLT.DINV.WD.GD.ZS?locations=TZ>

<sup>31</sup> United Nations Development Programme. (2016). Human Development Report 2016 - Tanzania. Retrieved April 17, 2017 from [http://hdr.undp.org/sites/all/themes/hdr\\_theme/country-notes/TZA.pdf](http://hdr.undp.org/sites/all/themes/hdr_theme/country-notes/TZA.pdf)

<sup>32</sup> Central Intelligence Agency. (2017). Tanzania. Op cit

<sup>33</sup> United Nations Development Programme. (2016). Human Development Report 2016 - Tanzania. Op cit

<sup>34</sup> World Bank. (2011). GINI index (World Bank estimate). Retrieved April 17, 2017 from <http://data.worldbank.org/indicator/SI.POV.GINI?locations=TZ>

<sup>35</sup> United Nations Development Programme. (2016). Human Development Report 2016 - Tanzania. Op cit

<sup>36</sup> Central Intelligence Agency. (2017). Tanzania. Op cit

<sup>37</sup> World Economic Forum. (2016). Global Competitiveness Index 2016 - 2017. Op cit

<sup>38</sup> Central Intelligence Agency. (2017). Tanzania. Op cit

<sup>39</sup> World Economic Forum. (2017). Inclusive Development Index 2017. Retrieved April 17, 2017 from <http://reports.weforum.org/inclusive-growth-and-development-report-2017/scorecard/#economy=TZA>

basic infrastructure and services. Having said this, Tanzania is doing better than most of its East African neighbours.

According to the Heritage Foundation's Index of Economic Freedom 2017 report, Tanzania's economic freedom index is 58.6 making it the 105<sup>th</sup> freest economy out of the 178 ranked countries and rated as "mostly unfree". The report notes that Tanzania has made progress in achieving income growth and poverty reduction over the past decade. "While small in size, the financial sector has undergone modernization, and credit is increasingly allocated at market rates, supporting the development of a more vibrant entrepreneurial sector."<sup>40</sup> It also notes, however, that "government seems to lack strong commitment to further institutional reforms that are essential to long-term economic development. Long-standing structural problems include poor management of public finance and an underdeveloped legal framework that interferes with regulatory efficiency."<sup>41</sup>

Tanzania's ranking on the International Telecommunication Union's (ITU) ICT Development Index (IDI) for 2016 was 1.65, placing it 167 out of 175 countries.<sup>42</sup> This is unchanged from 2015. Tanzania is ranked 31 in the region and thus still lags many of its regional competitors.

Furthermore, the World Economic Forum's Networked Readiness Index for 2016 ranked Tanzania 126 out of 139 countries with a score of 2.9.<sup>43</sup> Tanzania ranks very poorly in individual usage of ICT (134) and their economic impact (132). Affordability (131) along with poor secondary school enrolments (134) are also noted as limiting factors to leveraging ICT for the development of the Knowledge Society. These findings are echoed by the Global Innovation Index 2016, which highlights ICT use (123<sup>rd</sup> out of 128) and ICT access 119<sup>th</sup> out of 128) as particular weaknesses.<sup>44</sup> Tanzania's overall ranking is 105 out of 128 countries with a score of 26.4.

The Tanzanian Development Vision 2025 is the country's guiding development document and is supported by the National Five Year Development Plan 2016/16 – 2020/21 (NFYDP). The Vision 2025 document lays out the basic framework to guide Tanzania's development and transition from a least developed to a middle income country by 2025. The plan articulates three key targets:

- 1) High quality livelihood - A high quality livelihood for all Tanzanians is expected to be attained through strategies which ensure the realisation of the following goals:
  - a) Food self-sufficiency and food security.
  - b) Universal primary education, the eradication of illiteracy and the attainment of a level of tertiary education and training that is commensurate with a critical mass of high quality human resources required to effectively respond and master the development challenges at all levels.
  - c) Gender equality and the empowerment of women in all socio-economic and political relations and cultures.
  - d) Access to quality primary health care for all.
  - e) Access to quality reproductive health services for all individuals of appropriate ages.
  - f) Reduction in infant and maternal mortality rates by three-quarters of current levels.
  - g) Universal access to safe water.
  - h) Life expectancy comparable to the level attained by typical middle income countries.

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<sup>40</sup> The Heritage Foundation. (2017). 2017 Index of Economic Freedom. Retrieved April 17, 2017 from <http://www.heritage.org/index/country/tanzania>

<sup>41</sup> Ibid

<sup>42</sup> International Telecommunications Union. (2016). ICT Development Index 2016. Retrieved April 17, 2017 from <http://www.itu.int/net4/ITU-D/idi/2016/>

<sup>43</sup> World Economic Forum. (2016). Networked Readiness Index 2016. Retrieved April 17, 2017 from <http://reports.weforum.org/global-information-technology-report-2016/economies/#economy=TZA>

<sup>44</sup> Global Innovation Index. (2016). 2016 Report. Retrieved April 17, 2017 from <https://www.globalinnovationindex.org/analysis-economy>

- i) Absence of abject poverty
- 2) Good Governance and the Rule of Law - It is desired that the Tanzanian society should be characterized by:
  - a) Desirable moral and cultural uprightness.
  - b) Strong adherence to and respect for the rule of law
  - c) Absence of corruption and other vices.
  - d) A learning society which is confident, learns from its own development experience and that of others and owns and determines its own development agenda.
- 3) A Strong and Competitive Economy - The economy is expected to have the following characteristics:
  - a) A diversified and semi-industrialized economy with a substantial industrial sector comparable to typical middle-income countries.
  - b) Macroeconomic stability manifested by a low inflation economy and basic macroeconomic balances.
  - c) A growth rate of 8% per annum or more.
  - d) An adequate level of physical infrastructure needed to cope with the requirements of the Vision in all sectors.
  - e) An active and competitive player in the regional and world markets, with the capacity to articulate and promote national interests and to adjust quickly to regional and global market shifts.<sup>45</sup>

Much of what is contained in Vision 2025 is the same as was included in the preceding Arusha Declaration which guided the country's development between 1967 and 1997 and identified "poverty, disease and ignorance" as the three critical challenges to be overcome.<sup>46</sup> Mallya criticises Vision 2025 for this reason, stating that "there is therefore nothing new in the Vision 2025 that was not covered in the Arusha Declaration. Yet, the environment in which an attempt will be made to meet the very same objectives has become much more treacherous and competitive."<sup>47</sup>

Tanzania emits approximately 0.2 tonnes of CO<sub>2</sub> per capita per year well below the global average of almost five tonnes per capita per year (2013 figures) although this has more than doubled over the past decade.<sup>48</sup> Electric power consumption was just below 90 kWh per capita in 2013, up from 67 kWh per capita in 2003 (a 140% increase).<sup>49</sup> Renewable energy consumption as a percentage of total energy consumption was 88% in 2012, down from 92% a decade earlier.<sup>50</sup> In keeping with this trend, renewable electricity output as a percentage of total output was less than 30% in 2012, down from almost 96% in 2003.<sup>51</sup> It should be noted, however, that over this period, non-hydroelectric generation has increased from zero to 36 million kWh indicating that some investment into alternative renewable energy sources has taken place although some of this change is attributable to the effects of climate change.<sup>52</sup>

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<sup>45</sup> United Republic of Tanzania Planning Commission. (2000). The Tanzanian Development Vision 2025. Retrieved April 17, 2017 from <http://www.mof.go.tz/mofdocs/overarch/Vision2025.pdf>

<sup>46</sup> Mallya, E. T. (2000). A Critical Look at Tanzania's Development Vision 2025. Retrieved April 17, 2017 from <http://unpan1.un.org/intradoc/groups/public/documents/idep/unpan002404.pdf>

<sup>47</sup> Ibid

<sup>48</sup> World Bank. (2013). CO<sub>2</sub> emissions (metric tons per capita). Retrieved April 17, 2017 from <http://data.worldbank.org/indicator/EN.ATM.CO2E.PC?locations=TZ-1W>

<sup>49</sup> World Bank. (2013). Electric power consumption (kWh per capita). Retrieved April 17, 2017 from <http://data.worldbank.org/indicator/EG.USE.ELEC.KH.PC?locations=TZ>

<sup>50</sup> World Bank. (2012). Renewable energy consumption (% of total final energy consumption). Retrieved April 17, 2017 from <http://data.worldbank.org/indicator/EG.FEC.RNEW.ZS?locations=TZ>

<sup>51</sup> Ibid

<sup>52</sup> World Bank. (2013). Electricity production from renewable sources, excluding hydroelectric (kWh). Retrieved April 17, 2017 from <http://data.worldbank.org/indicator/EG.ELC.RNWX.KH?locations=TZ>

Although Tanzania’s overall levels of CO<sub>2</sub> emissions are relatively very low, the country is still extremely vulnerable to global climate change. For example, average annual temperatures have increased by 1°C and average annual rainfall has decreased by 2.8mm since 1960. Dry season flow in the Mara river has decreased by 68% since 1972 with even greater effects visible in the south of the country.<sup>53</sup> As a result of more regular and more intense periods of drought, grazing lands have been reduced as has the electricity supply from hydro-electric means.

Future predictions point to an acceleration in some of these trends. Average annual temperatures are expected to rise between 1.0°C and 2.7°C by 2060.<sup>54</sup> While average rainfall is expected to increase, this will mostly be the result of significant flooding events.

Tanzania, has a raft of legislation and policies related to addressing and mitigating the causes and effects of climate change. The following table provides a summary of these as they related to various sectors of the economy.

Figure 4 Summary of Climate related legislation and policies<sup>55</sup>

Sector / Theme	Policy Document
<b>Climate Change / Environment</b>	<ol style="list-style-type: none"> <li>1. National Adaptation Programme of Action (2007)</li> <li>2. National Climate Change Strategy (2012)</li> <li>3. National Environmental Policy (1997)</li> <li>4. National Environmental Management Act (2007)</li> <li>5. National Climate Change Communication Strategy (2012)</li> </ol>
<b>Development</b>	<ol style="list-style-type: none"> <li>6. National Growth and Poverty Reduction Strategy II (2010 – 2015)</li> <li>7. Five Year Development Plan (2011 – 2016)</li> </ol>
<b>Agriculture / Food Security</b>	<ol style="list-style-type: none"> <li>8. Agriculture Climate Resilience Plan (2014 – 2019)</li> <li>9. National Food Security Act (DRAFT 2012)</li> <li>10. National Livestock Policy (2006)</li> <li>11. National Food and Nutrition Policy (1992)</li> </ol>
<b>Disaster Management / Risk Reduction</b>	<ol style="list-style-type: none"> <li>12. National Disaster Relief Coordination Act (1990)</li> <li>13. National Disaster Management Policy (2004)</li> <li>14. National Disaster Management Policy (DRAFT 2011)</li> </ol>
<b>Health</b>	<ol style="list-style-type: none"> <li>15. National Health Policy (2003)</li> <li>16. Health Sector Strategic Plan (2009 – 2015)</li> </ol>

In the introduction to their report on climate change policy inventory and analysis for Tanzania, Daly et. al. (2015) comment that climate change is a crosscutting issue that is of central importance to national development planning in Tanzania.

*Tanzania’s economy is already very vulnerable to the impacts of climate variability and change, and climate projections show that climate change will further impact climate-sensitive sectors through changes in temperature and precipitation patterns. It is therefore imperative that Tanzania develops effective policies and institutional frameworks for supporting climate resilience in climate-sensitive sectors.*<sup>56</sup>

<sup>53</sup> Irish Aid. (2015). Tanzania Climate Action Report 2015. Retrieved April 17, 2017 from <https://www.irishaid.ie/media/irishaidpublications/TZA-Country-Climate-Action-Reports-Tanzania-2015.pdf>

<sup>54</sup> Ibid

<sup>55</sup> Daly, M. E., Yanda, P. Z., & West, J. W. (2015). Climate change policy inventory and analysis for Tanzania. Retrieved April 2017, 2017 from <https://brage.bibsys.no/xmloi/bitstream/handle/11250/2367251/CICERO%20Reposrt%2005%20-%20web.pdf?sequence=1&isAllowed=y>

<sup>56</sup> Ibid

Of particular relevance here are the National Adaptation Programme of Action (NAPA) of 2007 which was prepared as part overall national sustainable development planning processes and was the result of several vulnerability assessments,<sup>57</sup> and the National Climate Change Strategy (NCCS) of 2012 whose broad goal is to enable Tanzania to effectively adapt to climate change and participate in global efforts to mitigate its effects.

The NAPA prioritised the following 14 strategic adaptation activities:

- 1) Water efficiency in crop production irrigation to boost production and conserve water;
- 2) Alternative farming systems and water harvesting;
- 3) Developing alternative water storage programmes and technology for communities;
- 4) Community based catchments conservation and management programmes;
- 5) Exploration and investment in alternative clean energy sources;
- 6) Promotion of co-generation in the industry sector for lost hydro potential;
- 7) Afforestation programmes in degraded lands using more adaptive and fast growing tree species;
- 8) Development of community forest fire prevention plans and programmes;
- 9) Establishment and strengthening of community awareness programmes on preventable major health hazards;
- 10) Implementation of sustainable tourism activities in the coastal areas and relocation of vulnerable communities from low-lying areas;
- 11) Enhanced wildlife extension services and assistance to rural communities in managing wildlife resources;
- 12) Water harvesting and recycling;
- 13) Construction of artificial structures, e.g. sea walls, artificially placing sand on beaches and coastal drain beach management systems; and
- 14) Establishment of a good land tenure system and facilitation of human settlements.<sup>58</sup>

The NCCS was “developed in response to the growing concern of the negative impacts of climate change and climate variability on the country’s social, economic and physical environment. Its overall aim is to enhance the technical, institutional and individual capacity of the country to address the impacts of climate change. The Strategy covers adaptation, mitigation and cross-cutting interventions that will enable Tanzania the benefit from the opportunities available to developing countries in their efforts to tackle climate change.”<sup>59</sup>

The specific objectives of the strategy are noted as:

- 1) To build the capacity of Tanzania to adapt to climate change impacts.
- 2) To enhance resilience of ecosystems to the challenges posed by climate change.
- 3) To enable accessibility and utilization of the available climate change opportunities through implementation.
- 4) To enhance participation in climate change mitigation activities that lead to sustainable development.
- 5) To enhance public awareness on climate change.
- 6) To enhance information management on climate change.
- 7) To put in place a better institutional arrangement to adequately address climate change.

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<sup>57</sup> United Republic of Tanzania Vice President’s Office. (2007). National Adaptation Programme of Action. Retrieved April 17, 2017 from <http://unfccc.int/resource/docs/napa/tza01.pdf>

<sup>58</sup> Irish Aid. (2015). Tanzania Climate Action Report 2015. Op cit

<sup>59</sup> United Republic of Tanzania Vice President’s Office. (2012). National Climate Change Strategy. Retrieved April 17, 2017 from

<https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwiRxuveyqvTAhUKIMAKHSzhBuUQFggiMAA&url=http%3A%2F%2Ftanzania.um.dk%2Fen%2F~%2Fmedia%2FTanzania%2FDocuments%2FEnvironment%2FTANZANIA%2520CLIMATE%2520CHANGE%2520STRATEGY%2FTANZANIA%2520CLIMATE%2520CHANGE%2520STRATEGY.pdf&u sg=AFQjCNF7g4g-EMDc96zuMFnlPnNceCCn1Q&sig2=ICF8iCulvrYEGdV43Y2KNQ&cad=rja>

8) To mobilize resources including finance to adequately address climate change.<sup>60</sup>

The NCCS employs a three-pronged approach aimed at building the country’s technical, institutional and individual capacities to address the impacts of climate change. The strategy outlines a range of interventions for climate change mitigation, adaptation, and crosscutting issues, however, “adaptation interventions are given explicit priority over mitigation interventions and are intended to build upon, and expand, the priority activities defined within the NAPA.”<sup>61</sup>

The following table itemises the priority sectors and themes identified by the NCCS in terms of adaptation, mitigation and cross-cutting strategies

*Table 1 Priority Adaptation, Mitigation and Crosscutting Themes and Sectors in the NCCS.*<sup>62</sup>

<b>Adaptation Sectors/Themes</b>	<b>Mitigation Sectors/Themes</b>
Water Resources Coastal and Marine Environment Forestry Wildlife Agriculture and Food Security Human Health Tourism Energy Industry Livestock Fisheries Infrastructure Human Settlements Land Use	Energy Industry Livestock Transport Mining Waste Management Forestry Agriculture
<b>Cross-cutting Issues</b>	
Research and Development Information, Communication, Education Technology Transfer and Development Institutional and Capacity Building Systematic Observation Early Warning Systems Disaster Risk Management Impacts of Response Measures Gender and Vulnerable Groups Planning and Financing International Cooperation Climate Change and Security	

<sup>60</sup> Ibid

<sup>61</sup> Daly, M. E., Yanda, P. Z., & West, J. W. (2015). Climate change policy inventory and analysis for Tanzania. Op cit

<sup>62</sup> United Republic of Tanzania Vice President's Office. (2012). National Climate Change Strategy. Op cit

## 5. Information and Communication Technology

### 5.1. ICT Policy Frameworks

As noted above, the guiding document for Tanzania's development is the Tanzania Development Vision 2025. This document specifically mentions ICT as part of the section on promoting competence and competitiveness and notes that ICT are:

*central to competitive social and economic transformation. ICT costs are continuing to fall while their capabilities and resultant profitability enhancements are increasing. These technologies are a major driving force for the realization of Vision. They should be harnessed persistently in all sectors of the economy and should be put to benefit of all social groups with a view to enabling the meeting of basic needs of the people, increasing productivity and promoting competitiveness. The new opportunities which the ICTs are opening up can be harnessed to meet the goals of the Vision. However, appropriate skills and capabilities would have to be put in place. This task demands that adequate investments are made to improve the quality of science based education and to create a knowledge society generally.*<sup>63</sup>

The NFYDP notes that ICT is one of the "critical enablers of socioeconomic development and transformation."<sup>64</sup>

Beyond these general descriptions of the benefit of ICT which Tanzania aims to leverage are the specific details contained in the latest version of the National Information and Communications Technology Policy (2016) which states the following main objective – "To accelerate socio-economic development with potentials to transform Tanzania into ICT driven middle-income economy and society."<sup>65</sup>

It goes on to list the following specific strategic objectives:

- 1) To develop and enhance human capital that is capable of championing ICT in the creation of Tanzania's knowledge society;
- 2) To enhance public participation and understanding of potentials of ICT for effective transformation towards a knowledge based society;
- 3) To strengthen strategic ICT leadership at all levels to effectively champion exploitation of ICT in all sectors of economy;
- 4) To enhance access and availability of affordable and reliable broadband services to accelerate socio-economic development of the society;
- 5) To have reliable, interoperable and sustainable ICT infrastructure that supports ubiquitous national connectivity;
- 6) To have universal access to ICT products and services in order to bridge the digital divide;
- 7) To strengthen management and promote efficiency in spectrum allocation and utilization that guarantees its availability and competition in both urban and rural areas;
- 8) To promote and strengthen management of scarce ICT resources for sustainable ICT industry;
- 9) To enhance local content in all aspects of ICT value chain and local hosting of electronic services;
- 10) To promote a competitive ITES/ BPO industry and development of electronic services in all aspects of ICT value chain activities;

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<sup>63</sup> United Republic of Tanzania Planning Commission. (2000). The Tanzanian Development Vision 2025. Op cit

<sup>64</sup> United Republic of Tanzania Ministry of Finance and Planning. (2016). National Five Year Development Plan 2016/2017 - 2020/2021. Retrieved April 18, 2017 from [http://www.mit.go.tz/uploads/files/National%20Five%20Year%20Development%20Plan%202016-17\\_2020-21%20\(1\).pdf](http://www.mit.go.tz/uploads/files/National%20Five%20Year%20Development%20Plan%202016-17_2020-21%20(1).pdf)

<sup>65</sup> United Republic of Tanzania Ministry of Works, Transport and Communication. (2016). National Information and Communication Technology Policy. Retrieved April 17, 2017 from <https://tanzict.files.wordpress.com/2016/05/national-ict-policy-proofed-final-nic-review-2.pdf>

- 11) To strengthen cooperation and collaboration in regional and international ICT development initiatives that promote knowledge transfer and attract foreign direct investment;
- 12) To strengthen legal and regulatory environment that facilitates acquisition, utilization and development of ICT in Tanzania;
- 13) To have secure environment that builds confidence and trust in the use of ICT products and services; xiv. To promote safety on use of ICT products and services;
- 14) To strengthen quality control and standardization in the ICT industry;
- 15) To have sustainable ICT industry;
- 16) To promotes effective use of ICT in the productive sectors for increased productivity;
- 17) To enhance participation of gender and social diversity groups in ICT;
- 18) To promote use of ICT in disaster management;
- 19) To promote use of ICT in environmental conservation;
- 20) To have Good Governance enhanced by ICT; and
- 21) To promote investment in ICT under PPP arrangement.

These specific objectives find expression through a variety of policy areas and specific issues detailed in the strategy, with each one having its own articulated policy objective and statement.

The Electronic and Postal Communications Act of 2010, the Universal Communications Services Act of 2006, the Cybercrimes Act of 2015<sup>66</sup> and Electronic Transfers Act of 2015,<sup>67</sup> provide key parts of the ICT legal framework for the country. In addition, amendments to the Evidence Act of 2007 allow for the admissibility of electronic evidence. Various other regulations have been made to promote electronic communications, consumer protection, and to address general cyber security issues.<sup>68</sup>

## 5.2. ICT Infrastructure

Tanzania is connected to both the SEACOM<sup>69</sup> and EASSY<sup>70</sup> submarine cable systems via landing stations in Dar es Salaam. These cable connections have largely replaced satellite systems as the main conduits of international bandwidth. Efforts are currently underway to connect Dar es Salaam to The East African Marine System (TEAMS)<sup>71</sup> via Mombasa to bring great competition, flexibility, affordability and capacity redundancy to Tanzania.<sup>72</sup>

The 7,560km National ICT Broadband Backbone (NICTBB) extends this connectivity to the rest of the country as well as providing regional connectivity with neighbouring countries: Kenya, Uganda, Rwanda, Burundi, Zambia, Malawi, Mozambique and DRC.<sup>73</sup> The NICTBB was launched in 2010 to provide “reliable state-of-the-art ICT infrastructure, of adequate capacity, high-speed and countrywide coverage”. It was constructed over two phases between 2009 and 2012 with a

<sup>66</sup> United Republic of Tanzania. (2015). The Cybercrimes Act. Retrieved April 18, 2017 from <https://www.tcra.go.tz/images/documents/policies/TheCyberCrimeAct2015.pdf>

<sup>67</sup> United Republic of Tanzania. (2015). The Electronic Transactions Act. Retrieved April 18, 2017 from <http://parliament.go.tz/polis/uploads/bills/acts/1452061571-ActNo-13-2015-Book-11-20.pdf>

<sup>68</sup> United Republic of Tanzania Ministry of Works, Transport and Communication. (2016). National Information and Communication Technology Policy. Op cit

<sup>69</sup> SEACOM. (2017). Network Map. Retrieved April 17, 2017 from <http://seacom.mu/network-map/>

<sup>70</sup> EASSY. (2010). EASSY Maps. Retrieved April 17, 2017 from <http://www.eassy.org/map.html>

<sup>71</sup> TEAMS. (2014). Map of TEAMS Cable. Retrieved April 17, 2017 from <http://www.teams.co.ke/map-of-teams-cable/>

<sup>72</sup> United Republic of Tanzania Government Portal. (2015). ICT Infrastructure. Retrieved April 17, 2017 from <http://www.tanzania.go.tz/home/pages/1440>

<sup>73</sup> Ibid

maximum capacity of 400Gb/s.<sup>74</sup> The NICTBB and the submarine cables have reportedly reduced the cost of backhaul transport bandwidth by 99%.<sup>75</sup>

The major users of the NICTBB include national operators Tanzania Telecommunication Company Limited (TTCL), Tigo, Zantel, Airtel, Vodacom, Infinity Africa and Simbanet although, since its launch, utilization of the NICTBB has remained muted as many network operators, have not yet fully subscribed to the network due to the existence of proprietary parallel backhaul infrastructures. However, despite this, the cost of phone calls and Internet charges has decreased by about 75%.<sup>76</sup>

Metropolitan fibre networks exist only in Dar es Salaam with 3 networks having been constructed by TTCL, Vodacom and a consortium including Tigo, Airtel and Zantel. The Tanzania Electric Supply Company Limited (TANESCO), for example, has started to open access to its internal fibre networks and has been providing optic fibre cables through the power distribution lines projects which can be used to extend broadband services to citizens in line with the national universal access agenda.<sup>77</sup>

The provision of last mile connectivity remains a significant challenge for Tanzania. The Universal Communication Services Access Fund (UCSAF) was established by the Universal Communications Service Access Act of 2006 to:

- 1) Ensure the availability of communication services in rural and urban under-served areas;
- 2) Promote the participation of public and private sector in the provision of universal service in the rural and urban underserved areas;
- 3) Promote the socio-economic development of rural and urban underserved areas;
- 4) Create a framework for open and efficient access to and use of communication networks and services in production and availability of competitive market;
- 5) Promote widespread provision of quality services at affordable rates and ensure that rural and urban underserved areas have access to communication and information services at reasonable and affordable price; and
- 6) Ensure availability of universal services by enhancing communications services access through private sector participation.<sup>78</sup>

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<sup>74</sup> United Republic of Tanzania Government Portal. (2015). National ICT Broadband Backbone. Retrieved April 17, 2017 from <http://www.tanzania.go.tz/home/pages/1441>

<sup>75</sup> United Republic of Tanzania Ministry of Works, Transport and Communication. (2016). National Information and Communication Technology Policy. Op cit

<sup>76</sup> United Republic of Tanzania Government Portal. (2015). National ICT Broadband Backbone. Op cit

<sup>77</sup> United Republic of Tanzania Government Portal. (2015). ICT Infrastructure. Op cit

<sup>78</sup> Universal Communication Service Access Fund. (2014). About UCSAF. Retrieved April 17, 2017 from [http://www.ucsaf.go.tz/index.php/pages/about\\_us](http://www.ucsaf.go.tz/index.php/pages/about_us)

Figure 5 Tanzania National ICT Broadband Backbone Network Map<sup>79</sup>



In its Rural Telecommunications Project August 2016 report, the UCSAF reported that a total of US\$37 million in subsidies had been disbursed to service providers for the provision of rural telecommunications services. Services had been provided to 52% of the allocated geographical wards resulting in 1,939 villages receiving access to basic telecommunications services. The estimated uncovered population stood at 3,114,912.<sup>80</sup>

The ITU’s IDI for 2016 reports the following key access statistics for Tanzania.

Table 2 Key ICT access statistics for Tanzania for 2016<sup>81</sup>

Measure	Value
Fixed-telephone subscriptions per 100 inhabitants	0.27
Mobile-cellular subscriptions per 100 inhabitants	75.86
International Internet bandwidth per internet user	4,106.78 (Bits/s)
Percentage of households with a computer	4
Percentage of households with computer access	4.51

In 2014, mobile network coverage stood at 95% of the population with mobile tariffs at US\$ 0.67 (per minute Purchasing Price Parity - 133<sup>rd</sup> out of 139 in terms of affordability) and fixed broadband

<sup>79</sup> National ICT Broadband Backbone. (2016). Domestic Network Coverage. Retrieved April 17, 2017 from <http://www.nictbb.co.tz/map.php>

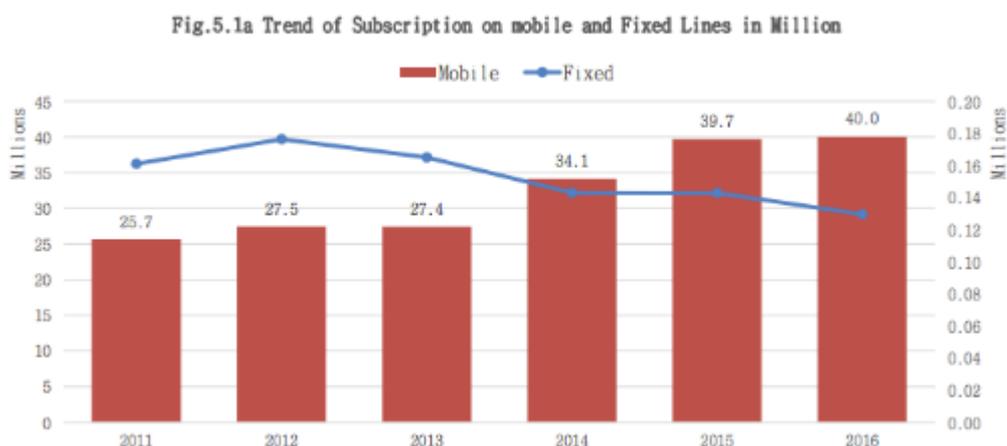
<sup>80</sup> Universal Communications Service Access Fund. (2016). Rural Telecommunications Project August 2016 Report. Retrieved April 17, 2017 from <http://www.ucsaf.go.tz/files/publications/attachments/7a3147aad8bedd6e5a0aee341f253f4.pdf>

<sup>81</sup> International Telecommunications Union. (2016). ICT Development Index 2016 - Tanzania. Retrieved April 17, 2017 from <http://www.itu.int/net4/ITU-D/idi/2016/#idi2016countrycard-tab&TZA>

Internet tariffs at US\$72.15 (per month PPP – 114<sup>th</sup> out of 139 in terms of affordability).<sup>82</sup> The NICTP 2016 indicates however, that since the connection to the international cable systems, internet costs have dropped by about 50% since 2010.<sup>83</sup>

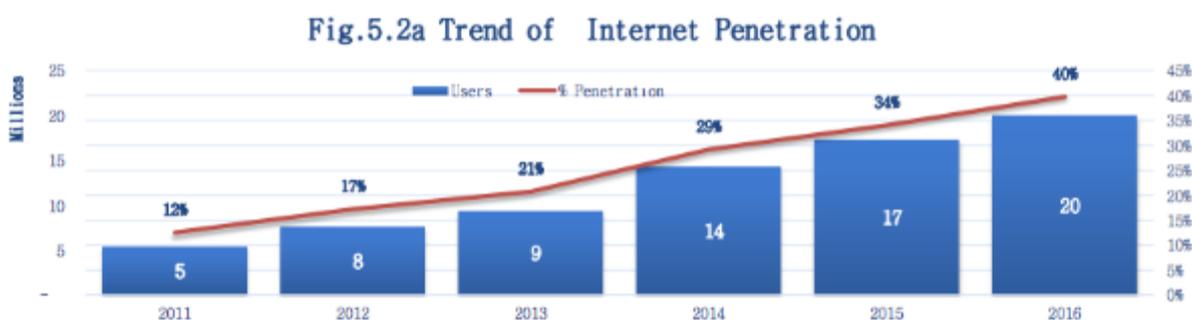
According to the Tanzania Communications Regulatory Authority (TCRA) quarterly statistics report for October to December 2016, there were 40,173,783 active voice subscriptions representing a penetration rate of 80% with the largest of the seven operators, Vodacom, accounting for 31% of this total. Of this total, 40,044,186 or 99.7% were mobile, rather than fixed line subscriptions. The trend since 2011 is towards an increasing proportion of mobile subscriptions.<sup>84</sup>

Figure 6 Trend in mobile and fixed line voice subscriptions<sup>85</sup>



In the same report, the total number of Internet subscriptions is reported as 19,862,525 (a penetration of 40%). The bulk of these (91%) were mobile subscriptions, followed by fixed wireless (6%) and fixed wired (3%).<sup>86</sup> The report also notes that the 2015 Internet penetration was 34% with a total number of subscriptions of 17,263,523 – a significant year-on-year increase.

Figure 7 Trend in Internet penetration<sup>87</sup>



<sup>82</sup> World Economic Forum. (2016). Networked Readiness Index 2016. Op cit

<sup>83</sup> United Republic of Tanzania Ministry of Works, Transport and Communication. (2016). National Information and Communication Technology Policy. Op cit

<sup>84</sup> Tanzania Communications Regulatory Authority. (2016). Quarterly Communications Statistics Report - October to December 2016. Retrieved April 18, 2017 from <https://www.tcra.go.tz/images/documents/telecommunication/CommStatDec16.pdf>

<sup>85</sup> Ibid

<sup>86</sup> Ibid

<sup>87</sup> Ibid

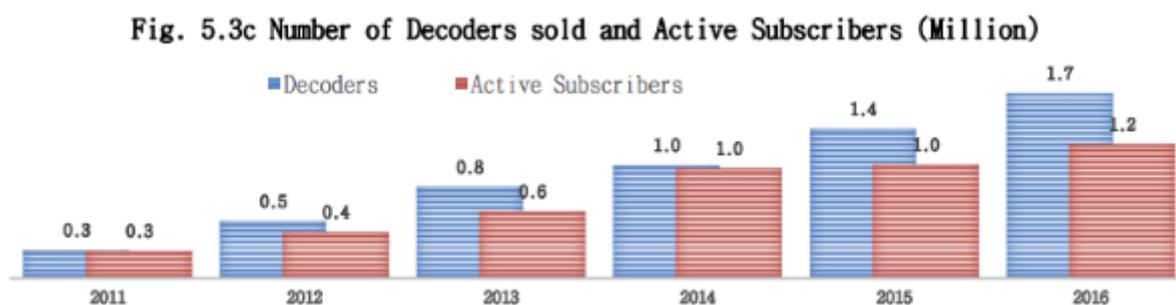
However, the World Bank estimated that in 2015, only 5.355% of the population used the Internet<sup>88</sup> and there were 106,000 broadband connections country-wide.<sup>89</sup> These apparent contradictions indicate that, while approximately 40% of the population have access to the internet, only a small fraction of these people make regular use thereof.

According to the World Bank, Tanzania’s overall use of the internet remains low even when compared to the rest of the East African region. In Kenya, for example, the percentage of internet users is more than 45% while it is 19% in Uganda and 18% in Rwanda.<sup>90</sup> Mobile penetration, however, is greater than in Uganda and Rwanda but not as high as in Kenya.<sup>91</sup> The NICTP 2016 concedes this point when it says that “despite the above-mentioned achievements, most citizens still cannot access broadband services.”<sup>92</sup>

Tanzania began its migration to Digital Terrestrial Television (DTT) in 2006 with the amendment of its broadcasting legislation to accommodate DTT. The physical migration began in 2012 and was completed by the 30<sup>th</sup> April 2015, ahead of the international deadline.<sup>93</sup>

The TCRA reported that by the end of 2016, there were 46 television broadcast service providers with an estimated 1,686,122 decoders having been sold and 1,220,352 active subscriptions. Of these service providers, 25 were free-to-air, three satellite, three paid DTT, and 15 cable TV.<sup>94</sup> The figure below, shows the recent trend in decoder and active subscriber numbers.

Figure 8 Trend in number of decoders and active subscribers<sup>95</sup>



There are currently a total of 123 licensed radio broadcasters in the country, 23 of them national broadcasters.<sup>96</sup>

<sup>88</sup> World Bank. (2015). Individuals using the Internet (% of population). Retrieved April 17, 2017 from <http://data.worldbank.org/indicator/IT.NET.USER.ZS?locations=TZ>

<sup>89</sup> World Bank. (2015). Fixed broadband subscriptions. Retrieved April 17, 2017 from <http://data.worldbank.org/indicator/IT.NET.BBND?locations=TZ>

<sup>90</sup> World Bank. (2015). Individuals using the Internet (% of population) - Comparison. Retrieved April 17, 2017 from <http://data.worldbank.org/indicator/IT.NET.USER.ZS?locations=TZ>

<sup>91</sup> World Bank. (2015). Mobile cellular subscriptions (per 100 people) - Comparison. Retrieved April 17, 2017 from <http://data.worldbank.org/indicator/IT.CEL.SETS.P2?locations=TZ-KE-UG-RW>

<sup>92</sup> United Republic of Tanzania Ministry of Works, Transport and Communication. (2016). National Information and Communication Technology Policy. Op cit

<sup>93</sup> All Africa. (2015, June 18). Tanzania: Startimes Sponsors Digital TV in Tanzania. Retrieved April 18, 2017 from <http://allafrica.com/stories/201506181039.html>

<sup>94</sup> Tanzania Communications Regulatory Authority. (2016). Quarterly Communications Statistics Report - October to December 2016. Op cit

<sup>95</sup> Ibid

<sup>96</sup> Ibid

### 5.3. ICT4D Initiatives

The NICTBB is the largest and most ambitious ICT project in the country. To date, phase one and two of this project have been completed. The project has the following key objectives:

- 1) To increase the usage of ICT for equitable and sustainable socio-economic and cultural development of Tanzania;
- 2) To establish a Point of Presence in all country's administrative districts;
- 3) To facilitate the implementation of e-government initiative;
- 4) To make ICT related services particularly internet affordable and readily available to common Tanzanians;
- 5) To provide access to international submarine fiber optic cables via Dar es salaam landing point to all landlocked neighbouring countries i.e. Uganda, Rwanda, Burundi, Malawi, Zambia and the Democratic Republic of Congo;
- 6) To create a favourable environment for cooperation and partnership in ICT among public and private sectors, civil society and between all stakeholders at local, national, regional and international levels; and
- 7) To provide equal access of the backbone network to all licenced operators for the sake of creating an open and healthy competitive environment in delivery of ICT services.

Phases four and five of the project include the rolling out of optical fibre Metro Ring Networks in urban areas and, significantly, implementing a “National Last mile broadband connectivity initiative intended to realise more user networks that will load the NICTBB, which include the Education and Research Network (ERNET), GovNet, eSchoolNet.”<sup>97</sup>

The Tanzania Education and Research Network (TERNET) was first proposed in 2002 when 16 Higher Education Institutions (HEIs) signed a Memorandum of Understanding to establish TERNET. In 2007, the first formal TERNET meeting was held representing 21 HEIs. TERNET finally began operating in 2008. The current objectives of the project include the following:

- 1) To establish a sustainable and high capacity network infrastructure connecting educational and research institutions in Tanzania.
- 2) To increase the usage of the computer as a tool that stimulates the creativity, critical analysis, the divergent thoughts, the expressive capacity and the resolution of problems.
- 3) To enable Tanzania students to construct their own knowledge as they learn and to develop skills necessary in the highly technological modern society.
- 4) To establish a human resource base of highly qualified people that will increase the country's international competence and its successful participation in the globalization process
- 5) To support the establishment and sharing of teaching and learning resources among educational and research institutions in Tanzania and the globe.
- 6) To enable linkages with and among various economic sectors that can leverage national development.

The GovNet is an infrastructure project aimed at connecting all Ministries, Departments and Agencies (MDAs) and Local Government Agencies (LGAs) throughout the country into single “secure, cost effective, scalable, robust, flexible and shared Infrastructure for Information Processing, Storage and Exchange.”<sup>98</sup> The project is managed by the e-Government Agency (eGA), a semi-autonomous

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<sup>97</sup> United Republic of Tanzania Government Portal. (2015). National ICT Projects. Retrieved April 18, 2017 from <http://www.tanzania.go.tz/home/pages/1347>

<sup>98</sup> United Republic of Tanzania President's Office, Public Service Management. (2015). e-Government Infrastructure: Best Practices and Current Status in Tanzania. Retrieved April 18, 2017 from <http://www.ega.go.tz/uploads/publications/1b35b3eddf47>

institution with the mandate to coordinate, oversee and promote e-government initiatives and especially to:

- 1) Enhance the capacity of Public institutions to implement e-Government initiatives;
- 2) Improve Public access to e-service;
- 3) Improve sharing of ICT resources within public service;
- 4) Enhance coordination, management and compliance of e-Government initiatives in the public service; and
- 5) Improve e-Government advisory, technical support and consultancy services.

The work of the eGA is directed by the Tanzania e-Government Strategy which states that the goals of the strategy are to deliver high quality public services with improved accessibility, responsiveness, and efficiency, to strengthen oversight and coordination across the Government and its partners, and enhance productivity and knowledge sharing, and to provide integrated, secured and innovative solutions to enable high quality service delivery and improvement of work processes.<sup>99</sup>

The strategy goes on to list five priority projects all to have been implemented by the end of 2015, namely:

- 1) Business Licensing System;
- 2) Land Information System;
- 3) e-Procurement System;
- 4) National Vital Records Registration; and
- 5) Telemedicine Systems for Muhimbili Hospital<sup>100</sup>

The eGA has also developed its own internal strategy called the Strategic Intent 2012/2013 – 2016/2017 which lists five sector specific priority areas for future efforts:

- 1) Infrastructure
- 2) Agriculture
- 3) Industrial Development
- 4) Human Capital and Skills Development
- 5) Tourism, Trade and Financial Services<sup>101</sup>

The NICTP 2016 notes the follows as key e-Government achievements to date:

- 1) National Payment System (NPS);
- 2) Tanzania Interbank Settlement System (TISS);
- 3) Electronic Clearing House (ECH);
- 4) Integrated Financial Management System (IFMS);
- 5) Retail Payment System (RPS);
- 6) Central Admission System (CAS) for higher learning students' placement; and
- 7) Online Loan Application System (OLAS).<sup>102</sup>

However, the policy goes on to state that

*there is low level of application of ICT services in the public sector in Tanzania. The language of Internet content also poses a significant challenge, underscoring the importance of having Internet content in languages that the citizens can read and understand.*<sup>103</sup>

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<sup>99</sup> United Republic of Tanzania. (2013). Tanzania e-Government Strategy. Retrieved April 18, 2017 from <http://www.ega.go.tz/uploads/publications/23cf7d8a8cc304ba38e083d904ae660e.pdf>

<sup>100</sup> Ibid

<sup>101</sup> eGovernment Agency. (2012). Strategic Intent 2012/2013 - 2016/2017. Retrieved April 18, 2017 from <http://www.ega.go.tz/uploads/pages/attachments/0a917a62744b883dc27929462c0b54eb.pdf>

<sup>102</sup> United Republic of Tanzania Ministry of Works, Transport and Communication. (2016). National Information and Communication Technology Policy. Op cit

In addition, Tanzania and Finland signed an agreement and launched the Information Society and ICT Sector Development Project (TANZICT) in 2011 to promoting the ICT sector for the effective contribution of the sector in social economic development of the country by strengthening the Tanzanian information society with enhanced capacities to contribute to the achievement of Government’s socio-economic development goals.

The project consists of three main components:

- 1) Component 1: To support the revision of the National Information and Communication Technology (ICT) Policy (2003) - The component includes Reviewing Tanzania’s ICT Policy (2003) and formulation of the associated implementation strategies so as to address new challenges currently facing the industry as well as accommodating new technological development that have occurred in the sector since 2003 when the current ICT Policy was enacted.
- 2) Component 2: To strengthen the Institutional capacity of the Ministry of Communication, Science and Technology (MCST) - This component aims to provide MCST with capacities to be able to properly lead the policy design and coordination role in the usage of ICT in the country.
- 3) Component 3: To implement the Tanzanian Innovation Programme (TIP) - This component focuses on stimulating innovations in the ICT sector creating seamless ICT innovation chain from ideas to pilots, raising awareness as drivers of economic and social development, transferring knowledge and good international practices on promotion of innovation to Tanzania.<sup>104</sup>

In terms of civil society activity several local and international organizations are active in the ICT4D space in Tanzania. The ICT for Development Tanzania Foundation (ICT4D-TF) is a registered, research based NGO, and a non-profit making information and innovation centre, that has committed itself in accelerating poverty reduction and improve economic conditions of local citizens through capacity building, promotion of access to information and professional services among local Tanzanian citizens. It’s ICT4D programmes include a Community Based ICT Centres Project which seeks to establish local centres for students, teachers, office workers and entrepreneurs to access professional ICT skills, and the ICT in Schools project which works with primary and secondary schools to promote ICT as tools for teaching and learning.<sup>105</sup>

In case of the ICT Schools project, the foundation works in partnership with Close the Gap, an organization working across the globe, principally to provide refurbished computers. Close the gap currently works in eleven sites across Tanzania on a range of projects including health, education, environmental and gender initiatives.<sup>106</sup>

There are several other initiatives with a focus on Education that will be discussed below.

## 5.4. Key Actors and Players

Actor/Player	Role and Area of Development
Ministry of Works, Transport and Communication	Guides the ICT sector, although this is a relatively recent addition to its portfolio of responsibilities.

<sup>103</sup> United Republic of Tanzania Ministry of Works, Transport and Communication. (2016). National Information and Communication Technology Policy. Op cit

<sup>104</sup> United Republic of Tanzania Government Portal. (2015). National ICT Projects. Op cit

<sup>105</sup> Information Communication Technology for Development Tanzania Foundation. (2011). Main Programs. Retrieved April 18, 2017 from <https://www.ict4dtf.org/e-schools>

<sup>106</sup> Close the Gap. (2013). In the World. Retrieved April 18, 2017 from <http://close-the-gap.org/what-we-do/close-the-gap-in-the-world/>

e-Government Agency	A semi-autonomous institution with the mandate to coordinate, oversee and promote e-government initiatives
Tanzania Communications Regulatory Authority	A semi-autonomous institution with the mandate to regulate the communications and broadcasting sectors in Tanzania
Universal Communications Services Access Fund	Works to ensure equitable access to communications technology to rural parts of Tanzania
National ICT Broadband Backbone	Responsible for planning and implementing the installation of the country's national optic fibre backbone infrastructure
Tanzania Telecommunications Company Limited	State owned communications service provider and manager of the national ICT backbone.

## 5.5. Challenges in ICT Development

Two key challenges hindering further ICT development in Tanzania, reported by numerous sources (including Panos (2010)<sup>107</sup>, Yonazi (2012)<sup>108</sup> and Twaakyondo (2011)<sup>109</sup>) are the continuing relative high cost of ICT access, especially in relation to neighbouring countries and the continuing relatively low levels of Internet usage. Even though costs have come down in recent years, there appears room for additional cost decreases.

The Panos London report, echoed by Yonazi,<sup>110</sup> goes on to list additional challenges including a lack of reliable electricity supply, especially in rural areas, a lack of local content, a lack of capacity to translate good policies into action on the ground and a general societal lack of skills and knowledge necessary to use ICT for societal transformation.<sup>111</sup>

The NICTP 2016 becomes even more specific when it lists the following challenges identified during the NICTP 2003 policy review process and that the new NICTP 2016 is geared towards addressing:

- 1) Non-recognition of the ICT profession, inadequacy of skilled and competent human resources base and illiteracy amongst citizens to effectively participate in a knowledge society;
- 2) Ineffective leadership framework at different levels to champion the integration of ICT in the socio-economic development process;
- 3) Lack of appropriate frameworks for deployment and utilization of ICT infrastructures including data centres, right of way, e-readiness and availability of electricity in most rural areas;
- 4) Underutilization of the deployed radio-communication frequency spectrum and other scarce ICT resources due to lack of policy framework;
- 5) Most ICT used in the country lack or contain minimal local content components, online content language is foreign predominantly English which is not accessible to most citizen and no framework for promotion of the competitive ITES/BPO Industry in the country;
- 6) Relative increase in ICT infrastructure vandalism and unsafe/unsecure use of communication services which lead to cybercrime, infringement of privacy and detriment to national culture including child abuse online;

<sup>107</sup> Panos. (2010). Realising the potential of ICTs in Tanzania. Retrieved April 18, 2017 from [http://panoslondon.panosnetwork.org/wp-content/files/2011/01/panos-london-ICTs\\_and\\_tanzania-policy.pdf](http://panoslondon.panosnetwork.org/wp-content/files/2011/01/panos-london-ICTs_and_tanzania-policy.pdf)

<sup>108</sup> Yonazi, J. J. (2012). Exploring Facilitators and Challenges Facing ICT4D in Tanzania. Retrieved April 18, 2017 from <http://ibimapublishing.com/articles/JEGSBP/2012/703053/703053-1.pdf>

<sup>109</sup> Twaakyondo, H. M. (2011). Key Issues in Information Communication Technology Policy Review Process: The Case of Tanzania. Retrieved April 18, 2017 from <http://ijcir.mak.ac.ug/volume5-number2/article5.pdf>

<sup>110</sup> Yonazi, J. J. (2012). Exploring Facilitators and Challenges Facing ICT4D in Tanzania. Op cit

<sup>111</sup> Panos. (2010). Realising the potential of ICTs in Tanzania. Op cit

- 7) Unsupportive policy framework for National ICT standardization and e-waste management;
- 8) Weak research & development (R&D) in the sector and high dependency on ICT importation which negatively impact innovation within ICT start-ups and the industry;
- 9) Low negotiation capacity and ineffective participation in regional and international integration ICT initiatives which hinder opportunities for network creation, collaboration and linkage to Foreign Direct Investment (FDI) and technology transfer;
- 10) Dire need to develop awareness of hidden and under-promoted conceptual and technical assets on Intellectual Property rights;
- 11) Ineffective integration of ICT for increased productivity and value addition in the production chain; and
- 12) Increased gender inequality in ICT initiatives and ineffective application of ICT in key / potential crosscutting sectors.<sup>112</sup>

A 2013 review of the Tanzanian ICT landscape conducted by Research ICT Africa concluded the following key policy recommendations:

- 1) Ensure that UCSAF promotes access to underserved urban and rural poor communities, reducing the urban/rural connectivity divide;
- 2) Enforce Quality of Service standards in both broadband and voice sectors;
- 3) Monitor and intervene in retail pricing based on potential market failure and anticompetitive conduct on the part of dominant operators;
- 4) Ensure non-discriminatory allocation of spectrum, frequencies and telephone masts and towers, in order to support network rollout, especially for new entrants;
- 5) Monitor wholesale prices for the NICTBB to ensure that access is provided on nondiscriminatory terms, especially for new entrants; and
- 6) Encourage the NICTBB to expand fiber access to rural and semi-urban areas.<sup>113</sup>

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<sup>112</sup> United Republic of Tanzania Ministry of Works, Transport and Communication. (2016). National Information and Communication Technology Policy. Op cit

<sup>113</sup> Esselaar, S., & Adam, L. (2013). Understanding what is happening in ICT in Tanzania. Retrieved April 18, 2017 from [https://www.researchictafrica.net/publications/Evidence\\_for\\_ICT\\_Policy\\_Action/Policy\\_Paper\\_11\\_-\\_Understanding\\_what\\_is\\_happening\\_in\\_ICT\\_in\\_Tanzania.pdf](https://www.researchictafrica.net/publications/Evidence_for_ICT_Policy_Action/Policy_Paper_11_-_Understanding_what_is_happening_in_ICT_in_Tanzania.pdf)

## 6. Education

Tanzania education system follows a 7-4-2-3 system of education (although some tertiary qualifications require four or five years), preceded by largely optional pre-primary education. The medium of instruction to all government primary schools is Kiswahili, the national language, with English taught as a subject from standard III to VII in the primary phase. The Ministry of Education, Science, Technology and Vocational Training (MoESTVT)<sup>114</sup>, through several divisions and units, is responsible for all education in Tanzania from pre-primary to higher education. It is supported in this role by the following key institutions.

### **The National Examinations Council of Tanzania (NECTA)**

The function of NECTA include:

- 1) To formulate examinations policy in accordance with the principles of education for self reliance and the education and training policy;
- 2) To ensure responsibility for examinations within the United Republic of Tanzania and to make provision for places and centres for examinations;
- 3) To receive from other persons or bodies of persons reports or other material affecting examinations policy and from from time to time to consider and review examinations policy as circumstances may require;
- 4) To co-operate with other persons or bodies of persons in the orderly development of an examinations system in the United Republic of Tanzania;
- 5) To conduct examinations for, and to grant, diplomas, certificates and other awards of the the council; and
- 6) To act as the body which shall facilitate, administer and supervise foreign examinations in Tanzania.<sup>115</sup>

### **Tanzania Institute for Education (TIE)**

TIE is responsible for the following:

- 1) To design and develop curricula for Pre- primary, Primary, Secondary, and Teacher Education levels.
- 2) To design and develop learning materials including books for basic education, secondary education and in-service teachers.
- 3) To conduct long and short courses on Curriculum related subjects.
- 4) To carry out in-service teachers training for for efficient and effective implementation of curricula. The pre- service training of teachers is now governed by the National Council for Technical Education (NACTE) since 2014.
- 5) To provide and oversee education quality assurance with regard to teaching methods, subject objectives and standards of teaching-learning materials.
- 6) To provide technical advice to the Government through the Ministry responsible for education and to other stakeholders with the ultimate objective of providing quality education at all levels.<sup>116</sup>

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<sup>114</sup> In 2008, higher education was folded into the them Ministry of Education and Vocational Training to form the Ministry of Education, Science, Technology and Vocational Training.

<sup>115</sup> The National Examinations Council of Tanzania. (2017). NECTA Roles. Retrieved April 18, 2017 from <http://www.necta.go.tz/roles>

<sup>116</sup> Tanzania Institute of Education. (2016). Main Function of the TIE. Retrieved April 18, 2017 from <http://www.tie.go.tz/index.php/functions>

### **National Council for Technical Education (NACTE)**

NACTE is responsible for regulating and co-ordinating the issues related to non-university institutions in Tanzania providing Technical Education and Training (TET). It was established by the passing of the National Council for Technical Education Act and oversees the development and maintenance of academic standards at these institutions.<sup>117</sup>

### **Vocational Education and Training Authority (VETA)**

The Vocational Educational and Training Authority (VETA) was established by an Act of Parliament No. 1 of 1994 charged with broad tasks of coordinating, regulating, promoting and managing Vocational Education and Training (VET) in Tanzania. This is further described as follows:

- 1) To provide vocational education and training opportunities and facilities for such training;
- 2) To establish a quality vocational education and training system, which includes both basic and specialized training and to ensure that the system meets the needs of both formal and informal sectors within the framework of overall national socio-economic development, that the system is integrated with entrepreneurship, it is cost effective and with decentralised planning and implementation authority to regions;
- 3) To promote on the job training in industry for both apprenticeship training and for skills updating and upgrading;
- 4) To promote the balancing of supply and demand for skilled labour in both wage employment and for skills needed for self employment in rural and urban areas;
- 5) To promote access to vocational education and training for disadvantaged groups;
- 6) To secure adequate and stable financing for the vocational education and training system;
- 7) To support improvement of both quality and productivity of the national economy by promoting the provision of short tailor made training programmes to meet in-service training needs;
- 8) To promote a flexible training approach and appropriate teaching methodologies; and
- 9) To possibly establish or manage vocational training institutions including vocational teacher training colleges.<sup>118</sup>

### **Tanzania Commission for Universities (TCU)**

The TCU was established in 2005 as the statutory and regulatory organization mandated to oversee university education in Tanzania. All universities require recognition, approval and accreditation from the TCU in order to operate.<sup>119</sup>

The Zanzibar Ministry of Education (ZMOE) fulfils a parallel role to the MoESTVT on the mainland.

The Education Sector Development Programme (ESDP) 2008 – 2017 is an overarching strategic plan for the entire education sector in Tanzania and specifies specific targets for each of the various sub-sectors. These are grouped according to the following major cluster outcomes:

- 1) Capabilities and Values;
- 2) Conducive Teaching and Learning Environment;
- 3) Micro-Macro Efficient Management, and
- 4) Education Provision in order to increase enrolment at all levels.<sup>120</sup>

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<sup>117</sup> The National Council for Technical Education. (2007). Admission of Students into Higher Learning Programmes Offered by Tertiary Non-University Institutions in Tanzania . Retrieved April 18, 2017 from [http://www.iaea.info/documents/paper\\_1162b25b97.pdf](http://www.iaea.info/documents/paper_1162b25b97.pdf)

<sup>118</sup> Vocational Education and Training Authority. (2017). Profile of VETA. Retrieved April 18, 2017 from <http://www.veta.go.tz/index.php/en/profile>

<sup>119</sup> Tanzania Commission for Universities. (2015). Background. Retrieved April 18, 2017 from [www.tcu.go.tz/about-us/background](http://www.tcu.go.tz/about-us/background)

<sup>120</sup> Ministry of Education, Science and Technology. (2008). Education Sector Development Programme 2008 - 2017. Retrieved April 18, 2017 from <http://www.globalpartnership.org/download/file/fid/2515>

The ESDP notes that it will promote “effective and cost efficient provision of educational infrastructure and ICT. The changes, reforms and interventions will be properly focused on improving learning outputs and outcomes, on teacher capability improvements, and on promoting a better teaching and learning environment resulting in increased achievement and competences by learners and teachers.”<sup>121</sup>

Each sub-sector then also has its own development programme which outlines specific strategic goals for that part of the system as follows.

### **The Primary Education Development Programme (PEDP)**

- 1) Increase equitable access to pre-primary and primary education;
- 2) Raise the quality of education to ensure better learning outcomes for children including improved literacy;
- 3) Improve the teaching and learning of 3Rs at lower primary education;
- 4) Strengthen the capacity for governance and management for effective delivery of pre-primary and primary education services;
- 5) Ensure that cross-cutting issues are addressed so that children receive a well-rounded education;
- 6) Strengthen research and monitoring and evaluation to support evidence based decision making and; Streamline institutional arrangements and co-ordination mechanisms.<sup>122</sup>

### **The Secondary Education Development Programme (SEDP)**

- 1) Improvement of quality and relevance;
- 2) Enhancement of access and equity;
- 3) Improvement of the teaching force and teaching process;
- 4) Improving management efficiency and good governance; and
- 5) Institutionalization of cross-cutting issues.<sup>123</sup>

### **The Technical and Vocational Education and Training Development Programme (TVETDP)**

- 1) Improving Access and Equity;
- 2) Improving the Quality of Outputs;
- 3) Improving the Capacity to provide Quality TVET; and
- 4) Improving Monitoring and Evaluation of TVET Subsector.<sup>124</sup>

### **Higher Education Development Programme (HEDP):**

- 1) Phase 1 objectives (2010 – 2015):
  - a) Institutional Reforms;
  - b) Improved service delivery; and
  - c) Improved sustainability mechanisms.
- 2) Phase 2 objectives (2015 – 2020):
  - a) Establishment of communities of excellence and provision of equipment;

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<sup>121</sup> Ibid

<sup>122</sup> Ministry of Education, Science and Technology. (2012). Primary Education Development Programme III 2012 - 2016. Retrieved April 18, 2017 from [http://www.egov.go.tz/egov\\_uploads/documents/PEDP\\_III\\_2012-2016\\_en.pdf](http://www.egov.go.tz/egov_uploads/documents/PEDP_III_2012-2016_en.pdf)

<sup>123</sup> Ministry of Education, Science and Technology. (2010). Secondary Education Development Programme 2010 - 2015. Retrieved April 18, 2017 from [http://www.egov.go.tz/egov\\_uploads/documents/Secondary\\_Education\\_Development\\_Plan\\_2010-2015\\_en.pdf](http://www.egov.go.tz/egov_uploads/documents/Secondary_Education_Development_Plan_2010-2015_en.pdf)

<sup>124</sup> Ministry of Education, Science and Technology. (2013). Technical and Vocational Training Development Programme 2013/2014 - 2017/2018. Retrieved April 18, 2017 from [http://www.egov.go.tz/egov\\_uploads/documents/TVET\\_Development\\_Programme-Final\\_](http://www.egov.go.tz/egov_uploads/documents/TVET_Development_Programme-Final_)

- b) Establishment of ICT parks;
- c) Establishment of demonstration centres;
- d) Establishment of innovation centres; and
- e) Establishment of virtual education system.<sup>125</sup>

Clearly, the above is only a very high level view of the details contained in each of these development programmes. Space does not allow a full exposition of the details contained in each of these development programmes.

Primary education is fee-free and compulsory and consists of two years of pre-primary education (ages 5-6 years) and seven years of primary education (ages 7 -13 years – Standard I - VII). The Government is the largest provider of both pre-primary and primary education in Tanzania and accounted for 95% and 97% of enrolments respectively in 2012. Students sit the Primary School Leaving Examination (PSLE) in order to exit the primary phase and enter secondary school.<sup>126</sup>

Secondary education consists of four years of Ordinary Level Secondary Education (ages 14 – 17 years – Form 1 - 4) and 2 years of Advanced Level Secondary Education (ages 18- 19 years – Form 5 - 6).<sup>127</sup>

The following table outlines enrolment in pre-primary, primary and secondary education in 2013 by ownership and gender.

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<sup>125</sup> Ministry of Education, Science and Technology. (2010). Higher Education Development Programme 2010 - 2015. Retrieved April 18, 2017 from [http://www.egov.go.tz/egov\\_uploads/documents/Higher\\_Education\\_Development\\_Programme\\_2010-2015\\_en.pdf](http://www.egov.go.tz/egov_uploads/documents/Higher_Education_Development_Programme_2010-2015_en.pdf)

<sup>126</sup> United Republic of Tanzania Government Portal. (2015). Primary Education. Retrieved April 18, 2017 from <http://www.tanzania.go.tz/home/pages/1219>

<sup>127</sup> United Republic of Tanzania Government Portal. (2015). Secondary Education. Retrieved April 18, 2017 from <http://www.tanzania.go.tz/home/pages/1222>

Table 3 Total Enrolment by Level, Ownership, Sex and GPI, 2013<sup>128</sup>

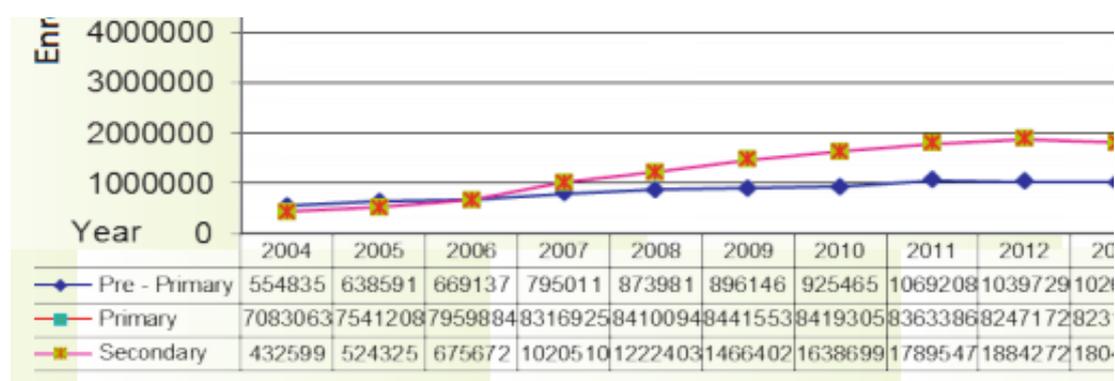
Level	Male	Female	Total	GPI
<b>Pre- Primary</b>				
Govt	483720	485963	969683	
Non-Govt	29078	27705	56783	
<b>Total</b>	<b>512798</b>	<b>513668</b>	<b>1026466</b>	<b>1.0</b>
<b>Primary</b>				
Govt	3965572	4068354	8033926	
Non-Govt	100715	97272	197937	
<b>Total</b>	<b>4066287</b>	<b>4165626</b>	<b>8231913</b>	<b>1.0</b>
<b>Secondary Form 1-4</b>				
Govt	757587	693102	1450689	
Non-Govt	130736	147109	277845	
<b>Total</b>	<b>888323</b>	<b>840211</b>	<b>1728534</b>	<b>0.9</b>
<b>Secondary Form 5 -6</b>				
Govt	41661	16529	58190	
Non-Govt	9207	8125	17332	
<b>Total</b>	<b>50868</b>	<b>24654</b>	<b>75522</b>	<b>0.5</b>
<b>Secondary Form 1 -6</b>				
Govt	799248	709631	1508879	
Non-Govt	139943	155234	295177	
<b>Total</b>	<b>939191</b>	<b>864865</b>	<b>1804056</b>	<b>0.9</b>

Thus, gender parity has been attained in all but Advanced Secondary Education where there are significantly few female enrolments as compared to male enrolments. One also notes that a far greater proportion of advanced secondary education is privately provided as opposed to other areas.

The following figure illustrates trends in enrolments since 2004 for pre-primary, primary and secondary education.

<sup>128</sup> Ministry of Education, Science and Technology. (2014). Pre- Primary, Primary and Secondary Education Statistics 2013. Retrieved April 18, 2017 from <http://www.pmorag.go.tz/noticeboard/tangazo-1023-20141229-Basic-Education-Statistics-BEST/FINAL-NATIONAL-27-MAY-2014.pdf>

Figure 9 Trends in enrolments since 2004 for pre-primary, primary and secondary education<sup>129</sup>



The figure shows gains in enrolment in all three areas although this has tended to level off in recent years. What the levelling off of primary enrolment in figure 8 does mask is a drop in the Gross Enrolment Ratio (GER)<sup>130</sup> which has dropped from a peak of 108.75% in 2008 to 81.706% in 2015.<sup>131</sup>

One striking feature of these figures, though, is the relatively large increase in secondary school enrolments over the period – from 432,599 to 1,804,057 represents a 400% increase. This is a truly exceptional achievement for a developing country.

The GER in 2013 for pre-primary was 37.3%, for Lower Secondary 45.5% and for Advanced Secondary 4.2%.<sup>132</sup> Thus while Universal Primary Education has been achieved, there is still a great deal of work required below and above this.

Transition rates from primary to secondary schooling increased from 31.6% in 2004 to 64.8% in 2013 but the transition rates from Lower to Advanced Secondary dropped from 29.8% to 10.6% over the same period.<sup>133</sup>

Such decreases in the number of students able to eventually access university education will constrain the development of the Knowledge Society in Tanzania.

General increases in enrolment over the past decade have required an increase in the teaching force, especially of secondary teachers. This is illustrated in figure nine below. Particularly noteworthy has been the massive increase in secondary teachers, although there is some debate

<sup>129</sup> Ministry of Education, Science and Technology. (2014). Pre- Primary, Primary and Secondary Education Statistics 2013.

Op cit

<sup>130</sup> Total enrolment in primary education, regardless of age, expressed as a percentage of the population of official primary education age. GER can exceed 100% due to the inclusion of over-aged and under-aged students because of early or late school entrance and grade repetition.

<sup>131</sup> World Bank. (2015). Gross enrolment ratio, primary, both sexes (%). Retrieved April 20, 2017 from <http://data.worldbank.org/indicator/SE.PRM.ENRR?locations=TZ>

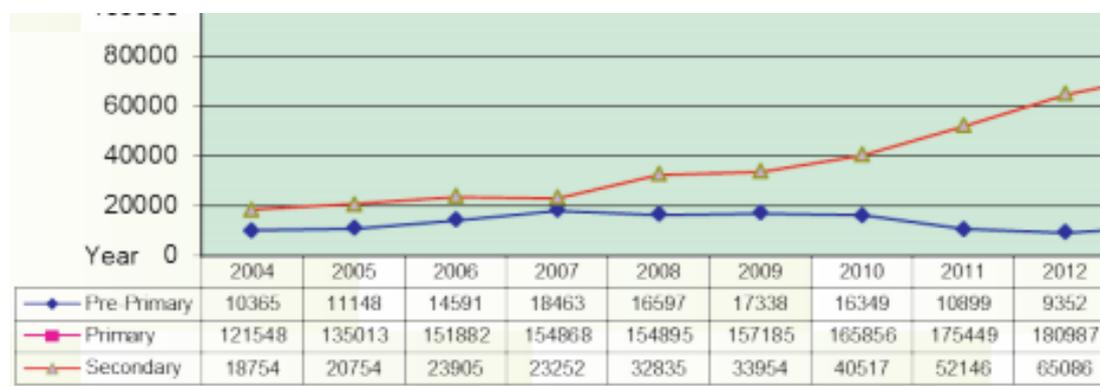
<sup>132</sup> Ministry of Education, Science and Technology. (2014). Pre- Primary, Primary and Secondary Education Statistics 2013.

Op cit

<sup>133</sup> Ibid

emerging as to the quality of many of these graduates given that many of them did not go through formal qualification processes (see the brief discussion on “licensed” teachers below).

Figure 10 Number of teachers by level 2004 - 2013<sup>134</sup>



As a result, pupil teacher ratios have shown a general improvement over the same period. Again, given the massive relative increases in secondary enrolment over the period, the fact that the system returned to a pupil teacher ratio of 25 by 2013 is significant.

Table 4 Pupil teacher ratio by level and ownership 2004 - 2013<sup>135</sup>

2010	60	27	57	52	23	51	46	23	40
2011	100	81	98	49	20	48	38	22	34
2012	97	85	95	47	25	46	31	21	29
2013	98	23	83	45	20	43	26	20	25

In terms of quality, the trends tend to be flat or down as evidenced by the following three tables showing the pass rates for the Primary School Leaving Examination (end of the primary phase), Form Four (end of the lower or Ordinary secondary phase) and Form Six examinations (end of the upper or Advanced secondary phase) over the period 2004 – 2013.

<sup>134</sup> Ministry of Education, Science and Technology. (2014). Pre- Primary, Primary and Secondary Education Statistics 2013.

Op cit  
<sup>135</sup> Ibid

Table 5 Primary school leaving examination pass rates 2004 - 2013<sup>136</sup>

Year	Candidates Sat	Number Passed	% Passed
2004	499241	243045	48.7
2005	493636	304936	61.8
2006	664263	468279	70.5
2007	773573	419136	54.2
2008	1017865	536672	52.7
2009	999070	493333	49.4
2010	895013	478912	53.5
2011	973809	567567	58.3
2012	865534	265873	30.7
2013	844938	427606	50.6

Table 6 Form Four examination pass rates 2004 – 2013<sup>137</sup>

Year	Candidates Sat	Passed	% Passed
2003	62359	54938	88.1
2004	63487	58091	91.5
2005	85292	76166	89.3
2006	85865	76506	89.1
2007	125288	113135	90.3
2008	163855	136983	83.6
2009	248336	180044	72.5
2010	351214	177012	50.4
2011	339330	181880	53.6
2012	397222	171203	43.1
2013	352614	201152	57.1
All Candidates in 2013	403789	235227	58.3

Table 7 Form Six examination pass rates 2004 – 2013<sup>138</sup>

Year	Candidates Sat	Number Passed	% Passed
2004	13975	13696	98.0
2005	16884	16361	96.9
2006	21126	20344	96.3
2007	24813	22902	92.3
2008	32275	29919	92.7
2009	39105	36915	94.4
2010	48791	45766	93.8
2011	44720	41545	92.9
2012	44188	40786	92.3
2013	42952	40332	93.9

<sup>136</sup> Ibid

<sup>137</sup> Ibid

<sup>138</sup> Ibid

Primary School Leaving Examination pass rates continue to hover at around 50% (meaning that half of primary school students are not even permitted to continue to secondary education), lower secondary pass rates fell from a high of 90% in 2007 to 58.3% in 2013 and upper secondary pass rates remain over 93% but are down from previous highs of 98%.

Of particular relevance to the use of ICT in education is the access that schools have to a reliable electricity supply. Tanzania needs to make huge strides in this area, however, as illustrated in these figures from 2013, where just 20% of primary schools and 62% of secondary schools had any access to electricity. Generator and “Other Sources” (e.g. biofuel generators) tend to be expensive to run and not capable of providing continuous supply throughout a school.

Table 8 Schools with electricity by source<sup>139</sup>

Level	National Grid	Solar Power	Generator	Other Source	Total	% of all Schools with electricity
Primary	2126	283	163	769	3341	20.4
Secondary	1366	837	568	93	2864	62.6

The formal TVET system is offered through two distinct sub-systems, namely vocational education and training (VET), under the administration VETA, and technical education (TE), under the administration of NACTE. VET centres offer programmes in, for example, masonry and bricklaying, carpentry and joinery, welding and fabrication, electrical installation, secretarial duties, air fare and ticketing, tour guiding, and others of similar nature.<sup>140</sup>

TVET programmes are offered at the secondary education level. Specifically, at the Ordinary Level students can opt for two year programmes in VET vocational and crafts training offered at district and regional vocational and technical training institutes. Students who take vocational and crafts training are not permitted to proceed to the next level of education and will normally enter the labour market. At the Advanced Level, students can opt for three-year technical training courses, also VET.

Swarts and Wachira (2010) have noted that while VETA is structured to allow it to respond to the needs of the labour market, most of the training it continues to provide is still historically artisanal in nature. While artisans are still required by the economy, VETA has been slow in responding to the needs of the ICT and broader technology sector.<sup>141</sup>

It also seems that there is little clarity or regulation regarding separating VETAs functions as a regulatory and financier body and that of a services and training provider in that VETA owns and operates 28 training institutions which reportedly receive funding priority from VETA.

TVET at the tertiary education level is offered in universities, university colleges, and tertiary-based institutions. Students can take three-year professional TET training courses.

The Medium Term Strategic Plan 2012/13 – 2015/16 outlines the following specific TVET related objectives:

<sup>139</sup> Ibid

<sup>140</sup> World TVET Database. (2017). Tanzania. Retrieved April 18, 2017 from <http://www.unevoc.unesco.org/go.php?q=World+TVET+Database&ct=TZA>

<sup>141</sup> Swarts, P., & Wachira, E. (2010). Tanzania: ICT in Education Situational Analysis. Retrieved April 18, 2017 from [http://www.tanzania.go.tz/egov\\_uploads/documents/Situational\\_Analysis\\_Tanzania\\_sw.pdf](http://www.tanzania.go.tz/egov_uploads/documents/Situational_Analysis_Tanzania_sw.pdf)

- 1) Improve access to TVET programmes by increasing the number of adequate places in higher, technical, and vocational training institutions;
- 2) Ensure that the TVET curricula is relevant to the needs and interests of the country;
- 3) Develop new TVET curricula with focus on skills for self-employment;
- 4) Promote an environment for investment in science, technology, technical and vocational education, and higher education; and
- 5) Develop clear policies and guidelines regarding the TVET structure.<sup>142</sup>

In addition, the National Strategy for Growth and Reduction of Poverty II 2010-2015 addresses a number of issues related to the national education system, and particularly issues related to the quality of TVET, higher education, and adult, non-formal and continuing education. Specifically, the strategy sets out a number of TVET related objectives, including the need to:

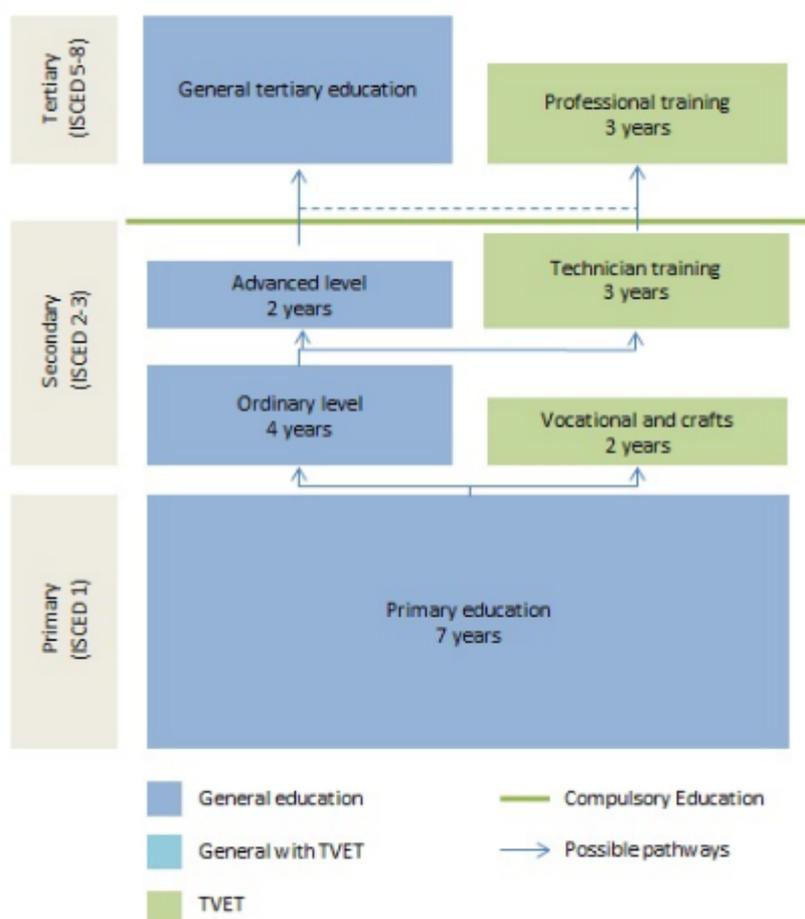
- 1) Increase TVET capacity to include secondary school leavers;
- 2) Equip young people with the necessary skills to enhance their employability and mobility;
- 3) Improve apprenticeship schemes and mentoring systems organized in partnership with the private sector;
- 4) Expand and improve TVET infrastructure in order to expand enrolment – especially for girls;
- 5) Review and update the curricula in order to make TVET more relevant to the needs of the labour market;
- 6) Improve the quality of teaching and learning environments;
- 7) Strengthen quality assurance mechanisms; and
- 8) Promote the use of Information and Communication Technology (ICT) in teaching and learning.<sup>143</sup>

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<sup>142</sup> Ministry of Education and Vocational Training. (2012). Medium Term Strategic Plan 2012/13 – 2015/16. Retrieved April 18, 2017 from [http://planipolis.iiep.unesco.org/sites/planipolis/files/ressources/tanzania\\_ur\\_medium\\_term\\_strategic\\_plan\\_2012-13\\_2015-16.pdf](http://planipolis.iiep.unesco.org/sites/planipolis/files/ressources/tanzania_ur_medium_term_strategic_plan_2012-13_2015-16.pdf)

<sup>143</sup> Ministry of Finance and Economic Affairs. (2010). National Strategy for Growth and Reduction of Poverty II. Retrieved April 18, 2017 from <https://www.imf.org/external/pubs/ft/scr/2011/cr1117.pdf>

Figure 11 Structure of the TVET system<sup>144</sup>



According to a 2015 European Commission study, the number enrolled students in public and private VET and TET institutions was 145,511 (54% male) and 113,080 (54% male) respectively in 2012. The number of VET and TET lecturers was 2,150 and 3,784 respectively.<sup>145</sup>

The following table illustrates some good growth in the number of VET enrolments between 2012 and 2015. In this period, the enrolments grew by 26% but the number of females enrolled (except for 2013) was significantly less than males.

Table 9 Total vocational education and training enrolments from 2012 to 2015.<sup>146</sup>

Year	Total Enrolments	Male%	Female%
2012	145,511	54%	46%
2013	164,077	39%	61%
2014	189,687	58%	42%
2015	196,091	62%	38%

Recent enrolment figures do not appear to be available for TE, however, graduate figures for TEs were 35,080 (52% male) in 2012, 28,366 (51% male) in 2013<sup>147</sup> and 86,334 (49% male) in 2015 and

<sup>144</sup> World TVET Database. (2017). Tanzania. Op cit

<sup>145</sup> European Commission. (2015). TVET teacher education in Africa. Retrieved April 18, 2017 from [http://ec.europa.eu/dgs/education\\_culture/repository/education/library/reports/tvet-africa-report\\_en.pdf](http://ec.europa.eu/dgs/education_culture/repository/education/library/reports/tvet-africa-report_en.pdf)

<sup>146</sup> Government Open Data Portal. (2015). Number of Trainees Enrolled in Vocational Training Centres. Retrieved April 19, 2017 from <http://opendata.go.tz/en/dataset/takwimu-za-elimu-na-mafunzo-ya-ufundi-stadi>

2016 combined (no disagreed figures seems to be available).<sup>148</sup> One can see that there is far more gender parity in the TE sector than in the VET sector.

2015 and 2016 TE graduate statistics indicate the following splits in terms of the field of study.

*Table 10 Total number of technical education graduates in 2015 and 2016<sup>149</sup>*

Field of Study	Total Number of Graduates	Percentage of total
Business, Tourism and Planning	42,961	50%
Health and Allied Sciences	12,792	15%
Science and Allied Technologies	12,368	14%
Teaching and Learning Facilitation	18,213	21%
Total	86,334	

What should be noted is the comparatively small numbers of graduates in science related fields.

There are a total of 723 VET institutions, of which 28 are owned and operated by VETA, distributed as follows:

- 1) Dar es Salaam - 184
- 2) Eastern Zone – 72
- 3) Central Zone – 47
- 4) South Eastern Zone – 24
- 5) Northern Zone – 160
- 6) Lake Zone – 87
- 7) Highland Zone – 100
- 8) South Western Zone – 58
- 9) Western Zone - unknown<sup>150</sup>

NACTE lists 559 registered TET institutions on its website.<sup>151</sup>

Higher education (HE), defined as programmes leading to an advanced diploma or degree, is managed by the Higher Education Division of the MoESTVT which is responsible for developing, promoting and monitoring the quality of the HE sector as well as managing and developing the National Qualifications Framework. As noted, it is supported in this role by the Tanzania Commission for Universities (TCU).

Enrolment in private universities has increased rapidly over the past ten years as a result of the Education Act which permitted the establishment of private education institutions. Higher education is organized at two levels - non-university and university level. Non-university tertiary level institutions include those which offer up to three year courses leading to an advanced diploma as the highest award possible, while university level institutions include those which offer courses leading to bachelor's degrees and beyond.

<sup>147</sup> Government Open Data Portal. (2015). Student Graduated from Technical Institution. Retrieved April 19, 2017 from <http://opendata.go.tz/en/dataset/wanafunzi-waliyohitimu-katika-vyuo-vya-ufundi>

<sup>148</sup> Government Open Data Portal. (2016). Technical Colleges Graduates 2015. Retrieved April 18, 2017 from <http://opendata.go.tz/en/dataset/wahitimu-wa-vyuo-vya-ufundi/resource/3711a312-319f-4a6a-ab4c-d7a773086714>

<sup>149</sup> Ibid

<sup>150</sup> Vocational Education and Training Authority. (2017). Profile of VETA. Op cit

<sup>151</sup> National Council for Technical Education. (2015). List of Accredited, Registered Institutions and Recognized Universities Departments. Retrieved April 18, 2017 from <http://nacte.go.tz/en/institutions.php>

The number of higher education institutions in the country has grown from one institution at the time of independence in 1961 to there being 24 registered non-universities and 28 registered universities in Tanzania with a total enrolment in 2015 as indicated in the following table.<sup>152</sup>

While comparing the enrolment rates with other countries in the region, the higher education institutions are still rated as having a low capacity which has been attributed to limited funding. The Tertiary Gross Enrolment Rate (Bachelor degrees and above) in 2015 is reported as 3% with only 30% of students enrolled in Science or Technology related courses.<sup>153</sup> The Global Innovation Index 2016 lists tertiary enrolment in Tanzania as a specific area of weakness. However, it does note that the quality of tertiary education tends to be good.<sup>154</sup>

Table 11 Total number of higher education students by qualification type<sup>155</sup>

Qualification Type	Total Number of Students
<b>Technical Education</b>	
Basic Certificate	687
Certificate	6,697
Ordinary Diploma	23,548
<b>Higher Education</b>	
Advanced Diploma	2,068
Bachelor	145,054
Post Graduate	828
Masters	10,108
Doctorate	867
Total	189,857

A Labour Force Survey conducted in 2014 noted the following as being the main skill gaps or areas of concern:

- 1) Tanzania employees generally have appropriate education qualifications but have, either low levels or lack of soft or behavioural skills, which affect labour productivity negatively.
- 2) About 80 percent of the occupations available, including occupations that will be in demand in next three to five years, are based on science and mathematics related subjects, while pass rates in Form IV and VI were lowest in mathematics and science related subjects.
- 3) Another dimension of the skills gap is with regard to expectations of graduates, where, about 79 percent of graduates aspire for wage employment upon completion of their basic training and only 17 percent consider self-employment, clearly jeopardizing the goal of promoting self-employment, despite the fact that only about 44 percent of graduates get employed in a year.
- 4) There have been growing aspirations to acquire degrees or equivalent qualifications and many institutions responsible for technical/tertiary education have been converted into higher learning institutions with far reaching implications on the balance of ratios between engineers and technicians and artisans.<sup>156</sup>

<sup>152</sup> United Republic of Tanzania Government Portal. (2016). Institutes. Retrieved April 18, 2017 from [http://www.tanzania.go.tz/directoryrecords/sub\\_dir/58](http://www.tanzania.go.tz/directoryrecords/sub_dir/58)

<sup>153</sup> United Republic of Tanzania Ministry of Finance and Planning. (2016). National Five Year Development Plan 2016/2017 - 2020/2021. Op cit

<sup>154</sup> Global Innovation Index. (2016). 2016 Report. Op cit

<sup>155</sup> Government Open Data Portal. (2016). Enrolment Degree & Non Degree 2015/2016. Retrieved April 18, 2017 from <http://opendata.go.tz/en/dataset/udahili-wa-wanafunzi-wa-vyuo-vikuu-ngazi-ya-shahada-na-isiyokuwa-shahada-2015-2016/resource/fb5a087d-137b-4a38-99d8-b3738c87e633>

<sup>156</sup> United Republic of Tanzania Ministry of Finance and Planning. (2016). National Five Year Development Plan 2016/2017 - 2020/2021. Op cit

## 6.1. ICT in Education

There are a number of overlapping policy documents which speak to ICT in basic education. In summary, these are described below.

### The Tanzania Development Vision 2025

The Vision envisages a nation imbued with five main attributes: high quality livelihood; peace, stability and unity; good governance; a well-educated and learning society; and a strong and competitive economy capable of producing sustainable growth and shared profits. The Vision explicitly includes ICT by noting “the new opportunities that ICT is opening up can be harnessed to meet the goals of the Vision.”<sup>157</sup>

### The National Five Year Development Plan 2016/2017 – 2020/2021

The current NFYDP notes that human capacity development, including education, is the lynchpin objective of any development plan for Tanzania and sets out the following broad education and training targets for 2020:

1. Pre-primary Net Enrolment Ratio - 50%
2. Primary Net Enrolment Ratio - 100%;
3. Secondary Net Enrolment Ratio - 50%
4. Percentage of pupils/students passing primary phase - 75%
5. Percentage of pupils/students passing Form Four - 90%
6. Percentage of pupils/students passing primary phase Form Six - 100%.
7. Higher education Gross Enrolment Rate - 6.9%
8. Proportion of working population with high level skills – 12.1%
9. Proportion of working population with medium level skills – 33.7%
10. Proportion of primary schools with electricity - 30% (from 18.3% currently)
11. Proportion of secondary schools with electricity - 85% (from 77.3% currently)<sup>158</sup>

The NFYDP II does not specify any specific targets or plans of action with respect to the use of ICTs in education and training other than noting that key interventions will be to expand the “use of ICT in teaching and learning at all levels” and to extend “ICT applicability at all levels of skills training and learning.”<sup>159</sup>

The electrification targets for primary and secondary education, while relatively modest, reflect intentions to leverage ICTs in basic education. The percentage of primary and secondary schools targeted for electrification by 2026 is 50% and 90% respectively.

The NFYDP II also sets a target of 63% of all tertiary education graduates will be science and engineering students by 2026.<sup>160</sup> Again, while no specific ICT initiatives are mentioned, this target reflects a commitment to expanding the use of ICTs in training.

### The National Strategy for Growth and Reduction of Poverty II

The NSGRP II provides more detailed descriptions of several education-related interventions. It notes that the long-term impact on society of the proposed interventions will lead to more empowered citizens making better decisions based on more accurate information and being able to use

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<sup>157</sup> United Republic of Tanzania Planning Commission. (2000). The Tanzanian Development Vision 2025. Op cit

<sup>158</sup> United Republic of Tanzania Ministry of Finance and Planning. (2016). National Five Year Development Plan 2016/2017 - 2020/2021. Op cit

<sup>159</sup> ibid

<sup>160</sup> Ibid

communication and information technology tools to improve the quality of their income generating and private activities.<sup>161</sup>

Specific interventions per sub-sector include:

### ***Primary and secondary education***

- 1) Rehabilitating and expanding school infrastructure, including science and ICT laboratories;
- 2) Providing necessary school materials;
- 3) Reviewing curricula in order to accommodate new and emerging issues for addressing skills gaps;
- 4) Equipping classrooms with ICT facilities and promoting use of ICT in teaching and learning;
- 5) Expanding access for children with disabilities to all levels of education, including improved access to laboratories; and
- 6) Providing suitable and adequate pre-service and in-service teacher development, with an emphasis on science subjects and promoting their effective use of ICTs in teaching and learning.<sup>162</sup>

### ***Technical and Vocational Education and Training***

- 1) Expanding and improving infrastructure in order to expand enrolment, especially of girls;
- 2) Reviewing curricula and up-dating the range of courses offered in order to provide knowledge and skills relevant to the job market and the national growth and development agenda;
- 3) Improving quality of teaching and learning environment;
- 4) Promoting adaptation of science and technology to Tanzania's conditions; and
- 5) Promoting use of ICT in teaching and learning.<sup>163</sup>

### ***Higher Education***

- 1) Expanding and improving infrastructure to support increased gender equitable enrolment and quality delivery;
- 2) Integrating ICT in teaching and learning; and
- 3) Reviewing curricula to accommodate new and emerging issues and challenges, nationally, regionally and globally.<sup>164</sup>

## **National Information and Communications Technologies Policy**

Tanzania's National ICT policy, recognizes that "there are new opportunities in applying ICT to enhance education, including curriculum development, teaching methodologies, simulation laboratories, life-long learning and distance education". The policy calls for the development of a nationwide e-education system, the teaching of ICT at all levels of education and training, and the use of ICT to improve the quality of delivery of education. It also recognizes the role of the education system in nurturing ICT skills for future labour markets.<sup>165</sup>

The Information and Communication Technology Policy for Basic Education of 2007 has largely been superseded by the various and more recent sub-sector development plans. This plan, however, is still a useful starting point for understanding the education system's fundamental strategies with

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<sup>161</sup> Ministry of Finance and Economic Affairs. (2010). National Strategy for Growth and Reduction of Poverty II. Op cit

<sup>162</sup> Ibid

<sup>163</sup> Ibid

<sup>164</sup> Ibid

<sup>165</sup> United Republic of Tanzania Ministry of Works, Transport and Communication. (2016). National Information and Communication Technology Policy. Retrieved April 17, 2017 <https://tanzict.files.wordpress.com/2016/05/national-ict-policy-proofed-final-nic-review-2.pdf>

regards to ICT in basic education. It describes the following six major areas. Each area is further articulated by way of several specific policy statements.<sup>166</sup>

### **Infrastructure and Technical Issues**

*A concerted effort is required to provide adequate ICT infrastructure throughout the education sector, from computers, digital equipment, telecommunications, and Internet access to radio and TV, as well as supportive infrastructure such as electricity. The infrastructure will serve the needs of all stakeholders in education, including students, teachers, parents, local communities, administrators and managers.*

*Given the current lack of ICT infrastructure, the roll-out of ICT will be carried out in phases, with the overall aim of nationwide coverage by 2025. From the outset, an effort will be made to provide infrastructure to remote and underserved areas, using technological solutions that are suited to local needs and conditions.*

### **Curriculum and Content**

*The successful integration of ICT in education requires continuous reviews of the curriculum, to accommodate training in ICT as well as ICT-enabled teaching and learning. ICT will be taught as a subject, and integrated as a pedagogical tool for teaching and learning in other subject areas. The use of ICT will require adjustments to more learner-centred and interactive teaching methods, thus redefining the role of the teacher as a facilitator. In order to optimize the use of ICT in education, ICT should also form an integral part of efforts to improve the quality and relevance of the curriculum for all levels.*

*Curricular reviews will be accompanied by the development of content, including e-content, i.e. instructional content or learning experiences that are delivered or enabled by ICT. Content development should be well-aligned with curricular goals and objectives, while addressing the shortage of teachers as well as teaching and learning materials.*

### **Training and Capacity Building**

*The MoEVT recognizes the need for continuous training programmes to build sufficient capacity among staff and other stakeholders. ICT training will range from ICT literacy and technical development skills to the use of ICT in management and administration. Special efforts will be made to train teachers and educators in ICT content development, troubleshooting, and pedagogical uses.*

*Given the wide applicability of ICT for training and professional development, ICT-enabled training methods will be fully explored, including distance education, e-learning, m-learning and blended learning. Training will be offered on a continuous basis to enable staff and other stakeholders to keep up to date with technological and pedagogical developments.*

### **Planning, Procurement and Administration**

*Effective and efficient planning for ICT provides important strategies to advance the State Purchasing Policy objectives as well as provision of knowledge to all stakeholders. In terms of planning for ICT procurement, the Ministry will consider and plan its strategies for ICT total cost of ownership, value for money, risk management, training and the review of existing ICT supply arrangements.*

### **Management, Support and Sustainability**

*Integration of ICT into the education system requires the leadership of the government and the ministry of education, working together with other relevant ministries and other stakeholders and partners. The leadership will provide a clear vision of why the government is*

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<sup>166</sup> Ministry of Education and Vocational Training. (2007). Information and Communication Technology Policy for Basic Education. Retrieved April 18, 2017 from <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwier>

*enabling the use of ICT within the various sectors of the education system and the type of society it hopes to achieve by doing so.*

### **Monitoring and Evaluation**

*The implementation of this policy requires systematic Monitoring & Evaluation (M&E) by all stakeholders. M&E will be used to research and develop ICT integration, to learn from past experiences, to improve implementation and service delivery, to assess and allocate resources, and to demonstrate results. It will also enable the MoEVT to coordinate all activities, while offering a means for accountability to key stakeholders.*

As one can see, there is general agreement as to the critical importance of embedding ICT into all sectors of the education system to improve quality and relevance and there is ample strategic commitment to see that this is done. However, developments on the ground seem to speak of a lack of policy implementation. The current situation of ICT in Education in Tanzania is best summarised by the current National Information and Communications Technology policy as follows.

*The intention of the Service Sectors focus area in the NICTP 2003 was to promote the use of ICT in various sectors including education. ICT has the potential to enhance effective delivery of both formal and informal education. However, given the current situation, this benefit is only evident in some schools and higher learning institutions in urban areas. Currently, few educational institutions, mostly private, have incorporated the use of ICT in education delivery. Universities and other higher learning institutions do not have adequate ICT facilities and bandwidth to meet real demand. There are various initiatives that the Government in collaboration with other stakeholders has been taking to promote the use of ICT in education.<sup>167</sup>*

It goes further to state:

*In addition, the inadequacy of effective programmes for teachers' training particularly in computer and other multi-media utilization has been identified as a major reason for slow take-up of ICT in education. Furthermore, the desire to unleash the potential of ICT in education delivery may cause Tanzania to precipitate numerous pitfalls as seen in other African countries. Experiences drawn from other countries' attempts to utilize ICT in education should provide Tanzania with useful lessons and reasons for exercising prudence in how it deploys ICT in education.<sup>168</sup>*

Further there seems to have been little improvement in the overall situation over the past five years. A 2010 GESCI ICT in Education Situational Analysis pointed out that information regarding the availability and usage of ICT across the system is mostly lacking and that issues of electricity provision, connectivity, maintenance and support, suitable ICT curricula, content and pedagogical training were all significant limiting factors to the integration of ICT into education as envisaged by policy.<sup>169</sup>

While data regarding the availability and use of ICT in schools is generally quite hard to locate, some data do exist. Maro (2014) reports that the total number of computers available in Tanzanian primary schools (both functional and non-functional) in 2012 was 7,035, with only about 20% of these computers available in public schools (which make up the majority of schools). He goes on to report that about 20% of the computers available in public schools were used for administration purposes. This figure in private schools was 37%.<sup>170</sup>

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<sup>167</sup> United Republic of Tanzania Ministry of Works, Transport and Communication. (2016). National Information and Communication Technology Policy. Op cit

<sup>168</sup> ibid

<sup>169</sup> Swarts, P., & Wachira, E. (2010). Tanzania: ICT in Education Situational Analysis. Op cit

<sup>170</sup> Maro, N. (2014). The Use of Computers in Public and Private Primary Schools in Tanzania: A Digital Divide. Retrieved April 18, 2017 from <http://research.ijcaonline.org/volume103/number15/pxc3899404.pdf>

This research indicates that even though there is a large disparity between ICT availability in public and private schools, even in private schools, access to and use of ICT for teaching and learning is severely limited. This view is supported by research into the use of computers in some Tanzanian secondary schools conducted by Sedoyeka and Gafufen in 2013. They found that of ten secondary schools which benefitted from a Rotary Club (UK) sponsored project to supply computers, only 60% had used the computers at all after six months.<sup>171</sup>

The situation in other sectors of the education system tends to be much the same. For example, the higher education sector also faces challenges associated with access, cost, a lack of pedagogical expertise and a lack of suitable technical support.<sup>172</sup>

However, positive steps are being taken. The TERNET continues to gain benefits in terms of affordability and speed from the NICTBB (see above). Moreover, there is widespread advocacy for Free and Open Source Software (FOSS) in Tanzania.<sup>173</sup> There is also a growing body of locally developed educational content with the Open University of Tanzania leading the way in this regard.

The Open University of Tanzania (OUT) was established 1992 by an act of parliament. OUT offers its certificate, diploma, degree and postgraduate courses through open and distance learning means including broadcast, telecast, correspondence, seminars and e-learning. OUT's academic programmes are quality-assured and regulated by the Tanzania Commission for Universities (TCU). Programmes are offered through the following faculties and institutes:

- 1) Faculty of Arts and Social Sciences;
- 2) Faculty of Business Management;
- 3) Faculty of Education;
- 4) Faculty of Law;
- 5) Faculty of Science, Technology and Environmental Studies;
- 6) Institute of Educational and Management Technologies; and
- 7) Institute of Continuing Education.

OUT has a network of 30 Regional Centres and ten Coordinating Centres spread throughout the region (Kenya, Uganda, Rwanda and Namibia) and including the African Council for Distance Education – Technical Collaboration Committee, the Centre for Economics and Community Economic Development and the SADC Centre of Specialization in Teacher Education. OUT also has also 69 Study Centres spread throughout Tanzania.

Also, several research institutes have recently been established and are in the process of greatly improving the quality of their research and training activities. One example, is the The Nelson Mandela African Institute of Science and Technology (NM-AIST) in Arusha, launched in 2008 as part of a network of similar institutes across Sub-Saharan Africa. It is being developed to become a world-class research intensive training institution for postgraduates in science, engineering and technology related fields. Initial areas of study include life sciences and bio-engineering; mathematics, computational and communication science and engineering; water resources and environmental science and engineering; materials science and engineering and; sustainable energy science and engineering.<sup>174</sup>

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<sup>171</sup> Sedoyeka, E., & Gafufen, G. (2013). Computers in Tanzania Secondary Schools - Challenges and Opportunities. Retrieved April 18, 2017 from <https://pdfs.semanticscholar.org/067c/df3be1b2b39a73a559e9309bf3b9ad3d5b48.pdf>

<sup>172</sup> Ngimi, H. M. (2013). Opportunities and Challenges of Integrating ICTs in Education Delivery in the Institute of Continuing Education at the Open University of Tanzania. Retrieved April 18, 2017 from [http://repository.out.ac.tz/1049/1/MARIDIANI\\_NGIMI\\_final](http://repository.out.ac.tz/1049/1/MARIDIANI_NGIMI_final)

<sup>173</sup> Swarts, P., & Wachira, E. (2010). Tanzania: ICT in Education Situational Analysis. Op cit

<sup>174</sup> The Nelson Mandela African Institution of Science and Technology. (2016). About. Retrieved April 18, 2017 from <http://nm-aist.ac.tz/pages/about.php#about-container1>

There have been several other initiatives over the past few years focussed on trying to address these ICT in education challenges. Some of the larger ones are noted below.

### **Tanzania Beyond Tomorrow (TBT)**

This public private partnership scheme was launched in May 2010 with the express aim of using ICT to alleviate the problems caused by shortage of teachers in, especially, Mathematics and Science as a result of the massive increase in secondary enrolment and schools that occurred in the preceding few years. ICT and distance education modes were identified as particularly potent solutions to the problem. For example, TBT planned to allow lessons from a single teacher to be distributed live to several hundred other schools these schools being connected to the internet through optic fibre connections and solar energy power sources.<sup>175</sup>

The TBT scheme was also designed to provide a mechanism for coordinating the various small-scale and disjointed initiatives, sometimes occurring within single schools. Specific projects identified to run under the TBT banner included:

- 1) NoPC – a technology solution that greatly reduces the need for maintenance, support and upgrades associated with traditional PC systems by providing an energy and cost-efficient PC substitution, eliminating high failure components, requiring little bandwidth and using under 100 watts for five workstations.<sup>176</sup>
- 2) BridgeIT – see below

The project designers considered four deployment scenarios to help effectively direct private sector investments.

- 1) no power grid, no internet
- 2) power, no internet
- 3) both provided, internet and power
- 4) full access to technology

However, despite the large amount of excitement and press coverage this initiative generated, there seems to be no evidence of it have bourn any fruit. The official website <http://www.tbtschools.org/> at the time of writing could not be reached.

### **ICT Training Programme**

One component of the TBT initiative that may have survived is the ICT Training Programme. This is a MoESTVT project that has been running since 2010 to train secondary school Mathematics and Science teachers to integrate ICT into their teaching practice. The project focusses on building basic ICT skills (including hardware and software maintenance) as well as the effective use of ICT in teaching and learning.<sup>177</sup>

### **The 21<sup>st</sup> Century Basic Education Programme**

This project is supported by USAID and Creative Associates International<sup>178</sup> and aims to improve the education provided to children in 900 lower primary schools in the Mtwara region and the islands of

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<sup>175</sup> eLearning Africa News. (2010). Tanzania eLearning project bringing education to 1.5 million secondary students. Retrieved April 19, 2017 from <http://ela-newsportal.com/283/>

<sup>176</sup> NoMachine. (2010). NoMachine Collaborates with NoPC to Provide Schools in Tanzania. Retrieved April 18, 2017 from <https://www.nomachine.com/310>

<sup>177</sup> Ministry of Education, Science and Technology. (2015). ICT Training Programme. Retrieved April 18, 2017 from <http://www.moe.go.tz/index.php/en/programmes-projects/item/360-ict-training-programme>

<sup>178</sup> Creative Associates International provides on-the-ground development services and forges partnerships to deliver sustainable solutions to global challenges. Its experts focus on building inclusive educational systems, transitioning

Pemba and Unguja in Zanzibar, by enabling teachers to teach reading, math and science more effectively. The projects activities include:

- 1) Focused technical assistance and professional support to primary school teachers, school administrators, students, school supervisors and education officers in the 900 project schools in Mtwara and Zanzibar;
- 2) Training for Standard One through Four teachers in child-centred, active-learning pedagogy, as well as assessment and feedback loops, classroom management and e-content incorporation;
- 3) Professional development for educators to enable them to use a phonics-based approach to Kiwswahili literacy;
- 4) In-service training and coaching programme for teachers that makes use of Teacher Resource Centres and communities of practice;
- 5) Development of school management committees that will create child-centred Whole School Development Plans;
- 6) Provision of ICT infrastructure, materials and computers to schools and teacher training institutions;
- 7) Establishment of School-based Education Management Information Systems (SEMIS) that will improve decision-making processes;
- 8) Provision of technical assistance and policy support;
- 9) Improved infrastructure to enhance ICT integration in primary schools and teacher training institutions;
- 10) Development and production of e-content, children's books and other instructional materials; and
- 11) Support for policy work that will build capacity.<sup>179</sup>

### **Secondary Education Development Programme**

This wide-ranging project is supported by a World Bank loan. One of its components is the improvement of existing school infrastructure including the connection of more schools to the national electricity grid. It also has a focus on the provision of more and better equipped science laboratories and ICT literate Mathematics, Science and Language teachers.<sup>180</sup>

### **Bridge IT Project**

This project, launched in 2007, was a joint collaboration between The International Youth (IYF) USAID, Nokia, Pearson Foundation and Vodacom aimed at improving primary level (standard five and six) Mathematics, Science and Life Skills through the innovative use of mobile phones to deliver and display digital content. It was run in 150 primary schools. Reported achievements of the project included:

- 1) Better conceptualization of difficult concepts for learners through the use of multimedia resources;
- 2) An increase in learner engagement;
- 3) An improvement in teacher lesson planning;
- 4) 20,619 students reached;
- 5) 1,024 teachers trained; and
- 6) 96 video and 102 lesson plans developed and distributed.

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communities from conflict to peace, developing sustainable economic growth, engaging youth, promoting transparent elections and more. Creative is recognized for its ability to quickly adapt and excel in conflict and post-conflict environments.

<sup>179</sup> TZ21. (2014). Activities. Retrieved April 18, 2017 from <http://crea-tz21.com/overview/activities/>

<sup>180</sup> Ministry of Education, Science and Technology. (2015). Secondary Education Development Programme. Retrieved April 19, 2017 from <http://www.moe.go.tz/index.php/en/programmes-projects/item/358-secondary-education-development-programme>

A 2011 evaluation of the project found that while there were statistically significant improvements in test scores in the test schools, these were often the result of small cohorts of learners performing significantly better rather than a general improvement of most learners in the test schools.<sup>181</sup>

### **Rotary Club UK/British Council Computer Refurbishment and Supply**

This project was a partnership between the Rotary Club UK, British Council and the Global Schools Partnership Programme with additional funding from the UK Department for International and Development (DfID). It provided 700 refurbished computers to 35 secondary schools along with training of two teachers per school in basic technical maintenance.<sup>182</sup>

### **Barclays Bank Computer Refurbishment and Supply**

This project aimed to distribute 10,000 refurbished computers to 500 schools in East Africa. The project's Tanzanian partners was the Tanzania Commission for Science and Technology.<sup>183</sup>

### **Computer Procurement and Refurbishment for Schools**

This project is managed by the Tanzania Computer Literacy for Secondary Schools Trust Fund, a local NGO based in Dar es Salaam which procures used computers and receives donations from donors and other organizations, refurbishes these computers and uses them to equip computer labs in secondary schools. The project also trains students in basic computer maintenance so that they can become the first-level support for the labs.<sup>184</sup>

### **Ubongo Kids**

Ubongo Kids, launched in 2014, is an interactive educational cartoon broadcast on national TV in Tanzania, delivered in partnership with local television stations. The programme is developed by Ubongo Ltd. And targets children between ages 7 and 12 by delivering supplementary Mathematics and Science lessons in English and Kiswahili. Students can interact with the characters on TV through SMS.<sup>185</sup>

### **SMILE**

SMILE stands for Stanford Mobile Enquiry-based Learning Environment and is an interactive learning management system designed to promote higher order thinking that consists of mobile learning management software and a computer server that acts as a router, Wi-Fi, and storage system and can operate on battery power. The technology allows for teachers to instantly gather learning analytics summaries and for students to exchange questions with peers around the world. The system is implemented in secondary schools in eight countries including Tanzania.<sup>186</sup>

### **HEST TVET - Skills Development for Labour Market**

This five-year project which started in 2015, is implemented by the MoESTVT with support from the African Development Bank, and aims to contribute to increased access and improved quality and

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<sup>181</sup> Enge, K. (2011). Summative Evaluation. Retrieved April 18, 2017 from [http://www.iyfnet.org/sites/default/files/BridgelT\\_Eval\\_Exec\\_Summary\\_Jul2011.pdf](http://www.iyfnet.org/sites/default/files/BridgelT_Eval_Exec_Summary_Jul2011.pdf)

<sup>182</sup> Swarts, P., & Wachira, E. (2010). Tanzania: ICT in Education Situational Analysis. Op cit

<sup>183</sup> Hare, H. (2007). ICT in Education in Tanzania. Retrieved April 18, 2017 from [https://www.infodev.org/infodev-files/resource/InfodevDocuments\\_432.pdf](https://www.infodev.org/infodev-files/resource/InfodevDocuments_432.pdf)

<sup>184</sup> Ibid

<sup>185</sup> Centre for Education Innovations. (2015). Ubongo Kids. Retrieved April 18, 2017 from <http://www.educationinnovations.org/program/ubongo-kids>

<sup>186</sup> Centre of Education Innovations. (2015). SMILE. Retrieved April 19, 2017 from <http://www.educationinnovations.org/program/smile-stanford-mobile-inquiry-learning-environment>

equity of technical vocational education and training and the building of capacity for secondary teacher education in science and mathematics.

Two of the three components related to ICT are detailed below.

- 1) Component 1 - Increasing access and improving the quality and equity of TVET through the provision of infrastructure and equipment (including ICT connectivity) as well as capacity building through staff and technical and vocational education teacher training and labour market surveys and tracer studies to inform curriculum review; and ICT connectivity.
- 2) Component 2 - Capacity building for secondary teacher education in science and mathematics by supporting the provision of new infrastructure and rehabilitation of existing infrastructure, including ICT connectivity as well as the training of staff and curriculum review.<sup>187</sup>

## 6.2. Curriculum

The TIE is responsible for curriculum and educational materials development for the pre-primary, primary, secondary and in-service teacher education parts of the system. It is organized into four primary units – Curriculum Development and Review; Educational Materials Design and Development; Research, Information and Publications; Centre for Curriculum Training.

The Educational Materials Design and Development unit is the unit primarily responsible for developing and testing ICT based materials and instructional technologies including, DVDs, the Internet, radio and television and to work with other units in training teachers to use these kinds of materials and technologies.<sup>188</sup>

No major curriculum developments or reviews have occurred since 2005. The current Ordinary Secondary curriculum includes ICT as a subject area while the Advanced Secondary curriculum includes Computer Science as a subject. The former provides students with a general introduction to ICT and their use in society while the latter is focused on computer programming skills.<sup>189</sup>

Both the Ordinary and Advanced Secondary curricula do specify the use of ICT in the teaching and learning of all subject areas. Both documents call for the provision of ICT facilities (including computers, Internet access and other audio-visual equipment) and modern, well equipped laboratories.<sup>190</sup>

A recent small-scale review of the Standard One and Two curricula indicates that teachers are expected to use ICT in the teaching of reading, writing and arithmetic.<sup>191</sup>

An African Development Fund project running between 2014 and 2019 has several components linked to curriculum and development and review to ensure that both VET and TET provide the kinds of skills Tanzania requires for the development of the Knowledge Society. Sub-component 1.2 of the project is designed to support the “building of capacity for strengthening TET to meet market and

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<sup>187</sup> African Development Bank. (2014). HEST TVET - Skills Development for Labor Market. Retrieved April 19, 2017 from <https://www.afdb.org/en/projects-and-operations/project-portfolio/p-tz-iad-001/>

<sup>188</sup> Tanzania Institute of Education. (2016). Department of Educational Materials Design and Development. Retrieved April 18, 2017 from <http://www.tie.go.tz/index.php/departments-and-sections/emdd>

<sup>189</sup> Tanzania Institute of Education. (2015). Syllabus and Materials. Retrieved April 18, 2017 from <http://www.tie.go.tz/index.php/services/syllabuses-price-list?showall=1>

<sup>190</sup> Tanzania Institute of Education. (2007). Curriculum for Ordinary Level 2007. Retrieved April 18, 2017 from <http://tie.go.tz/docs/CURRICULUM%20FOR%20SECONDARY%20EDUCATION.pdf>

<sup>191</sup> Tanzania Institute of Education. (2016). Curriculum for Basic Education Standard 1 and 2. Retrieved April 18, 2017 from <http://tie.go.tz/docs/Curriculum%20for%20Basic%20Education%20STD%20I%20&%20II.pdf>

social demands for inclusive economic growth” and includes the following two curriculum related activities:

- 1) Training of 7 trainers in Competency Based Education and Training (CBET) curriculum, development of teaching manuals for CBET curriculum delivery and tools for assessment, and training of 150 technical teachers in CBET;
- 2) Review of 100 CBET curricula and developing 65 non-CBET ones in technical institutions.<sup>192</sup>

### 6.3. Professional Development

Primary and lower secondary school teachers are trained at about 34 public teacher colleges and are awarded certificates and diplomas respectively. Upper secondary teachers received their training at universities. This cohort represents “trained teachers”. However, some teachers graduated from non-education programmes like BSc. Without a post-graduate diploma in education they are considered “non-trained” teachers.

Further, in an effort to address the massive shortages of teachers as a result of the enormous increase in schools and enrolments over the past 10 – 15 years, about 10,000 Form 6 school graduates have been trained and licensed to teach. They are known as “licensed teachers”.<sup>193</sup>

Upper secondary teachers have tended to show relatively high levels of attrition (up to 15%), especially early in their career.<sup>194</sup> Attrition rates for primary and secondary teachers in 2013 are shown in the table below and show that the majority of secondary teachers leave the profession voluntarily.

*Table 12 Attrition rates for primary and secondary teacher in 2013*<sup>195</sup>

Reason	Primary	%	Secondary	%
Retirement	2833	71.3	328	16.7
Death	731	18.4	120	6.1
Termination	409	10.3	1516	77.2
<b>Total</b>	<b>3973</b>	<b>100</b>	<b>1964</b>	<b>100</b>

There remains a general lack of systemic regularisation of in-service teacher development although the MoESTVT has instituted several programmes to address this including:

- 1) Addressing the scarcity of teachers in Science, Maths and English through the INSET Training Programme;<sup>196</sup>
- 2) Improving the teaching of basic literacy and numeracy through the Literacy and Numeracy Education Support programme;<sup>197</sup>

<sup>192</sup> African Development Fund. (2014). Support To Technical Vocational Education And Training And Teacher Education. Retrieved April 17, 2017 from [https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Tanzania - Support to Technical Vocational Education and Training and Teacher Education - Appraisal Report.pdf](https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Tanzania_-_Support_to_Technical_Vocational_Education_and_Training_and_Teacher_Education_-_Appraisal_Report.pdf)

<sup>193</sup> Swarts, P., & Wachira, E. (2010). Tanzania: ICT in Education Situational Analysis. Op cit

<sup>194</sup> Ibid

<sup>195</sup> Ministry of Education, Science and Technology. (2014). Pre- Primary, Primary and Secondary Education Statistics 2013. Op cit

<sup>196</sup> Ministry of Education, Science and Technology. (2015). INSET Training Programme. Retrieved April 18, 2017 from <http://www.moe.go.tz/index.php/en/programmes-projects/item/359-inset-training-programme-of-secondary-school-science-mathematics-and-english-teachers>

<sup>197</sup> Ministry of Education, Science and Technology. (2013). Technical and Vocational Training Development Programme 2013/2014 - 2017/2018. Op cit

- 3) Upgrading licensed teachers; and
- 4) Upgrading non-education professionals to full-time teachers.<sup>198</sup>

The Morogoro Vocational Instructors Training College (MVTTC), under the administration of VETA, is responsible for training VET teachers and trainers and offers two programmes;

- 1) the Vocational Teachers Certificate Course (VTCC) which aims to develop new TVET teachers' pedagogical and management skills and help them develop relevant competencies.
- 2) the Diploma in Vocational Education and Training (DVoET) which aims to enhance pedagogical and managerial skills of current TVET teachers.<sup>199</sup>

While access to ICT for the vast majority of Tanzanian primary and secondary schools is still lacking, there has been a greater priority placed on deploying ICT for teacher training. This process started in earnest in 2005 when the then MoEVT partnered with the Swedish International Development Agency (SIDA) to provide computers with internet connections to all 34 training colleges along with computer literacy and computer maintenance training. The project ended in 2008 and most project functions were handed over to the the ministry. Since 2013, the programme has struggled with connectivity, maintenance and training issues.

An evaluation, conducted in 2014, found that, while most of the project objectives had been achieved, the long term objective of embedding ICT into ongoing teacher training had only been partly achieved. The anticipated ratio of 15 student-teachers to 1 computer was not realised and the evaluation found a ratio of 20 to 1 instead.<sup>200</sup>

The evaluation report had this to say regarding the current state of ICT in education in Tanzania.

*Tanzanian education policies and plans are supportive of ICT in education. It is expected that student-teachers graduating from Teachers' Colleges will provide the necessary momentum to teaching ICT in primary and secondary schools. It is expected that student teachers will also use ICT as a tool for accessing the most up to date content knowledge and gain from using various sites which provide information on relevant pedagogies. It is expected that over time, ICT will become part and parcel of teaching and learning in primary and secondary schools. Currently there are syllabi for teaching ICT in schools, but lack of trained teachers to teach the subject and nonexistent infrastructure means that the subject is not taught in most schools. The syllabi focus more on teaching ICT as a subject rather than using ICT as a learning tool.<sup>201</sup>*

The report made several recommendations for the future of ICT in education, especially as it relates to teacher development including:

- 1) As an initial phase, ICT should be rolled out in secondary schools by establishing a computer laboratory in each school and providing internet connection for the laboratory.
- 2) ICT in teacher education needs to be re-prioritised to ensure that sufficient financial and human resources are allocated for the programme.
- 3) The ministry should strengthen collaboration with Ministry of Communication Science and Technology (MCST) for backup and support on technical issues relating to connectivity and ICT equipment and facilities.
- 4) The Department of Teacher Education with the ministry should prepare a Strategic Plan for moving forward with ICT integration in Teachers Colleges, with involvement of stakeholders.

<sup>198</sup> Swarts, P., & Wachira, E. (2010). Tanzania: ICT in Education Situational Analysis. Op cit

<sup>199</sup> World TVET Database. (2017). Tanzania. Op cit

<sup>200</sup> Swedish International Development Agency. (2014). Evaluation of Implementation of ICT in Teachers' Colleges Project in Tanzania. Retrieved April 19, 2017 from [http://www.sida.se/contentassets/a5e2e704cc54487e8ca01c812ae2d916/evaluation-of-implementation-of-ict-in-teachers8217-colleges-project-in-tanzania---final-report\\_3760.pdf](http://www.sida.se/contentassets/a5e2e704cc54487e8ca01c812ae2d916/evaluation-of-implementation-of-ict-in-teachers8217-colleges-project-in-tanzania---final-report_3760.pdf)

<sup>201</sup> Ibid

- 5) A programme coordinator should be appointed for the ICT in Teachers' Colleges programme.
- 6) The format for inspection of Teachers' Colleges should be revised to include the assessment of use of ICT in teaching and learning.
- 7) ICT replacements needed to be planned and budgeted for in advance.
- 8) The functioning of the ICT laboratories needs to be reviewed to maximise the use of both tutors and students, taking into consideration that tutors need separate laboratory facilities.
- 9) There is a need for all tutors to have a personal laptop and/or other mobile technologies, either through the ICT programme or through subsidies for buying their own.
- 10) Every classroom in the Teachers' Colleges should be equipped with projector and internet.
- 11) All colleges need to have more reliable power supply from the national grid, and back-up systems to counter fluctuations.
- 12) Training should be resumed and strengthened. More training is needed for those who have not received training together with refresher and on-going training (basic ICT training, technical training and training in the use for teaching and learning). In-service training could be used for most of this training.
- 13) The teaching of ICT should be revised focusing more on the use of ICT and less on the technical/theoretical parts of ICT systems.
- 14) Graduating student-teachers with good performance in ICT should be posted in schools identified to be potentially equipped to host ICT subject so that they are able to practice.<sup>202</sup>

#### 6.4. Key Actors and Players

Actor/Player	Role and Area of Development
Ministry of Education, Science, Technology and Vocational Training	The Ministry has primary responsibility for the education, science and technology and vocational training sectors.
Tanzania Institute of Education	The Tanzania Institute of Education (TIE) is a Parastatal Organization under the Ministry of Education and Vocational Training (MOEVT) charged with the responsibility of ensuring the quality of education in Tanzania at the pre-school, primary, secondary, and teacher training levels. This it does through the development of the required curricula at each of these levels.
NECTA	The National Examination Council of Tanzania (NECTA) is responsible for the administration of all national examinations in Tanzania, and awards official diplomas in primary, secondary and post secondary education. The exponential growth of the number of students and candidates has led to an increased need for online registration.
VETA	The Vocational Education and Training Authority was established (VETA) as an autonomous government agency charged with an overall responsibility of coordinating, regulating, financing, providing and promoting vocational education and training. As a regulator, VETA coordinates and supports VET provision to ensure that the training provided is of the required quality and meets the demand of the labour market. VETA therefore develops curricula, occupational unit standards, Training and Learning Elements, and conducts examinations and certification for the vocational training centres.
TCU	Responsible for managing and accrediting university and non-university HE institutions.

<sup>202</sup> Ibid

## 6.5. Challenges facing the Education Sector

Tanzania can be proud of the way it has so drastically expanded access to both primary and secondary education over the past decade. However, this repaid expansion of the system has resulted in significant and lingering challenges with regard to quality. Steps have been taken that include the building of many more schools and the training of many more teachers. However, with any rapid expansion of the teaching force, sacrifices in terms of the quality of teaching and learning each is able to provide has undoubtedly suffered.

Most observers agree on the key challenges facing the education sector, especially with regards to the integration of ICT. Most institutions (especially schools and VET institutions) lack any meaningful access to ICT facilities and Internet connections. Even in institutions which do have access to such, they are primarily used for administrative rather than teaching and learning purposes.

The reasons for this lack of access are myriad and include a lack of stable and regular electricity supply to many institutions as well as the high costs of technology due to the fact that almost all of it needs to be imported. While the efforts of the NICTBB and the UCSAF have made some inroads with regard to the quality and affordability of Internet connectivity, such connections still tend to be expensive and difficult to access for most institutions.

Despite early and large-scale investments into integrating ICT into pre-service teacher education, there still appears to be a general lack of pedagogical awareness, knowledge and confidence among most teachers which prevent even those that do have access to ICT from using them for teaching and learning. In addition, some reports indicate negative perceptions of the use of ICT among some teachers and lecturers.<sup>203</sup>

This is not all the result of a lack of policy initiatives in this space. Rather, it seems to be the result of a lack of policy implementation or, in some cases, a lack of the correctly formulated policies. For example, in-service professional development seems to remain uncoordinated and haphazard.<sup>204</sup>

A 2015 report on the challenges being experienced in HEIs concluded the following which reflects the most critical challenges facing the system as a whole:

- 1) Limited access of ICT hardware and software;
- 2) Misdirected government policies;
- 3) Poor ICT infrastructure;
- 4) Lack of competent ICT staff;
- 5) Poor institutional coordination and curriculum variation;
- 6) High cost imposed on ICT tools;
- 7) Lack of government funding;
- 8) Reluctance to use ICT tools in teaching and learning;
- 9) Lack of practical training; and
- 10) Limited capacity of ICT hardware and software.<sup>205</sup>

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<sup>203</sup> Oroma, J., Wanga, H., Wikedzi, T., & Ngumbuke, F. (2012). On The Difficulties Of Integrating ICT In Education in Tanzania Universities: A Case of Tumaini University At Iringa. Retrieved April 18, 2017 from <https://library.iated.org/view/ROMA2012OND>

<sup>204</sup> Tanzania Development Support. (2013). Educational System in Tanzania: Challenges and Prospective. Retrieved April 18, 2017 from <http://tdsnfp.org/wp-content/uploads/2013/06/Education-system-in-Tanzania-.pdf>

<sup>205</sup> Rumanyika, J. D., & Galan, R. M. (2015). Challenges for Teaching and Learning Information and Communication Technology Courses in Higher Learning Institutions in Tanzania: A Review. Retrieved April 18, 2017 from <https://www.researchgate.net/publication/28123>

## 7. Science, Technology and Innovation (STI)

Since 2008, the ministry primarily responsible for Science, Technology and Innovation (STI) in Tanzania is the Ministry of Education, Science, Technology and Vocational Training (MoESTVT). This mandate was previously the responsibility of the Ministry of Communications, Science and Technology.

Most of the responsibility for managing the STI sector, however, falls to the Tanzania Commission for Science and Technology (COSTECH). COSTECH, established by the Act of Parliament in 1986, is the principal advisory organ to the Government on all matters relating to innovation, scientific research and technology development. It is also responsible for the administration of research grants, maintenance of a national research registry and science information services, setting research policy, and creating incentives for invention and innovation, popularizing STI and promoting regional and international STI cooperation.<sup>206, 207</sup>

As such, major national research and development institutions are affiliated to COSTECH. Representatives from the affiliated institutions are elected to serve on the board of COSTECH, commonly known as 'the Commission'. Members of the Commission include Chief Executive Officers from national universities and policy makers from ministries of both the mainland and Zanzibar government as well as members representing all sectors of the economy (agriculture and livestock, public health, forestry, fisheries, marine sciences, minerals, industry, wildlife). For a full list of affiliated organizations, visit [http://www.costech.or.tz/?page\\_id=1610](http://www.costech.or.tz/?page_id=1610).

The organizational structure of COSTECH is based on three main arms, namely the Commission which is the governing authority, research and development sectoral based advisory committees, and the Secretariat. As the governing authority of COSTECH, the Commission gives broad directives and guidelines to the Secretariat and its various committees.

Internally, the Commission has established standing committees known as Research and Development Advisory Committees, which act as the Commission's think tanks on various STI issues. These are:

- 1) Agriculture and Livestock;
- 2) Natural Resources;
- 3) Industry and Energy;
- 4) Public Health and Medical Research;
- 5) Environmental Research;
- 6) Basic Sciences;
- 7) Social Sciences;
- 8) Development and Transfer of Technology; and
- 9) Biotechnology.<sup>208</sup>

A long standing contributor to the STI space in Tanzania is the Science, Technology and Innovation Policy Research Organization (STIPRO), dating back from the early 1980's. It produces various publications including policy briefs and engages in a number of STI related research projects. Two

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<sup>206</sup> Wikipedia. (2017). Tanzania Commission for Science and Technology. Retrieved April 19, 2017 from [https://en.wikipedia.org/wiki/Tanzania\\_Commission\\_for\\_Science\\_and\\_Technology](https://en.wikipedia.org/wiki/Tanzania_Commission_for_Science_and_Technology)

<sup>207</sup> Tanzania Commission for Science and Technology. (2017). Roles and Functions. Retrieved April 18, 2017 from [http://www.costech.or.tz/?page\\_id=1612](http://www.costech.or.tz/?page_id=1612)

<sup>208</sup> Tanzania Commission for Science and Technology. (2017). Advisory Committees. Retrieved April 19, 2017 from [http://www.costech.or.tz/?page\\_id=1605](http://www.costech.or.tz/?page_id=1605)

past project reports include the Impacts of ICT Adoption and Application in Innovation<sup>209</sup> and the Role of FDI in Local Technological Capacity Building.<sup>210</sup>

The organization's current strategic plan includes the following key objectives:

- 1) To increase the quantity and quality of human resources at STIPRO;
- 2) To increase the volume and quality of knowledge created by STIPRO that will support policy process and other decisions;
- 3) To achieve a wider dissemination of knowledge created by STIPRO through effective engagement with stakeholders; and
- 4) To improve the organizational performance of STIPRO through mobilization and efficient use of resources.<sup>211</sup>

For a further list of key research and civil society Institutions working in the STI sector in Tanzania visit [http://www.costech.or.tz/?page\\_id=2227](http://www.costech.or.tz/?page_id=2227)

Another important role player in Tanzania's STI sector is the Tanzania Investment Centre (TIC). Both public and local and international private sector investment is an important driver of STI internationally and, encouraging, facilitating and targeting such investment this investment is necessary to growing and sustaining an STI ecosystem.

TIC was established in 1997 by the Tanzania Investment Act as the primary agency responsible for coordinating, encouraging, promoting and facilitating investment in Tanzania and to advise the Government on investment policy and related matters. TICs basic functions include:

- 1) Creating and maintaining a positive climate for private sector investment;
- 2) Providing advice to the Government on investment related matters;
- 3) Stimulating local and foreign investments;
- 4) Facilitating investments by foreign and local investors;
- 5) Stimulating and supporting the growth of Entrepreneurship and SMEs in Tanzania;
- 6) Providing and disseminating up-to-date information on investment opportunities and incentives available to investors; and
- 7) Monitoring the Tanzania business environment and growth of Foreign Direct Investment (FDI) in the country.<sup>212</sup>

## 7.1. STI Policies and Objectives

The Tanzania Development Vision 2025, the NFYDP, the NSGRP II and the National Research and Development Policy (NRDP) all speak directly to the essential need for STI for Tanzania to reach its goal of becoming a middle income country.

The Tanzania Development Vision 2025 points out that the economy has remained primarily agricultural and thus remains vulnerable to climate and market fluctuations, both of which tend to be increasing. It goes on to note that available domestic resources have been insufficiently utilised to promote sustainable development and productivity largely attributable to low levels of scientific

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<sup>209</sup> STIPRO. (2012). The Impact of ICT Adoption and Application on Innovation. Retrieved April 19, 2017 from [http://www.stipro.or.tz/index.php?option=com\\_jdownloads&view=download&id=112:impact-of-icts-adoption-and-application-on-innovation&catid=27](http://www.stipro.or.tz/index.php?option=com_jdownloads&view=download&id=112:impact-of-icts-adoption-and-application-on-innovation&catid=27)

<sup>210</sup> STIPRO. (2011). The Role of FDI in Local Technological Capacity Building. Retrieved April 19, 2017 from [http://www.stipro.or.tz/index.php?option=com\\_jdownloads&task=download.send&id=36&catid=27&m=0](http://www.stipro.or.tz/index.php?option=com_jdownloads&task=download.send&id=36&catid=27&m=0)

<sup>211</sup> STIPRO. (2015). STIPRO's Five Year (2014/15 – 2018/19) Strategic Plan. Retrieved April 19, 2017 from [http://www.stipro.or.tz/index.php?option=com\\_phocadownload&view=file&id=1&Itemid=266](http://www.stipro.or.tz/index.php?option=com_phocadownload&view=file&id=1&Itemid=266)

<sup>212</sup> Tanzania Investment Centre. (n.d.). About TIC. Retrieved April 18, 2017 from <http://www.tic.co.tz/Team?!=en>

and technological innovations. It calls for high levels of investment in both STI capacity and education and enabling technologies, including ICT to create a strong, sustainable and resilient economy.<sup>213</sup>

The NFYDP goes into more detail and outlines the following observed limits to increased STI in Tanzania:

- 1) While Tanzania previously decided to spend 1% of GDP for STI-related activities annually (excluding private investment), the 2014/15 budget was only 0.4%.
- 2) Private investment is also limited due to weak incentives and poor understating of the potential benefits to be derived from such investments
- 3) Tanzania makes low usage of advanced and modern technologies, primarily due to high costs of sourcing and updating to modern technology.
- 4) Restrictive patent rights acquisition, and limited knowledge on new technologies as well as weak multi-stakeholder platforms and partnerships also limit the use and development of new technologies.

Key targets by proposed by the NFYDP for 2020 are:

- 1) Increasing the proportion of Research and Development (R&D) expenditure to 1.0% of GDP (and 1.5% by 2025);
- 2) Increasing the proportion of R&D expenditure by public sector universities and other research institutions to 68% of annual expenditure (and 72% by 2025);
- 3) Incentivising an increase in private sector R&D to 15% of expenditure;
- 4) Increasing the number of local R&D institutions with strong foreign partner institutions to 22;
- 5) Increasing the proportion of science and engineering students in tertiary and higher learning which access student loans to 56%.<sup>214</sup>

The NSGRP II does not specifically mention STI or set any targets or strategies for the sector but it does highlight the importance of R&D and STI in both agricultural and industrial value chains.<sup>215</sup>

The NRDP of 2010 is in many ways a much needed revision of the original National Science and Technology Policy (NSTP) of 1996 which had been used to guide R&D in Tanzania. The NRDP states that this original policy does not provide specific guidance on how to address many of the recognised gaps in Tanzania's STI sector. As such, focus is given the content of the NRDP as opposed to the NSTP.<sup>216</sup>

The gaps noted in the NRDP closely match those articulated in the NFYDP indicating that, unfortunately between 2010 and 2016, little progress had been made on addressing these. Nevertheless, the NRDP does offer the following extensive list of strategic objectives across ten focus areas:

- 1) Strategic R&D Leadership and Institutional Framework
  - a) Establishing effective R&D coordination, guidance and foresight mechanism through a harmonized institutional framework.
- 2) Prioritization of Research Areas
  - a) Creating a mechanism for setting up and periodically reviewing research priority areas and identifying strategic research areas which are important to national security and economic growth.

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<sup>213</sup> United Republic of Tanzania Planning Commission. (2000). The Tanzanian Development Vision 2025. Op cit

<sup>214</sup> United Republic of Tanzania Ministry of Finance and Planning. (2016). National Five Year Development Plan 2016/2017 - 2020/2021. Op cit

<sup>215</sup> Ministry of Finance and Economic Affairs. (2010). National Strategy for Growth and Reduction of Poverty II. Op cit

<sup>216</sup> Ministry of Communication, Science and Technology. (2010). National Research and Development Policy. Retrieved April 19, 2017 from [http://www.tzonline.org/pdf/National\\_Research&DevPolicy.pdf](http://www.tzonline.org/pdf/National_Research&DevPolicy.pdf)

- b) Aligning research planning, implementation, monitoring and evaluation as well as reporting to the national development agenda.
- 3) Enhancing Research Capacity in ICT and Social Economic Disciplines
  - a) Increasing the contribution of research in socio-economic disciplines and ICT for national development.
  - b) Increasing the use of ICT in research.
- 4) Commercialization and Dissemination of Research Results
  - a) Establishing effective mechanisms that will ensure the identification and translation of innovative research results into products, processes and services.
  - b) Establishing an efficient management system for commercialization and dissemination of innovative research results.
  - c) Ensuring that R&D institutions collaborate with local industries (including small and medium enterprises) in up-scaling the local technologies and skills in order to produce quality products and services.
  - d) Ensuring that COSTECH takes a lead in gathering and dissemination of research results in the country.
- 5) Human Resource Development and Management
  - a) Establishing and implementing a human resource development programme focusing on short, medium and long-term research needs.
  - b) Creating a conducive working environment through provision of necessary infrastructure, better remuneration and incentives.
- 6) Financing of Research and Development
  - a) Ensuring adequate funds are allocated to research activities.
  - b) Motivating private sector/industry, development partners and individuals to contribute to research funding.
- 7) Research Ethics and Intellectual Property Rights
  - a) Strengthening ethics management.
  - b) Fostering equitable sharing of research resources and benefits/IPR, particularly with local researchers/ institutions/research communities.
- 8) Collaboration, Partnership and Networking
  - a) Establishing and institutionalizing an efficient system of partnership, networking and collaboration among researchers and private sector.
  - b) Creating a favourable environment for cooperation and partnership for R&D institutions in the country.
- 9) Regional and International Cooperation
  - a) Promoting strategic partnership and collaboration between research institutions, the government, regional and international development partners, including the diaspora.
  - b) Strengthening collaboration between the national research coordinating body, research institutions and other regional and international coordinating bodies.
- 10) Gender and Other Factors of Inequality
  - a) Taking affirmative action in promoting research that addresses challenges facing disadvantaged groups of people.
  - b) Empowering all segments of the population to benefit from research results.
- 11) Environment
  - a) Minimizing the effects of research undertaking on the environment.
  - b) Promoting research that is beneficial to the environment.
- 12) Occupational Risks Including HIV/AIDS
  - a) Mitigating the risks associated with research activities to research staff.<sup>217</sup>

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<sup>217</sup> Ministry of Communication, Science and Technology. (2010). National Research and Development Policy. Op cit

Finally, the National Biotechnology Policy (NBP) of 2010 provides specific guidance to the development of this important part of Tanzania’s STI sector given the significant role that agriculture still plays in the economy in terms of a proportion of GDP and employment. Biotechnology has also been identified as a critical area of innovation for Tanzania given the country’s need to mitigate the effects of climate change and the effects this is likely to have on food security and the country’s overall disease burden, particularly a likely increased incidence of flood-induced cholera. In summary, it articulates four broad policy objectives, namely:

- 1) Provide adequate financial resources for coordination of activities of the National Biotechnology Advisory Committee;
- 2) Set biotechnology targets for institutions working in biotechnology research and development;
- 3) Foster close institutional collaboration between institutions conducting research under similar themes; and
- 4) Define benefit items and the means of getting them from international institutions.<sup>218</sup>

## 7.2. Research and Innovation

The COSTECH website lists 30 affiliated agriculture and livestock research institutions, nine affiliated industrial and energy research institutions, four affiliated natural resource research institutions, six public health research institutions, and 33 affiliated universities with research capacity.<sup>219</sup>

While there are many research institutions affiliated with COSTECH, Tanzania’s aggregate STI research output is low. For example, in 2013, Kenya produced more than double the number of published scientific and technical research papers (871 to 378).<sup>220</sup> Also, in 2015, Tanzania filed one patent application compared to Kenya’s 137.<sup>221</sup> Tanzania also scored poorly in the 2016 Global Innovation Index on the Human Capital and Research component (ranked 126 out of 128 countries with a score of 9.7). Particular areas of weakness in this component were tertiary enrolment and the per capita number of researchers.<sup>222</sup>

These results are largely echoed by the World Economic Forum’s 2016 Global Competitiveness Index which ranks the quality of higher education and training 126 out of 134 countries. However, the report did rate Tanzania’s capacity for innovation more highly (88 of 132 countries) with the quality of scientific institutions (82), university-industry R&D collaboration (55) and government procurement of advanced technology products (52) particularly strong.<sup>223</sup>

The top ten research institutions in 2016 by research outputs, according to the Nature Index were as follows:

*Table 13 Top ten Tanzanian research institutions in 2016 by research outputs<sup>224</sup>*

Institution	Article Count
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<sup>218</sup> Ministry of Communication, Science and Technology. (2010). National Biotechnology Policy. Retrieved April 19, 2017 from [http://www.tzonline.org/pdf/Biotechnology\\_Policy\\_WEBB1.pdf](http://www.tzonline.org/pdf/Biotechnology_Policy_WEBB1.pdf)

<sup>219</sup> Tanzania Commission for Science and Technology. (2017). Affiliated Institutions. Retrieved April 18, 2017 from [http://www.costech.or.tz/?page\\_id=1610](http://www.costech.or.tz/?page_id=1610)

<sup>220</sup> World Bank. (2013). Scientific and technical journal articles. Retrieved April 19, 2017 from <http://data.worldbank.org/indicator/IP.JRN.ARTC.SC?locations=TZ-KE>

<sup>221</sup> World Bank. (2015). Patent applications, residents. Retrieved April 18, 2017 from <http://data.worldbank.org/indicator/IP.PAT.RESD?locations=TZ-KE>

<sup>222</sup> Global Innovation Index. (2016). 2016 Report. Op cit

<sup>223</sup> World Economic Forum. (2016). Global Competitiveness Index 2016 - 2017. Retrieved April 17, 2017 from <http://reports.weforum.org/global-competitiveness-index/country-profiles/#economy=TZA>

<sup>224</sup> Nature Index. (2017). Tanzania. Retrieved April 18, 2017 from <http://www.natureindex.com/country-outputs/Tanzania>

Institution		Article Count
1.	Muhimbili University of Health and Allied Sciences (MUHAS)	2
2.	Gombe Stream Research Centre (GSRC)	1
3.	Ifakara Health Institute	2
4.	National Institute for Medical Research (NIMR)	3
5.	Tanzania Ministry of Agriculture, Food Security and Cooperatives (MAFC)	1
6.	Naliendele Agricultural Institute (NARI)	1
7.	Tanzania Ministry of Water	1
8.	University of Dar es Salaam	1
9.	Management and Development for Health (MDH)	1
10.	Tanzania Wildlife Research Institute (TAWIRI)	1

STI activities are being or have been supported by the following initiatives:

### **Tanzania ICT Technology Park**

Starting in 2016 and to be developed over approximately 5 years in Bagamoyo within a Special Export Zone, the ICT Technology Park, a Public and Private Partnership between the Government and SEACOM, will become a focal point for ICT innovation. It will include an Incubator providing co-working space, seed funding, training and mentorship for ICT entrepreneurs as well as a two-tier datacentre, managed by the National Identification Authority (NIDA), suitable for government, private sector and multinationals. The park is expected to help provide jobs by housing multinational enterprises and start-ups. Long term plans also include the establishment of a new ICT research and development university.<sup>225</sup>

### **TANZICT**

TANZICT was a bi-lateral project between Tanzania and Finland, which ran between 2011 and 2016. Apart from providing assistance to revise the NICTP and strengthening the institutional capacity of the ministry, it also sought to develop an ICT and technology innovation programme. TANZICT established an innovation space within COSTECH, called Buni Lab as well as several regional innovation spaces in Iringa, Zanzibar and Mbeya. Eight Living Labs (spaces where community members can get involved in or drive innovations particular to their local communities). TANZICT was also involved in various initiatives to provide support especially to women ICT and technology entrepreneurs. In 2012, the project launched an ICT innovation fund which provided grants of up to US\$10,000 for new start-up ideas. Over four rounds between 2012 and 2015, 41 proposals received funding.<sup>226</sup>

### **Dar Teknohama Business ICT Incubator (DTBi)**

The Dar Teknohama Business Incubator (DTBi), a registered non-profit company, was set up in June 2011 under a Public Private Partnership between InfoDev and COSTECH. It is hosted by COSTECH as an incubator to support local technology-driven companies as well as young entrepreneurs with high growth potential. DTBi supports pre-incubation (previously in co-operation with TANZICT), of disruptive business ideas that are implementable or have an existing prototype, potential for scalability and ability to create greater social and economic impact. DTBi also provides Incubation for existing companies and provides loan guarantees for incubated companies with signed private

<sup>225</sup> IST Africa. (2016). Current ICT Initiatives and projects - Republic of Tanzania. Retrieved April 19, 2017 from <http://www.ist-africa.org/home/default.asp?page=doc-by-id&docid=4323>

<sup>226</sup> TANZICT. (2015). Strengthening the Innovation Ecosystem in Tanzania. Retrieved April 19, 2017 from [https://tanzict.files.wordpress.com/2016/12/tanzict\\_end\\_publication.pdf](https://tanzict.files.wordpress.com/2016/12/tanzict_end_publication.pdf)

sector or public sector contracts who need working capital. DTBi was the implementing partner for the InfoDev East Africa Virtual Incubation pilot launched in January 2013.

In June 2014, Tigo Tanzania signed a partnership with DTBi and COSTECH which aims to support ten scholarships per year for Masters students, an internship programme and employment opportunities. Over the past four years, DTBi has mentored a mix of 35 technology entrepreneurs and start up companies. DTBi has also helped incubatees receive more than \$80,000 in funding during 2014/2015 and assisted in securing loan guarantees to enable them to secure operating capital to scale their business. To date incubatees have created more than 4,750 jobs.<sup>227</sup>

## **KINU**

KINU was established in January 2012 as a social enterprise to provide an open space for Tanzania's tech community to foster co-creation, innovation and capacity building. Initial funding towards operational costs was secured from Indigo Trust and Google Africa. Other partners include SMILE (a telecommunications network company) and RAHA (a broadband internet service provider). In September 2012 SEACOM donated 30mb of Internet connectivity for one year to support KINU. Samsung provided equipment for a test laboratory.

KINU also supports an active role for women and children in technology by co-organizing Girls Night Out events to support female entrepreneurs to leverage ICT in their businesses. An agreement has also been reached with the Internet Society (ISOC) to provide training for women and to support two-three Tanzanian women to become ISOC certified trainers. A six-week Robotics Programme has been run for children (6 - 12 year olds) of members of the KINU community during 2013 and future coding programmes for children are planned.<sup>228</sup>

## **7.3. Human Resource Development**

The Science Technology and Higher Education Programme (STHEP) was a significant World Bank funded project that ran from 2009 to 2016 valued at US\$115 million. The long-term purpose of STHEP was to improve development of human capital in area of Science and Technology (S&T) and create a knowledge-based economy within the next ten years. 128 Higher Education and Research Institutions (HERIs) were identified to participate in the STHEP programme.

The development objectives of the project were two-fold:

- 1) To increase the quantity and quality of higher education graduates, with special emphasis on science, technology, and education; and
- 2) To lay the foundations for improved responsiveness of tertiary education to the labour market.<sup>229</sup>

An additional line of credit was provided an 18-month extension to allow for the completion of initial activities as well as the piloting of two programmes designed to sustain the momentum of key reforms in science teacher training and performance-based financing in higher education that had already been initiated, and to develop a strategy and operational plan for human capital and skills development at the tertiary level in priority growth areas in response to labour market demands.<sup>230</sup>

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<sup>227</sup> Dar Teknohama Business Incubator. (2017). DTBi. Retrieved April 19, 2017 from <http://teknohama.or.tz/>

<sup>228</sup> IST Africa. (2016). Current ICT Initiatives and projects - Republic of Tanzania. Op cit

<sup>229</sup> World Bank. (2014). Tanzania - Science and Technology Higher Education Project: additional financing. Retrieved April 19, 2017 from <http://documents.worldbank.org/curated/en/858121468311390477/Tanzania-Science-and-Technology-Higher-Education-Project-additional-financing>

<sup>230</sup> Ibid

## 7.4. Key actors and Players

Actor/Player	Role and Area of Development
Ministry of Education, Science, Technology and Vocational Training	The ministry is ultimately responsible for providing policy guidance to the STI sector and ensuring the development of a viable STI ecosystem in Tanzania.
Tanzania Commission for Science and Technology	Manages the STI sector; principal advisory organ to the Government on all matters relating to innovation, scientific research and technology development; responsible for the administration of research grants, maintenance of a national research registry and science information services; setting research policy; creating incentives for invention and innovation; popularizing STI; promoting regional and international STI cooperation
STIPRO	Provides sector-wide policy and implementation research
National Institute for Medical Research	Government public health research institution
Sokoine University of Agriculture	Research university
Tanzania Food and Nutrition Center	Government institution overseeing nutrition related research in Tanzania
Ifakata Health Institute	Health research organisation working in environmental health, clinical trials, health system impact evaluation and policy and training and capacity building.
Muhimbili University of Health and Allied Sciences	Research university
Tanzania Food and Drugs Authority	Government regulator for safety and effectiveness of food, drugs, cosmetics and medical devices

## 7.5. Challenges facing the STI Sector

The challenges facing the STI sector are well documented and can be summarised as follows.

- 1) A lack of public budget allocation;
- 2) A lack of private budget allocation;
- 3) A lack of understanding of the benefits of STI investments in the private sector;
- 4) Lack of incentives for private sector funding;
- 5) High costs of imported technologies;
- 6) Restrictive and ill-developed patent protections;
- 7) Weak leadership and multi-stakeholder partnerships and collaborations within the STI sector;
- 8) Inadequate mechanisms for including new areas of research into the national agenda and defining national research priorities; and
- 9) Low numbers of qualified researchers and poor hiring and training processes.

## 8. Conclusion

The development of the Knowledge Society in Tanzania has shown some progress over the past decade. Gross domestic product continues to grow steadily, averaging approximately 7% over the past decade. Gross National Income doubled from US\$410 in 2005 to US\$920 in 2015<sup>231</sup> and life expectancy is also steadily improving (65.487 years in 2015).<sup>232</sup> Mobile penetration rates continue to climb reaching almost 76% in 2015. Fixed broadband subscriptions and the percentage of the population using the internet, while both still very low, even for the region, are also on upward trajectories.

The NICTBB is a very significant development for the country and positions Tanzania to become a power regional ICT hub by connecting to the region's submarine cable infrastructure and extending access to this to its landlocked neighbours. As a result, the cost of Internet bandwidth has fallen dramatically recently. However, high retail technology and access costs seem to be stifling demand and usage at a time when it should be greatly increasing.

It is interesting to note the number of Tanzanian websites, especially government websites, that are available in both English and Kiswahili. This is an indication of some effort to generate and promote local digital content. This is a small part of the government's eGovernment efforts which are starting to yield fruit.

There has been a marked improvement (over 400%) in secondary enrolments. However, universal primary education seems to have slipped in the past few years, falling to just over 81% in 2015. As is the case in many developing countries, large improvements in access have not been accompanied by improvements in quality and Tanzania is no different.

Primary School Leaving Examination pass rates continue to hover at around 50% (meaning that half of primary school students are even not permitted to continue to secondary education), lower secondary pass rates fell from a high of 90% in 2007 to 58.3% in 2013 and upper secondary pass rates remain over 93% but are down from previous highs of 98%.

While IT is formally part of the secondary curriculum and ICT are noted as being important for teaching and learning, far too few primary and secondary schools have access to ICT and Internet connectivity and, the majority of those that do, still tend to make use of ICT only for administrative purposes. Recent efforts to improve the quality of pre- and in-service teacher training and to embed ICT into pedagogy, are unlikely to yield results until there is more ubiquitous access to ICT in classrooms.

The progression figures noted in the section on education indicate that many children are not able to access any secondary education and, many of those that do, do not progress to a point where they are able to access university education, critical for the development of those technical skills most required for the development of an advanced knowledge society. With an enrolment rate of 3.6% in 2015, there is much room for improvement.

Tanzania's research output is minimal and the country has failed to meet its target of 1% of GDP for STI, only budgeting 0.4% in 2015, a figure far below what is required to fully develop the country's STI capabilities.

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<sup>231</sup> World Bank. (2015). GNI per capita, Atlas method (current US\$). Retrieved April 20, 2017 from <http://data.worldbank.org/indicator/NY.GNP.PCAP.CD?locations=TZ>

<sup>232</sup> World Bank. (2015). Life expectancy at birth, total (years). Retrieved April 20, 2017 from <http://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=TZ>

The TVET and TE sectors are both growing, although still not at the rates required to absorb all those exiting primary and secondary education. For example, even the impressive 2015 VET enrolment figure of 196,091 is not enough to absorb the approximately 300,000 children who did not pass their Primary School Leaving Examination in 2015 and would need to be able to access VET to continue with their education. There is also concern with regard to an increasing mismatch between the skills being taught in VET and TE and those required by the economy.

Tanzania, therefore requires massive and consistent investment in education (facilities, technology and ICT) to enable the full development of a knowledge society. Policy and the regulatory frameworks that direct, enable and link primary, secondary, TVET, tertiary education and STI tend to be in place. It seems that it is adequate implementation that is lacking.

Tanzania Vision 2025 is clear in its aspirations of Tanzania becoming a middle-income country by 2025 and it is widely recognized as the guiding document for government planning and policy formulation. Tanzania's overarching development policies, like the current NFYDP and the NSGRP II are good, sound policies that frankly acknowledge the current barriers to development and propose reasonable actions and budgets to overcome these. The National ICT Policy has been very recently updated to reflect changes in the sector and it too sets clear and reasonable targets. The various education sector development plans are also reasonably up to date and well constructed. What seems critically lacking is the ability to translate these policy intentions into action on the ground that translates into the intended outcomes.

This can largely be traced back to a lack of the relevant institutional capacity and knowledge in most key parts of the education, technology and STI sectors. The structures and institutions seem to be in place in theory but they seem, by and large, to be unable to translate policy intention into strategic operating plans.

High technology costs and a general lack of awareness and appreciation of the benefits of ICT investment and implementation as well as an understanding of how such investments can and should be made, especially in the education and STI sectors, are also playing a significant limiting role in preventing further development of the Knowledge Society.

So while the intentions are clear and much of the enabling high level policy framework is in place, Tanzania's continued development of the knowledge society is hampered by a lack of knowledge and capacity.

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## About GESCI

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

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

GESCI's mandate is to assist governments in the socio-economic development of their countries through the widespread integration of technology for inclusive and sustainable knowledge society development.

# Assessment of Knowledge Society Development in Tanzania June 2017

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